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PREFACE

EAPRIL is ...

EAPRIL is the European Association for Practitioner Research on Improving Learning. The association promotes practice-based and practitioner research on learning issues in the context of formal, informal, non-formal, lifelong learning and professional development with the aim to professionally develop and train educators and, as a result, to enhance practice. Its focus entails learning of individuals (from kindergarten over students in higher education to workers at the workplace), teams, organisations and networks. More specifically

- Promotion and development of learning and instruction practice within Europe, by means of practice-based research.
- To promote the development and distribution of knowledge and methods for practice-based research and the distribution of research results on learning and instruction in specific contexts.
- To promote the exchange of information on learning and instruction practice, obtained by means of practice-based research, among the members of the association and among other associations, by means of an international network for exchange of knowledge and experience in relation to learning and instruction practice.
- To establish an international network and communication forum for practitioners working in the field of learning and instruction in education and corporate contexts and develop knowledge on this issue by means of practically-oriented research methods.
- To encourage collaboration and exchange of expertise between educational practitioners, trainers, policy makers and academic researchers with the intent to support and improve the practice of learning and instruction in education and professional contexts.
- By the aforementioned goals the professional development and training of practitioners, trainers, educational policy makers, developers, educational researchers and all involved in education and learning in its broad context are stimulated.

Practice based and Practitioner research

Practice-based and practitioner research focuses on research for, with and by professional practice, starting from a need expressed by practice. Academic and practitioner researchers play an equally important role in the process of sharing, constructing and creating knowledge to develop practice and theory. Actors in learning need to be engaged in the multidisciplinary and sometimes trans-disciplinary research process as problem-definers, researchers, data gatherers, interpreters, and implementers.

Practice-based and Practitioner research results in actionable knowledge that leads to evidence-informed practice and knowledge-in-use. Not only the utility of the research for and its impact on practice is a quality standard, but also its contribution to existing theory on what works in practice, its validity and transparency are of utmost importance.

Context

EAPRIL encompasses all contexts where people learn, e.g. schools of various educational levels, general, vocational and professional education; organisations and corporations, and this across fields, such as teacher education,

engineering, medicine, nursing, food, agriculture, nature, business, languages, ... All levels, i.e. individual, group, organisation and context, are taken into account.

For whom

Practitioner researchers, academic researchers, teachers, teachers educators, professional trainers, educational technologists, curriculum developers, educational policy makers, school leaders, staff developers, learning consultants, people involved in organisational change and innovation, L&D managers, corporate learning directors, academics in the field of professional learning and all who are interested in improving the learning and development of praxis.

How

Via organising the annual EAPRIL conference where people meet, exchange research, ideas, projects, and experiences, learn and co-create, for example via workshops, training, educational activities, interactive sessions, school or company visits, transformational labs, and other opportunities for cooperation and discussion. Via supporting thematic sub communities 'Clouds', where people find each other because they share the same thematic curiosity. Cloud coordinators facilitate and stimulate activities at the conference and during the year. Activities such as organizing symposia, writing joined projects, speed dating, inviting keynotes and keeping up interest/expertise list of members are organised for cloud participants in order to promote collaboration among European organisations in the field of education or research, including companies, national and international authorities. Via newsletters, access to the EAPRIL conference presentations and papers on the conference website, conference proceedings, regular updates on cloud meetings and activities throughout the year, access to Frontline Learning Research journal, and a discount for EAPRIL members to the annual conference.

More information on the upcoming 2018 Conference as well as some afterglow moments of the 2017 Conference can be found on our conference website <http://www.eapril.org>.

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FEELING SAFE AT YOUR WORK, TEACHER?

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ABSTRACT

There is a prolific need for a discussion about safety and security even in the vocational schools in Finland now. The schools have faced threats outside but also inside and all of them leave marks on teachers and students. The main question here is with what causes this phenomenon of insecurity is connected. What have changed in our surroundings because we need plans for security, skills to meet aggressive students, we need to know when to escape or when to hide inside. I have made participatory reflections during the 6-credits-educational process where the teachers have discussed and learned about their daily lives in vocational schools considering the safety. In this article, I share my perceptions on the safety in vocational schools considering physical, psychological and social aspects. As a result of these perceptions, I will present a checklist for adding security and safety in vocational schools. As a conclusion, I hope to add discussion about the phenomenon of insecurity and unsafe in vocational institutes and the reasons for these phenomena.

THE BACKGROUND OF THE STUDY

Are you feeling safe at your work? Do you have a feeling of security and safety while working at your work place? In “good old days” we used to feel safe at Finnish schools because the teachers were highly respected and they were considered as authorities. But, in recent years something has happened. Things have changed even in the Finnish society although we have been so safe here far in the North.

We have had to start discussing the security even in the schools, in the educational institutes in Finland. In this article, the target is to contemplate why there is a need for discussion about safety and to propose what we should do to add the security in the educational institutes.



The data is collected during the course aimed for vocational teachers further education. The course was called "Safety and security for all in vocational education". It was arranged by Tampere University of Applied Sciences and financed by Finnish National Agency for Education during the year 2017. All in all, we arranged this course four times during the year for different kinds of target groups and for different kinds of needs. This course consisted of three modules of safety and three different views to theme: physical, mental and social. The participants were mostly teachers from the vocational institutes. They could earn 2-6 credits by participating on contact days and doing some "homework". In this article I deal with the course arranged in the spring 2017. There were totally 27 participants taking part in the three modules during that time.

TEACHING AND EDUCATION ARE IN TRANSITION BUT NOT ALONE

After every module I asked the participants the question: "Why must we discuss the phenomenon of security in educational institutes?" They had a possibility to write their opinions on the Padlet. The on-line Padlet was usable because everyone could see everyone's comments. Here are participants' comments to the question:

- Societal development
- Challenges in teachers' well-being
- Too narrow view to security
- Written plans or taken seriously?
- Should be everyone's business
- Changes in the society
- Respect for the security in everyday life or just one exit-training per year?
- Students have changed and are more demanding nowadays

According to the former studies (Helkama & Seppälä 2005; Kolbe 2004; Lehtinen 2005; Teikari 2003; Vesterinen 2012; Tapani 2013b, Tapani 2016) there are ongoing some changes in different sectors that I claim have some effects on risen need for safety discussion also in educational institutes. The changes in the society, families, education, working life, teaching and youngsters influence and challenge the habits in educational institutes. I will next shortly describe the main changes on these different sectors. This is a very surface level description. I have only taken some main lines like megatrends to notice if teaching and education, schools and educational institutes are connected to other sectors and have an influence on each other.

In *societal* level there has underwent a value transition: in the 1990's individualism overruled but in the 2000's it is said that the collectivism is arisen. Collectivism has



connections to safety: having networks means that a person has more social capital and by that he/she will feel more safe in the society. Family values are said to take place in western countries in response to individualism. Social capital is not purely a good thing (see e.g. Putnam 2000): it has some individual perspectives inside because to network and be part of some meaningful group takes time but it also takes time to earn living and take care of daily life. So, it is said that social capital will cumulate: those who have to work long hours do not have much time for networking and they do not have time for benefitting their contacts for taking new steps in their lives. Or sometimes they do not even have time for creating networks that would be useful for them.

Collectivism is also needed to handle the technological development. The new technological equipment are complex and obscure and learning to use the equipment needs shared expertise. Knowledge-based society is taken for granted but there is a need for critical evaluation. ICT-skills are valued high in present society, to be able to use different kinds of medias is an essential information society skill. Technology gives us the feeling of the control of the global environments but it is illusion because of the global quick changes.

There are also changes in *families* (Kolbe 2004). Since 1960's there was going on the construction of the modern well-fare state. Industrialization, construction of the service sector, well-fare and knowledge were main concepts in Finland then. Women activated in working life. The state intrudes to family sector by arranging e.g. day-care. The community of relatives was not taking care of elderly people at home but they were taken care in old people's home.

In the 1990's the feeling of insecurity and rootlessness rose: a child who manages on his/her own is the symbol of that time. During that time competitive spirit, believing in technology and materialism arose. In the beginning of the new millennium we started to play with the mobile phones. Children started to play in virtual spaces. Kolbe who studied the childhood asked who needs climbing frames in the gardens while children only play with computers? Finnish tradition of care and education was, and still is, in transition. School and home are getting competitors from several actors because of the new sources of information, like Internet. Teachers and parents need to think, whose information and knowledge really counts and is paid attention to.

What is the role and value of *education* then? There is a change in basic skills: children are not nowadays doing so much handwork as they did some years ago. The work itself has become more abstract and it has effects on career planning and motivation, also on commitment to studies. We can notice some educational and socio-economical segregation but also dichotomy among the students. Some students need a lot of support and encouragement for their studies, some are more self-directed. In the education we face the need for teaching and learning individual



but also communal skills. In the curriculum level there are questions like segmentation or integration or how to apply the knowledge into practice. The education should be a possibility for all: we talk a lot about educational equality but also strategies of the economy count. The educational policy controls the supply and demand of education: the educational institutes should afford the education that is needed and useful for the working life and companies. (Lehtinen 2005.)

In Finland we have also some special movements in educational sector (Lehtinen 2005): we have underwent one reform in 1980's when all vocational degrees were modified, then in 2018 we are facing a new reform and the degrees are then competence-based, not time-based (Reform of vocational upper secondary education). In 1990's we got a new actor in the education sector: universities of applied sciences (UAS). UASs fit for the Finnish educational system, but the identity is still missing; academic interest plays a big role but their speciality is to apply the knowledge and teach in a working-life oriented way.

Working-life has also changed (Teikari 2003): in the 1980's attention was paid to mental effects of one's work. It was noticed that to participate has an impact on well-being at work. In 1990's group work was the main thing and there was a strong belief that it will solve every problem. That time in working-life it was common to talk about the management of change. Because of the technological innovations it was possible to be on-line available 24 hours seven days a week. In 2000's we started to stress even more on networking and working in teams. There was also stress on academic education. Technological development also caused the possibility for virtualization of the public administration. It was easier to connect with the authorities by using Internet at any time of the day.

From 2010's we have started the trend of flexibility. There are quick changes in working habits and culture of trials is popular. Internal migration, mobility of educated labour has collected academics in bigger cities and towns. Now we also respect new professionals with workplace competences: they are persons that maybe have no formal education but a lot of competences like ICT, problem-solving, communication skills, team-work-skills. Informal skills are confessed gradually, although in Finland there still is a firm trust on certificates. New models of competency-based-learning that are gaining ground in vocational education and also in higher education will challenge the former teaching and learning habits. They will also cause some new questions to the safety: when a student can learn wherever he/she best can, in vocational education for example the work-placed learning plays a big role, so responsibilities, duties and safety themes must be revisited.

Every generation of *youngsters* has their own special characteristics (see Vesterinen 2012). They have different views to future, wealth, parents etc. In many cases the student and the teacher are representing different generations and this may cause



some troubles in understanding each other. For example, youngsters from generation Y (born 1980-1994) are described this way: If we ask them about future, they think: what future. Wealth is truism for them. They are not seeing their parents very often. The way of education for them is spontaneous, multiform. If we think about learning, their question is: WHY should I know this? They are so used to change that they demand it. In technology they are said to be masters. Commitment to work is very self-oriented: I quit if I can't get Friday off. They listen to and believe in colleagues who want to experiment. Of course this is a very category view to this generation, there are said to be 30 000-50 000 socially excluded in this generation, every day 5 persons are retired because of some illness, there are "second generation unemployed" persons in this group. Some of this generation study for many years. Some of them "sail" between work and studies, between work and unemployment etc. And then there are persons in this age group who are working five days a week or studying according to the curriculum.

We do not have not much research on generation Z (born 1995-2012). We know that the highly diverse environment they are growing up in will make the grade schools of the next generation the most diverse ever. The high level of technology will play a big role and there will be a need for customized solutions in every sector. They will be more Internet savvy and expert than their generation Y forerunners. (Generation X, Y, Z and the Others.)

Finally I want to point out some changes in *teaching*. At the preliminary stage (1960`s) teaching was like factory work and teachers treated persons like the masses. Teacher was in the lead, he/she used questions and answers -method, learning was sedentary job for students: students sat and learned. In 1960`s teachers isolated themselves in their classrooms. Teaching was a unique challenge for them and the profession was highly respected in the society. In 1970`s the management of the contents of teaching and didactic skills were the big things. Also human relations skills and keeping the social order became important. In 1980`s collegial working increased because the complexity of education increased. Teachers used their own skills and knowledge to solve the problems as long as they could but the amount of knowledge was increased dramatically. This meant a need for co-operative culture. Now there is a need to work in multiform networks. A lot of networking is needed also outside the vocational institutes. Questions like teaching as a good didactic skill, transfer the culture and strong mission to teach have got along the view of teaching as a profession.

In Table 1 I summarize this overview of changes described from different sectors. There are quite a lot of changes in different sectors. It is easy to notice some trends that are connected to each other and are affecting each other. For example in 1990`s there was a trend of individualism which is well connected to competitive spirit and teacher as an expert. In working-life there was a need to get these individuals to work



together so there was a need for group work. Group work was to solve the problems and it can be thought that this was a beginning for the new trend: collectivism in 2000`s. In 2000`s collectivism was an important thing and this may have arisen also from the family sector: the meaning of the family was obscured and the society had to take the role of the families. In teaching this can be seen as the task of upbringing. Teachers started to be also societal actors, not only experts inside the classrooms.

Table 1. A short overview of changes in different sectors in Finland 1960-2010

Time ...1960 -70	Society Industrialization, women activation (e.g. to work)	Family Modern well-fare state. The state intrudes to family sector	Education Comprehensive school	Working Life Machines help to work, spare time, health care	Youngsters Generation x (born 1965-1979)	Teaching Teachers isolated themselves in their classrooms; teaching was an unique challenge; treated persons like the masses 1970: management of the contents of teaching and didactic skills; also human relations skills; social order
1980	Economic boom, well- fare, data processing is still like "science fiction"	Computer games instead of playing outside, respect for food, vegetables became popular	The reform of vocational education, the raise of the educational level	Mental perspectives to work; to participate adds well- being	Generation y (born 1980-1994)	The complexity of education increased→ a need for co- operative culture
1990	In the beginning of the 1990`s recession; individualism	Insecurity, rootlessness, competitive spirit, materialism , faith in technology	Universities of applied sciences	Working in groups! Control of changes It is a virtue to be available 24/7	Generation i or z (born 1995-2009)	Teacher as an expert: knowing students, curricula, teaching arrangements , planning...
2000	Collectivism, seek for the safety, communality, ;	The meaning of the family is obscured:	Who will teach the communal skills?	Networking, team work, the emphasis on the	Generation i or z	Upbringing plays bigger role,



	the civil service creates virtual services	whose duty is to raise the kids/pupils Screen time, immobility, social segregation		academic education		teacher as an societal actor
2010	ICT, information society skills, complexity, obscurity, Feeling of the control via technology <-> quick changes		Educational segregation 2018: reform of the vocational education	Flexibility, quick changes, internal migration, educated labour is on the move vc. poverty, long- term unemployme nt	Generation? (born 2010-) "diginatives " ja "i-pad kids at desk"	Multiform communalitie s (more and more networking also outside)

(Tapani 2013a.; other references see text)

By this historical overview I want to make us to think if the education is an isolated island in the society or an affecting part of it, how much the educational sector reacts, how much it is an active actor. An important view to this theme is, if the education is something that affects the societal development. Or is it a service that works in the way economical, cultural and societal development wants? Is the education master or servant? I think this question also has to do with the safety: if the education only reflects the changes in the surroundings, the aspects from outside arrive to the educational institutes all of a sudden. But, if we listen to the silent signals, the signals from the teachers and then make the strategy of education according to them, we are more proactive and can also change the surrounding society and other sectors. Now it is time to listen to the voice of the participant teachers and pay attention to their notes of safety.

RESULT: THE CHECK-LIST

In this article the target was to contemplate why there is a need for discussion about safety and to propose what we should do to add the security in the educational institutes. During the spring time 2017 I had a possibility to take part as a participant observer to "Safety and security for all in vocational education" – course. I was the project manager in this project but I am not a safety expert at all, so I did not teach there myself. I made all the course arrangements and organized the experts to teach and share their expertise to the participants. We had two contact-day per theme and the participants did a lot of study in their own organizations considering the three aspects on safety. Then on contact-days we shared the perceptions. I was able to be there as a participant observer, listen to them, also take part in discussion. I made the check-list according to what I heard. Then I sent it in via email to the participants so they could comment on it. The list is divided in three themes like the main themes in this course were: the physical, mental and social point of view.



In physical safety we have things that have to do with the environments in vocational education, practicalities and other practical views. In mental view we focus on individuals: their well-being and individual skills to handle new situations that can cause anxiety. In the social safety we deal with multi-professionality and communality, how we can together survive and also help each other. It has also to do with self-knowledge and trusting one's intuitions in the community.

A. Physical safety (learning environment, practicalities)

1. Instructions must be available for all, everyone must know about the instructions and where to find help
 - for example who are members in the crisis group, how to reach them and when, updated plans
2. Everyone in the organization should be involved/committed in the safety plans
 - if you notice something is wrong or broken you know where to announce about it and also do the announcement
3. The safety plan takes into account the differences between the educational fields
 - not all knowledge is important for all but what is important in your field?
4. The attitude for safety
 - how to motivate participants for taking the safety questions seriously?
5. The orientation
 - newcomers, like new teachers and other staff, also part-time staff, must be orientated also to safety questions

B. Mental safety (well-being, individual know-how)

1. Distribution of work and responsibilities
 - everyone knows who does what; the organizational safety information is updated
2. Training
 - training in authentic conditions; also checking the know-how is scheduled
3. Well-being at work
 - take care of your well-being in different ways
4. Keep up the safety discussion
 - for example safety in social media must be discussed every now and then
5. Setting boundaries is to show you care
 - hold out the rules, act consistently, remember that you are an example yourself

C. Social safety (multi-professionality, communality, self-knowledge)

1. Social intelligence
 - calm down, let the dust settle, avoid provocation, remember the behavioural norms at work
2. Pay attention to the environment
 - prepare yourself; e.g exit-ways
3. Trust your feelings and intuition
 - recognize your absolute thresholds, make decisions consciously



4. Well-being at work community
 - affinity between the workmates but also the students. Remember that it is also permitted to be weak.
5. Focus on the basic task
 - teaching, guiding, networking; ensure and show that you care

DISCUSSION: SAFETY IS EVERYONE`S BUSINESS

The target was to propose what we should do to add the security in the educational institutes and to discuss why there is a need for discussion about safety. First about the need. As the participants wrote on the Padlet, the need for taking safety seriously is urgent. The safety is seen too narrowly and considered only as plans or one training of exit per year. During this course we have noticed how wide concept the safety is and we can also say that you will never be a master in it. The situation we face are so surprising. But we can train and try to be alert. According to the changes in society, working life, youngsters etc. we should be more proactive to notice the needs. Maybe by studying the trends, comparing the history of different sectors we could foresee what the future might bring and how we could be prepared for that.

I think an urgent need arises from the loneliness of students. From the 1990`s a child who manages on his/her own has been the symbol of our time. We support the individual development by giving possibilities to individual educational paths. There is a threat that self-direction turns to alone-direction. Hopefully this trend of education is not causing any safety problems in the future. As a vocational teacher educator I have noticed that even our adult teacher-students think that if they do not have a contact-day they are having free-time. They do not notice that they could do some studies by themselves. As a teacher I must tell them to do so. It is difficult even for them to be in the lead of their studies. So without guiding or support I think it is even more difficult to youngsters. As our participants mentioned, safety should be everyone`s business and should be taken into account also when the educational policy is made. According to identity theories a person needs peers to become what he/she is (Mead 1962). There is a task for us teachers to arrange peer-group exercises to our students who are studying and, hopefully, learning individually but not alone. I think new innovations for peer-learning are welcome for sake of everyone` safety.

The students have changed and are more demanding nowadays. This causes problems to teacher`s well-being. It is true that every generation has its own specialities and it may be difficult for the older generation to understand the younger and vice versa. This theme has arisen in many discussions with the vocational teachers and study counsellors. We offered also a course for better interaction between different generations: we used the youngsters as experience-experts and asked them to tell the participant teachers and study counsellors how they would like



to be treated and taught. One method for learning was shadowing: the participant teachers chose a colleague who is getting well along with students. These experiences were very good but there is only one challenge: teachers and study counsellors asked for the education but when it was offered, they had no time to attend. It concerns also this safety theme. I had to work hard to get enough participants to the course although this theme is said to be very important. These courses mentioned here are free of charge for the participants because they are funded by the Finnish National Agency for Education.

This leads us to the other question of this article: what should we do to add the security in the educational institutes. As mentioned before, the safety questions should be seen more widely and taken as everyone's business. If we take the checklist, we will find some concrete ideas: first of all, knowledge. Everyone should know about the safety instructions, know who are in charge and also have the attitude to take this knowledge seriously. The personnel do not have to know everything but must know what concerns his/her field. It is also an essential part of orientation of the newcomers. We had a lot of discussion with the teachers who taught only during the evenings. They had no idea about the safety systems. This kind of deviation in the safety system would be easy but also important to correct.

Then it comes to training: our participants told that the training is one exit-training per year. As we notice the safety is nowadays more than just being able to exit or hide. It is important to train different kind of authentic situations even with the students. The situation can be integrated to their field of studies so this training will at the same time add the safety-skills for the future workers.

Well-being is important to take care of and it has to do with the boundaries; we have to be aware of our skills and competences and be ready for asking help if needed. Keeping up the discussion for example about the safety in using social media is a theme where we can ask the students to teach each other and at the same us as teachers. I think the teachers could be more participatory in our teaching. As the former study (Vesterinen 2012) says, Y-generation in master in technology. Why try to master it by ourselves if there are person available who can handle it better? As we all know, by teaching others you learn most so why do not use this kind of teaching and learning method.

From the social point of view I would like to raise the intuition theme: if we "feel" that something is wrong we should pay more attention to that. Now we as teachers as often too subject-oriented and are pushing the feelings aside. As far as safety questions are concerned, this should be taken seriously. It is important that the whole community feels well: then it is possible to raise questions about the intuitive feelings and have also a permission to feel weak or tired. The responsibility of the community should be also to guide a colleague if the same person is feeling tired all



the time: maybe he/she should need some help outside. The community is taking care of its members and this also adds the feeling of safety.

Finally, a good hint for adding safety is to concentrate on the basic task. I think it is important to keep in mind that we are teachers, we can and must show that we care but our job is teaching, guiding, networking. Giving the possibilities for students to learn and develop, as human beings and future skilled workers. We must know our skills and capacity and if our skills are not enough, we should contact our networks and ask them to help.

All things considered, safety is everyone`s business. The need for the discussion arises from the close connect to the different everyday life sectors. We as educators and members of educational institutes are interacting all the time with the society, working-life, youngsters, families, educational development and teaching habits. We must try to affect also from our point of view to these sectors: to create better teaching methods and pedagogical affordances in order to add learning, reflect ourselves as teachers. Are we too keen on some habits that are out of date? Should we think more on the persons we are encountering, would they have something to share to each other? Safety things are small things in the daily life. According to this practical study, I wish we had some time to stop and rethink, what we are doing and why.

The things to add safety are not dramatic. Knowing the instructions is the cognitive part. The other parts are more like thinking, rethinking, discussing, reflecting the feelings and recognizing one`s skills and capacity. By these small things, we can add the security at our work but also among the students and the whole community.

REFERENCES

- Helkama, K. & Seppälä, T. (2005) *Arvojen muutos Suomessa 1980-luvulta 2000 – luvulle*. Sitran artikkelikokoelma. (translation: The change of values in Finland 1980-2000).
- Generation X, Y, Z and the Others. Retrieved from <http://socialmarketing.org/archives/generations-xy-z-and-the-others/>
- Kolbe, L. (2004) *"Joka vitsaa säästää, se lastaan vihaa" – koti asuntona ja perhe tunneyksikkönä*. <http://laurakolbe.net/sivut2004/Suomalainen%20ja%20eurooppalainen%20koti.htm>. Luettu 20.5.2013. (translation: Study on a family sector).
- Lehtinen, E. (2005) *Koulutusjärjestelmä suomalaisen yhteiskunnan muutoksessa*. Sitran artikkelikokoelma. (translation: Educational system in the change of the Finnish society).



- Mead, G.H. (1962) *Mind, Self, & Society*. From the Standpoint of a Social Behaviorist. Edited and with an Introduction by C.W. Harris. The University of Chicago Press.
- Putnam, R. D. (2000) *Bowling Alone: the collapse and revival of American community*. Simon and Shuster, New York.
- Reform of vocational upper secondary education*. Retrieved from <http://minedu.fi/en/reform-of-vocational-upper-secondary-education>
- Tapani, A. (2013a) *Teaching in Transition – Returning Back to Basics?* Presentation in Myths and Brands in Vocational Education, Tampere 14.-18.6.2013.
- Tapani, A. (2013b) Ammatillinen opettajankoulutus liikkeessä – kohti tulevaisuuden tuulia vai tämänpäivän toisintoa? Pro gradu -tutkielma. Tampereen yliopisto, Kasvatustieteiden yksikkö, Ammattikasvatus. <https://tampub.uta.fi/handle/10024/84945>. (translation: The vocational teacher education is on the move: towards new views or replaying the present ones?)
- Tapani, A. (2016) *Opettaja – oman tarinansa näkijä vai tekijä?* In TAMKjournal 7.4.2016, <http://tamkjournal.tamk.fi/opettaja-oman-tarinansa-nakija-vai-tekija/> (translation: Teacher as an actor or reflector?).
- Teikari, V. (2003) *Työpsykologian ja johtamisen perusteet*. Luennot 17.1.2003, Tampereen yliopisto, Hämeenlinna. (Lectures on psychology of work and leadership).
- Vesterinen, S-L. (2012) *Uusi sukupolvi opiskelijoina*. Luento 4.12.2012, Tampereen ammattikorkeakoulu. (Lecture on new generation as students).



I CAN TAKE IT BETTER COMING FROM YOU', - AN INVESTIGATION INTO PEER ASSESSMENT AND FEEDBACK AMONGST PGCE TRAINEE TEACHERS IN AN FE COLLEGE

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ABSTRACT

The overall aim of the project is to investigate the effectiveness of peer assessment and feedback as a teaching and learning approach for pre-service ITE trainee teachers. The conceptual rationale for peer assessment and peer feedback is that it enables students to take an active role in the management of their own learning. It is an element of self-regulated learning by which students monitor their work using internal and external feedback as catalysts. This study aims to investigate how effective is peer assessment and feedback in helping to develop the trainees' abilities to evaluate and self-reflect upon their own work and also their pedagogical approaches to AFL and teaching and learning in general.

STRENGTHS OF PEER ASSESSMENT AND FEEDBACK

There has been growing support for self- and peer assessment over the last three decades. Most of these studies indicate enhanced student learning outcomes (Bain, 2006), (Black and Wiliam, 2008), (Boud, & Falchikov, 2006 & 2007). Other research has shown that learners make more progress when they are actively involved in their own learning and assessment (Hattie and Timperley, 2007) and (Marzano, 2007). It has been suggested that self and peer assessment can have the following effects on learning:

- Enhance students' active engagement with their studies
- Increase the amount and the range of feedback students receive
- Augment learning as peer feedback invariably requires explanation and justification
- Gaining an ability to 'stand back' from own work for assessment purposes
- Help students understand what is considered good work and why, thereby increasing their ability to achieve. (Hanrahan & Isaacs 2001).



According to Black (2002) peer-assessment is uniquely valuable because students may accept, from one another, criticisms of their work which they would not take as seriously if made by their teacher. Peer work is also valuable because the interchange will be in language that students themselves would naturally use, and because students learn by taking the roles of teachers and examiners (Langan and Wheeler, 2003).

Boud and Falchikov (2007) suggest that by commenting on the work of peers, students develop objectivity in relation to standards which can then be transferred to their own work and this rich information can then be used by individuals to make their own self-assessments and follow up with actions to improve their work which can help them become more independent, self-critical and autonomous learners

Falchikov also argues peer assessment processes can help students learn how to receive and give feedback which is an important part of most work contexts. Peer assessment aligns with the notion that an important part of the learning process is gradually understanding and articulating the values and standards of a “community of practice” (Wenger, 1999, cited in Falchikov, 2001, p.129).

Cho et al. (2006) suggest that self assessment and peer-assessment help pupils to become more effective learners by enabling them to reflect on: their knowledge of themselves as thinkers and learners; their understanding of the task in hand; ways in which they can improve their learning. In doing so, it contributes to increased self-esteem, motivation and personal responsibility for learning. Other rigorous studies demonstrate improved thinking processes (Falchikov, 2001, Boud, et al. 1999; Hanrahan & Isaacs, 2001) and system awareness (Boud and Falchikov, 2007).

New learning strategies can be developed by scrutinising the work of others because it gives students a wider view of what is possible (Nicol and McFarlane--Dick, 2005). Exploration of others’ work allows students to see different ways of tackling the same task and, as a result, extending their own repertoire (James et.al. 2006)

Boud and Falchikov (2006) argue in some detail how peer assessment and feedback can be aligned with lifelong learning in general. The participants of the study reported the personal benefits to be improved self-confidence, praise and friendly support, confidentiality, mutual respect, and reduced stress. The benefits to their teaching included creative brainstorming and fine-tuning of lessons, resulting in improved organisation reparation, and delivery of lessons.

According to Race et al. (2005). students are continuously peer-assessing and setting up and facilitating peer assessment therefore legitimises and makes respectable something that most students are already engaged in. Learners becoming involved in peer assessment make the assessment culture much more transparent and they gain a better idea of exactly what will be expected of them in their efforts to demonstrate their achievement of the intended learning outcomes (Noonan and Randy, 2005).



WEAKNESSES OF PEER ASSESSMENT

Researchers are split over whether peer assessment possesses the same accuracy as teacher-based marking (Bain, 2006, Ngar-Fun and Carless, 2006, Boud et al. 1999). Some evidence suggests that students tend to over mark, or over praise work. According to Bain (2006) 94 % of participants indicated in their responses that they still had reservations about their peer's ability to mark work. This is supported by the work of Kilic (2016) who argued that students found that criticising their friends was difficult. His findings reveal that some students hesitate to grade their classmates and they do not feel comfortable when evaluating a fellow student

Some research suggests that students found grading to each other risky and unfair, and also doubted the objectivity of peer assessment (Stepanyan et al., 2009). Hanrahan & Isaacs (2001) findings also revealed that being objective is difficult for students and they do not feel comfortable when critiquing another student. Many students are not completely comfortable with feeding back work publicly, often preferring to remain anonymous when assessing peers (Nigel and Pope, 2005). This is particularly the case in relatively small, well-established groups (Foley, 2013).

Researchers have suggested a variety of solutions to the problem. Bain (2006) suggests that peer assessment should only be used as formative assessment. Boud et al. (1996) posit a different approach and recommend that instead of giving grades peer assessment should reward collaboration. Fun-Liu and Carless argue that the focus should be on peer feedback which has greater potential for learning than peer assessment because of the problems over the giving of grades (2006).

THE RESEARCH QUESTIONS

To what extent has peer assessment and feedback improved their ability to assess and to give and receive feedback?

To what extent has it developed their self-confidence, independence and self-direction as learners?

To what extent have their attitudes changed towards peer assessment and feedback after having undertaken it?

RESEARCH METHODOLOGY

The cohort of respondents consisted of 28 PGCE pre-service trainees on a full-time course. A central part of their programme is to develop teaching skills. This is achieved summatively during formal teaching observations in their placements and formatively via regular micro teaches sessions in front of their peers. Each trainee normally completed seven micro teach sessions over 14 weeks. Tutor and peer



feedback was always given but normally using only 'loosely structured' assessment criteria. According to Race (1999) one of the most effective ways to implement peer assessment is via presentation and thus I decided to use the micro teach sessions as a way of developing peer assessment and feedback in our PGCE sessions. (Curiously enough, I had been using peer assessment and feedback on a regular basis for several years when I teach Karate in order to support classes of over 30 plus learners but until recently never dared to use it with my PGCE groups.)

I had already worked with the group on the theory and practice of peer assessment and feedback for several sessions as part of their training in assessment so I was aware that they had a good understanding already of the processes involved and of my role as facilitator (Boud and Falchikov, 2007 and Van den berg, 2006)

Drawing on the work of Black et al. (2002), Race et al. (2005) and Bain (2006) I involved the trainees in the design process. The format of the assessment, peer assessment criteria and methods of feedback were negotiated and decided by the trainee group using some of the stages suggested by Race et al. (2005) including thought showering, prioritising and re-prioritising. It was decided collectively to run the sessions over 18 weeks rather than 14 to allow for extra time for self-evaluation after each micro-teach session.

It was also decided that each trainee would assess their peers micro-teach using the set summative assessment criteria and feedback in writing anonymously (Foley, 2013 and Nigel and Pope, 2005). They would not provide any kind of 'grade', however, in order to avoid the problems discussed by (Hanrahan & Isaacs, 2001). Fun-Liu and Carless (2006) and Kilic (2016) After each session each trainee would write a short self evaluation of their micro teach. In order to track whether trainees attitudes towards peer assessment were changing throughout the process, trainees were given a short survey to complete at the beginning and end of the 18 week cycle (Appendix B) to elicit their perceptions on their changing performances and the impact of peer assessment. (www.bsix.ac.uk/staff/research online).

At the end of research project the peer assessment and tutor assessment forms were taken in. Qualitative data was gathered from their individual self-evaluations produced after each micro teach session. These were coded using themes developed during initial analysis and used to support or contradict the results from quantitative analysis. Conclusions were also drawn from tutor observation notes which were similarly coded and analysed These were supplemented by verbatim notes made by me at the three weekly focus group meetings each trainee attended to discuss their experiences on the research project (De Geez et al. 2016).



ETHICAL ISSUES

The most important British Education Research Association (BERA) guidelines I have tried to follow are: Voluntary Informed Consent, Openness and Disclosure, Right to Withdraw, Detriment arising from Participation in Research and Privacy. I gave 28 PGCE a letter of consent to be signed by them. It outlined the research project, the limits of their involvement and their rights under BERA. Two trainees withdrew from the course and the research. The institution and the trainees have all been made anonymous and their pseudonyms have all been selected by them. This will also protect them from harm (BERA, 2011).

All the data generated from this research, including observation notes and focus group transcriptions were kept in a secure external hard drive and will be erased soon. (BERA, 2011)

I have tried to follow BERA's guidelines on openness by reading back my findings periodically to the trainees during focus group discussions in order to ensure that I have recorded their views accurately and fairly. When there have been disagreements, I have made appropriate amendments.

I have been mindful of the power relationships involved in the research and tried to minimise these issues by opening up the process of research as much as possible to their suggestions in order to empower my trainees. In doing so, I have tried to ensure that none of them have been affected negatively during the project (BERA, 2011).

FINDINGS

To what extent has peer assessment and feedback improved their ability to assess and to give and receive feedback?

An interesting outcome mentioned by some trainees was that peer assessment offered a clearer structure for students to observe, think and discuss the teaching of their fellow trainees and by implication, to understand better some of the issues faced by observers when they are being observed in their own placements: 'I think the whole research process has helped me to appreciate a lot more the difficulties that observers have when they come in to grade us. You have to make a lot of fine judgments on the spot and feed back in a way that is relevant and yet constructive.'

Many trainees believed that when peer assessment was employed using assessment criteria that was devised by themselves, the sense of ownership of the criteria helped them to apply their criteria much more objectively than when they were applying



tutors' criteria to each other's work. This confirms the findings of Bain (2009) and Fun-Liu and Carless (2006).

Cho et al. (2006), Boud and Falchicov (2006) and Van den berg, (2006) suggest that peer assessment and achievement as it helped students understand the marking process more clearly. This was confirmed by comments by some of the PGCE trainees. One trainee indicated that getting involved in peer assessment makes the assessment culture much more transparent, and thus trainees gain a better idea of exactly what will be expected of them to achieve their learning outcomes: 'I felt much more confident when I did these micro teaches than the ones before because I know exactly what the tutor was looking for and what I had directly to improve upon. Obviously it helped that we had originated the learning outcomes ourselves first.'

Researchers such as Black et al. (2002) and Falchicov (2007) argue the central importance of peer feedback in the assessment for learning process. Some of the trainees confirmed the importance of this by suggesting that peer assessment can give learners opportunity to clarify confusions or take criticisms more directly from a peer than they would a tutor (Boud et al. 1999, Black et al. 2002): 'Sometimes, you need the perspective of someone in exactly the same situation in order for it to make sense to you. More than that of an experienced tutor.'

To what extent has it developed their self-confidence, independence and self-direction as learners and teachers?

Many researchers have argued that one of the most powerful impacts of self-assessment has been upon students' self-direction as learners and sense of self efficacy (Barefoot et al. 2011, Topping, 1998, Race et al. 2005). This was confirmed by some of the trainees who felt that peer-assessment helped them to become more effective learners by enabling them to reflect on: their knowledge of themselves as thinkers and learners; their understanding of the task in hand and ways in which they can improve their learning. According to one trainee: 'I saw things and myself in three or even four dimensions'. For some, it developed their meta- cognition and in doing so, it contributed to increased self-esteem, motivation and personal responsibility for learning (Bostock, 2005): 'When I compared myself to other people, I used to think I was near the bottom of the class but the more practice I got the better about my own abilities I felt.'

In the context of their training as teachers the trainees reported the personal benefits to be improved self-confidence, praise and friendly support, confidentiality, mutual respect, and reduced stress (Nicol and McFarlane –Dick, 2005). One trainee said in a focus group session: 'I used to hate micro teaches with a passion. They were always much more stressful than teaching my own class. I felt that I was always being judged as a good or bad teacher by some people in the group...The more positive



peer feedback I got the more I came to realise that I wasn't doing so badly after all and that my teaching was improving over the year.'

Some of the trainees also identified the development of a greater sense of direction and responsibility to their peers which reflected the findings made by Langan and Wheeler (2003) and Noonan and Duncan (2005). One said: 'I know this sounds really bad but I always used to zone out a bit during micro teach sessions as I never felt properly engaged with them. Now I feel a lot more involved in them and feel a lot more confident about feeding back to people and helping them improve.'

Some trainees said that the micro teach sessions also benefited their classroom teaching and that new learning strategies could be developed by scrutinising the work of others because it gave them a wider view of what is possible (Bain, 2009). For example, one commented in a focus group that:

'I use the micro teach sessions to try things out in front of our group as I know that if they flop it doesn't matter that much. Some of my best ideas have come from experimenting in micro teaches.'

Killic (2016) argues that teacher education should enable pre-service teachers to develop the skills to critically examine the nature of teaching and that peer assessment training was an important aspect of this. Some of the PGCE trainees felt that successful self- and peer-assessment improved all three of the other key processes that were the focus of assessment for learning; developing classroom talk through questioning; feedback and sharing criteria (Black et al. 2002). One trainee clearly identified the connections when she said in a focus group: 'In a way, being a participant in this research (on peer assessment) has helped me gain a much deeper understanding of the purposes and functions of AFL as a whole

To what extent have their attitudes changed towards peer assessment and feedback after having undertaken it?

Initially, most of the trainees were sceptical of the effectiveness of peer feedback, especially in terms of its value and worth as a teaching technique which is consistent with the work of some researchers who have questioned the objectivity and credibility of peer feedback in their research (Hanrahan and Isaacs, 2001, Langan and Wheeler, 2003). My pre-research survey indicated that:

- 5 out of 24 trainees had used peer assessment and feedback with their own learners
 - 18 trainees said it was 'highly unlikely' or 'unlikely' they would use it in the future
 - Of those who had used it :
 - 4 said it had not contributed to teaching and learning in their classrooms.
- This was because the feedback tended to be:



- Excessive in praise
- Shallow
- Highly subjective and unstructured
- Of those who had never used it :
- The majority of them (12) felt that it would contribute ‘very little’ or ‘little’ to their learners’ achievements

During the research process there was some shifting of opinion. The post -research survey results indicated that:

- 10 out of 24 trainees had used peer assessment and feedback with their own learners
- 15 trainees said it was ‘highly likely’ or ‘likely’ they would use it in the future
- Of those who had used it :
- 9 said it contributed to teaching and learning in their classrooms
-

Impact of peer assessment and feedback on trainees’ teaching

According to the final survey the areas of teaching on which peer assessment and feedback had the clearest impacts were on

- ‘Creativity of approach and tasks’ where just under 25% of the group said it had helped them to improve ‘very much’ and just under 40% said ‘it helped them ‘much’
- ‘Meeting aims and learning objectives within the given time’ where just under 20% of the group said it had helped them to improve ‘very much’ and just under 50% said it helped them improve ‘much’.
- ‘Confidence in communication’ where 25% said it helped them improve ‘some’
- ‘Use of AFL’ where just under 50% said it helped them improve ‘some’
- ‘Pace of delivery’ where just over 40% said it helped them improve ‘some’

Many of them said they acted upon some of the peer feedback they received over the two months. Here are some of the comments made from the final survey:

‘I took on board comments about the pace of my speaking from the class and I think that I did improve a lot ‘.

‘Because of the rubric, the feedback was a lot more structured so I found some of it really useful.’

In addition, as trainee teachers some felt that peer assessment could help erode boundaries between teacher and students in the classroom and help create a stronger sense of community of learning (Boud and Falchikov, 2006):

‘ I think the whole process of peer assessment and feedback has brought the class together a lot more, broken up little cliques and helped create a sense of all ion this together – including the tutors .’



A key advantage cited was that in peer assessment trainees learn to work with colleagues in a way that they will do during their professional career and hence the experience was relevant to peer appraisal skills in future work settings (Boud and Falchikov, 2007). According to one trainee:

‘All teaching is a collaborate process so learning about how to give supportive and constructive feedback now is a good way of getting us into the right mind-set before we start our teaching careers.’

Echoing the study of Bain (2009) some suggested that the process has made them more mindful of the intricacies of assessment for learning and keener to extend their repertoire of formative assessment techniques:

‘I supposed I was agnostic towards peer assessment and just stuck to the basic assessment methods. Now I can see there’s a lot more involved in checking learning and I am trying things like peer assessment with my own students now.’

Some trainees were willing to give peer assessment and feedback a try in their own classes if it could be clearly linked with curriculum content and on-going teaching strategies so as not to confuse their students which was recommended by Black et al. (2002). Some argued that assessment can foster and serve as catalyst for peer learning, but only if it is consciously planned to be compatible (Nigel and Li, 2005): ‘If peer assessment is just bolted on as some kind of teaching gimmick there is no point in doing it.’

A few PGCE trainees still rejected the ‘idea’ of being judged by their peers outright, believing that their peers lacked both the knowledge and the experience to make assess their teaching which is reflected in the responses in the work of Cho et al. (2006). One trainee commented: ‘We’ve all been on the PGCE course for the same amount of time. What gives someone else the right to make judgments about my teaching?’

Another said:

‘I still haven’t changed my mind over it. I took the feedback with a pinch of salt. If I didn’t like the comments I just threw it in the bin’

Some researchers have questioned the objectivity and credibility of peer feedback in their research (Hanrahan and Isaacs, 2001, Langan and Wheeler, 2003). Topping (2009) specifies that bonds of friendship, sympathy or antipathy, or popularity of individuals can have an impact on peer assessment. Some PGCE trainees confirmed this anxiety by suggesting that at times both lecturers and students provided less helpful critical feedback or suggestions for improvement than positive features in the sessions, particularly in ‘good’ micro-teaches and thus they would have preferred a more constructive critical approach.

This is echoed in the focus group comment of one trainee:

‘People are too polite in this group. We are all so aware of hurting someone’s feelings or knocking someone’s confidence that we would never put down what we truly thought’, wrote one trainee. Another echoed the work of Wiliam (2009) and



wrote that ‘I could never work out how I could get to the next level from the feedback I got because it was never feed forward.’”

RECOMMENDATIONS

Student groups need a thorough grounding in the methods of peer assessment and feedback before it is introduced to them.

Peer assessment and feedback works more effectively when learners have a strong understanding of underpinning knowledge and skills of AFL.

Modelling exercises should be therefore be used to ensure that trainees have complete understanding of criteria used and taking the roles of teachers and examiners and of others.

The primary purpose of peer assessment should be formative.

The main objections to peer assessment and feedback can be overcome when it is clearly integrated into general teaching and learning strategies.

The issue of subjective marking can be overcome by anonymity which is also the preferred option for student groups in the literature (Foley, 2013, Falchikov, 2007). A strong community of practice needs to be developed and evident within the student group before peer assessment and feedback can take place effectively. This seems especially the case when groups are small.

All peer assessment activities and criteria should be negotiated /decided by student group as this can strengthen understanding of how a range of formative assessment functions.

Peer feedback needs to be done several times in order to test whether it shows greater expertise with practice. Trainees became better at peer assessment with practice in order to gain confidence in it and to become more competent at it.

Through participation and the development of a community of practice, trainees can develop stronger sense of identities as teachers with specific values, norms and professional behaviours which can help in their long term professional development.

REFERENCES

Bain, J. (2006) *Attitudes toward Peer Assessment in Initial Teacher Education Students: An Exploratory Case Study*. Goldsmiths: University of London.



- Barefoot, H., Fang, L. and Russell, M. (May 2011). Peer Assessment: Educationally Effective and Resource Efficient. *Blended Learning In Practice*, 2, 396-404.
- Black, P. (2002) *The Nature and Value of Formative Assessment for Learning*. London: King's College.
- Black, P. and Wiliam, D. (2008) *Changing teaching through formative assessment: research and practice*. The King's Medway-Oxfordshire formative assessment project.
- Bostock, S. (2005) *Student Peer Assessment*. HEA paper
- Boud, D. and Falchikov, N. (2007). *Rethinking assessment in Higher Education*. London: Kogan Page.
- Boud, D. and Falchikov, N. (August 2006). Aligning Assessment with long-term learning. *Assessment & Evaluation in Higher Education* .Vol. 31, No. 4, 399–413.
- Boud, D., Cohen, R and Sampson, J. (1999). Peer Learning and Assessment. *Assessment & Evaluation in Higher Education*, Vol. 24, No. 4, 69-90
- Langan, M and Wheeler, C. (February 2003). Can students assess students effectively? Some insights into peer-assessment. *Learning and Teaching in Action Vol. 2 Issue 1: Assessment*, 45-66.
- Cho, K.; Schunn, C., Wilson, D. and Roy, W. (Nov 2006). Validity and reliability of scaffolded peer assessment of writing from instructor and student perspectives. *Journal of Educational Psychology*, Vol 98(4), 891-901.
- De Grez, L., Valcke, M. and Roozen. I. (2013) How effective are self- and peer assessment of oral presentation skills compared to teachers' assessments? *Active Learning in Higher Education*, Vol 13, Issue 2, DOI: 10.1177/1469787412441284
- Kılıç, D. (2016). An Examination of Using Self-, Peer-, and Teacher-Assessment in Higher Education: A Case Study in Teacher Education *Higher Education Studies*; Vol. 6, No. 1; 90-120.
- Falchikov , N. (2001) *Learning Together - Peer Teaching in Higher Education*. London: Routledge.
- Foley, S. (2013) Student views of peer assessment at the International School of Lausanne *Journal of Research in International Education* Vol 12, Issue 3, 78-98
- Hattie, J. and Timperley, H. (2007). The Power of Feedback. *Review of Educational Research*. DOI: 10.3102/003465430298487



- Hanrahan, S and Isaacs, G. Assessing Self- and Peer-assessment: the students' views. *Higher Education Research & Development*, Vol. 20, No. 1, 2001, 97-114.
- Hughes, I. (2001) But isn't this what you're paid for? The pros and cons of peer and self assessment, *Planet*, 3:1, 20-23.
- James, M., Carmichael, P. Conner, C. Dudley. Fox, A. Frost, D. Honour, L., MacBeath, J. McCormick, R. Marshall, B. Pedder, D. Procter, R. Swaffield, S. and Wiliam, D. (2006). *Learning How to Learn Tools for schools*. London: Routledge.
- Nigel, K. Ll. Pope. (February 2005). The impact of stress in self- and peer assessment. *Assessment & Evaluation in Higher Education* Vol. 30, No. 1, 51-63.
- Kılıç, D. (2016). An Examination of Using Self-, Peer-, and Teacher-Assessment in Higher Education: A Case Study in Teacher Education. *Higher Education Studies*; Vol. 6, No. 1, 370-391.
- Marzano, R (2007). *The art and Science of Teaching*. Virginia: ASCD.
- Nicol, D and Macfarlane-Dick, D. (2005). Formative assessment and self-regulated learning: A model and seven principles of good feedback practice. *Studies in Higher Education*.
- Noonan, B and C. Randy, D. (November 2005) Peer and Self-Assessment in High Schools Practical Assessment. *Research & Evaluation Volume 10 Number 17*, 210-222.
- Nulty, D. A. (2001) *Guide to Peer and Self Assessment Approaches and Practice Strategies for Academics*. Griffith Institute for Higher Education.
- Race, P., Brown, S. and Smith, B. (2005) *500 Tips on Assessment* Second edition. London: Routledge.
- Sebba, J., Deakin, J., Crick, R., Yu, G., Lawson, H., Harlen, W. and Durant, K. (2008) *Systematic review of research evidence of the impact on students in secondary schools of self and peer assessment*. EPPI-Centre Social Science Research Unit Institute of Education University of London.
- Stepanyan, K., Mather, R., Jones, H. and Lusuardi, C. (2009). Student engagement with peer assessment : a review of pedagogical design and technologies in *Advances in Web Based Learning. Lecture Notes in Computer Science, Volume 5686* . Springer, 367-375. ISBN 9783642034251.
- Topping, K. (Fall 1998) Peer Assessment between Students in Colleges and Universities. *Review of Educational Research* Vol. 68, No. 3, 249-276.



Van den Berg, I. Admiraal, W. and Pilot, J. (February 2006). A Peer assessment in university teaching: evaluating seven course designs. *Assessment & Evaluation in Higher Education* Vol. 31, No. 1, DOI: 10.1080/02602930500262346.

Wenger, E. (1998) *Communities of Practice: Learning, Meaning, and Identity*. Cambridge University Press.



IDENTITIES AND MISUNDERSTANDINGS IN ORGANIZATIONS WITH CULTURAL AND GENDER DIVERSITY; THE EXAMPLE OF A COMPLAINT ABOUT AN INJUSTICE

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ABSTRACT

Attention to identity issues provides a useful perspective on communication and conflict in organizations with culturally diverse members. The focus on identities employed here refers to a sociological view that sees identity as a social construction. The diversity in organizations seems limitless, but race and religion alone mean much less than a fuller view of many intersecting influences. There are also diversities of gender identities and sexual orientation. All this diversity has the potential to enhance creativity and productivity in work or learning teams. At the same time, the possibility of intergroup misunderstanding and self-presentation issues detracting from effective problem-solving are a concern. The article considers a complaint about an injustice as an example problem to resolve.

INTRODUCTION

Many educators attend to personal development as a life-span process of discovery and reinforcement of an innate identity that ultimately accords with one's "true self" and potential. The idea of an unchanging personal essence was common among the Stoic philosophers; Chrysippus for one (Martin & Barresi, 2006, p. 27). Schachter and Rich propose that attention to an inner sense of identity can be exploited to help students engage with their studies in a meaningful way. They consider identity as a developmental issue of "dynamic self-understandings and self-definitions used to structure, direct, give meaning to and present the self, that are negotiated intra- and inter-personally across the lifespan within socio-cultural contexts..." (Schachter & Rich, 2011, p. 6). This definition of identity is of something people first set for themselves and then present in various ways to suit a given context.

For Geijssel and Meijers (2005, p. 423), identity is "the ever-changing configuration of interpretations that individuals attach to themselves, as related to the activities that they participate in". Here again identity is something people give themselves,



although it sounds more dynamic. Geijssel and Meijers agree with Charlotte Bühler that learning itself is an identity-changing encounter during a “boundary experience” (2005, p. 424).

Schachter and Rich’s notion of Identity Education (IdEd) promotes a personal and situated relationship with study materials and, as a point of departure, the validity of the approach is obvious. Geijssel and Meijers’ view of learning and the development of teacher’s professional identities are also very useful. Nonetheless, to better understand intergroup communication in diverse contexts, we will understand identities as social constructs layered over embodied selves and, provocatively, that there may be no “true” abiding self to discover. Of the Identity categories given by Verkuyten (2014, pp. 30-34), we are not interested in “Who am I?” since that is identification as labelling, nor are we interested in “How am I?” since that posits a discoverable true inner self. We are here concerned with Verkuyten’s “What am I?” since that is the social construction that, along with our physical nature, we argue determines the bulk of our identities.

It remains an open question how a human being would create an identity if it were possible to survive from birth in a state of isolation. As G.H. Mead puts it, we need others in order to take on roles and we need to conceptualize a “generalized other” in order to have a self (Mead in Aboulafia, 2001, p. 13). Our sense of self is initially conferred upon us by others, even if we later react against it.

To use the term “social construction” for identity, is to attempt to raise awareness of something that may seem given but is really contingent (Hacking, 2001, p. 6). Identity as employed here is more socially determined than the views employed with “IdEd” or “Identity Learning”. Identity will be taken to mean something that we, as animals, create for ourselves through the use of symbols, but not as a creation from a blank slate. The creation is spurred by social interactions—interactions with groups we belong to, that we wish we could belong to, that we are afraid of, that we want to differ from or that we allow to influence us for whatever reason.

As social actors, we do have some ability to think and act for ourselves, but this freedom is easily overestimated. The philosopher of mind, Daniel Dennett, felt it necessary to devote an entire book to the argument that freedom of action is still theoretically possible given the current state of scientific evidence to the contrary (2003). Biological, chemical, environmental, cultural, familial, and micro-social influences have an enormous impact on how we think and act, and on the identities we carry. The perspective on identity taken in this article acknowledges the powerful influence of our social environments, but still leaves room for social actors to make choices and at least negotiate their identities within their cultural setting. Seen this way, an approach such as IdEd does not only help students engage with class



material by making links to their current identity. If it has an impact, it will *alter* (and broaden) that student's identity.

CONFORMITY TO SOCIAL INFLUENCE

If this socio-constructivist approach is legitimate, we could expect to find neurological evidence to explain conformity. Conformity and reactions against our environmental influences (sameness and distinction) are, after all, the stuff of identity creation, so there should be evidence that our minds react to the ideas of others. The 1951 experiment of Solomon Asch surprised everyone when it found that over a third of participants were influenced by their peers to misjudge the length of a line. After seven confederate actors vocalized the same wrong answer to the question "Is this line the same length as lines A, B or C?" the eighth person was influenced to give an obviously wrong answer (Schnuerch & Gibbons, 2014).

Researchers in neuroscience have recently noted the error signal that results from disagreeing with others, and the discomfort this causes. They conclude that, due to the areas activated in the brain and the chemicals released, it is neurologically more pleasant to agree with our group. The arousal and negative affect of discord can provoke us to change our evaluations (Schnuerch & Gibbons, 2014). Feeling excluded or rejected by a group causes brain activity similar that of physical pain (Eisenberger et al., 2003, p. 291). Being dissonant with a group we like is uncomfortable. Being dissonant with a group we don't like negates the dissonance of opinion and is comfortable (Schnuerch & Gibbons, 2014, p. 468). Information received after an event can also change our memories. This is now thought to apply "even to negative traumatic events" which were earlier thought to be inviolable (Wright et al., 2012, p. 83). Thus, we do not always think for ourselves *after* an event. Even *before* we form an opinion, we are influenced by others in the way we perceive a stimulus. The front-end encoding of data tends to go with the majority response of the group we are in. This influence on perception holds true even when, after careful consideration and effort, people ultimately disagree with the group (Germar et al., 2016).

IDENTITIES

If our ability to perceive and evaluate is influenced in ways that are visible to neuroscientists, it adds weight to the socio-constructivist perspective that looks at how culture shapes our perceptions and circumscribes even the questions that we ask ourselves. And it is generally accepted that identity narratives of groups and individuals are the result of extremely selective memories (Lawler, 2008, p. 17). Using identity as a lens on social processes, then, accounts for much of our micro-social interactions. This includes *stability* when people react to us in similar ways



(reflecting an established identity), *change* when we start to elicit different responses because of changing age, health, or economic status, as well as change when we become influenced by *different* groups. Groups new to us are not always interested in our past or all aspects of the identities we bring to a new environment. Speaking of cultural groups and nations, the philosopher Charles Taylor observes that the recognition accorded to the minority group will either affirm their identity or deform it by an uncomprehending or negative evaluation (1995, p. 225). A similar observation can be made at the interpersonal level. Nicholson and others have found it awkward to transpose Taylor's political recognition to more personal forms of identity such as feminism, but that discussion is beyond the scope of this introduction to identity theory (Nicholson, 1996). Taylor did observe that we "end up relating to each other through a series of partial roles" (1989, p. 502) and that too is a useful perspective on the micro social.

In the case of gendered identities, it was in 1975 that West and Zimmerman started to work on the idea that gender is not something with a straightforward link to our biological sex, but is something that we "do" (2009, & 1987). Many researchers view genders as identities that require regular "doing" or performance to maintain. Masculinity, for example, can be seen as a "bottom-up process of constructing ... through various micro and macro social processes" such as language and symbolization (Addis et al., 2016, p. 82). An example of the use of language to maintain a certain masculine identity can be seen in some groups of working men where "male bonding often takes the form of sex talk and low-level sexual harassment" (Bradley, 2013, p. 115). Taylor agrees on "the fact that the self is constituted through exchange in language ..." (Taylor, 1989, p. 509).

Complaints and Identity Negotiation

With this view of identities as "produced between persons and within social relations" (Lawler, 2008, p. 8), we can consider the possibilities of misunderstandings in organizations with members of diverse cultural and gendered identities. One form of such a misunderstanding occurs when someone complains to an administrator about an injustice. The injustice may be about a questionable decision of an administrator. It may be about an institutional policy, or the interpretation of that policy. Or, it may be of a personal nature where emotions have arisen. The injustice may be linked to racism or sexism, but even if it is not, it is always about the identities of people who differ in some dimension or other.

In the case where feelings have been hurt, the complainant may say that there has been an isolated or systemic instance of bullying. Bullying (or mobbing) is a crude and cruel way in which some people attempt to enhance their standing or control a situation. The identity "message" is implicitly or explicitly about who is "in" or



dominant, and who is “out” or must conform. This holds true for cyber bullying which is often perpetrated by “social climber bullies” (Chibbaro, 2007, p. 66). The bully makes an identity statement about who they (gender neutral pleural pronouns will be used throughout) are, and who the victim is. If the method of a single bully is adopted by several people, as with scapegoating, the person who is “out” or nonconforming is *identified* as “the problem” and not fully as a person (Resch & Schubinski, 1996).

Faced with the complaint, the administrator might be expected to examine the facts of the case. Perhaps a decision was poorly made. Perhaps a policy is revealed to be unfair to employees or minority group members in the organization. While a certain amount of re-evaluation *may* occur, it is certain that the administrator will act to preserve their self-image and identity. This giving privilege to appearances over moral values was suggested by Goffman (Nizet & Rigaux, 2014, 97). Taylor (1989, p. 25) differs with Goffman on the lack of morals, but views this situation as a public actor’s competing for dignity.

Unless the administrator is among a minority that honestly see themselves as Machiavellian, they will approach the uncertainties of the complaint from the conviction that they, as an administrator, are a fair person. It is laudable to wish to be a fair person, but the problem is that we overestimate how fair we are (Messick, et al. 1985). If our organization, a policy we endorse, or a decision we have made, is called into question, it is uncomfortable to think of the implications of this for our self-image as a fair person. Yet if we are accountable, it is by virtue of a position held, and our identity has been invoked.

The “responsibility triangle” includes the event, any relevant prescriptions, and the identities of those involved as per their “role, qualities, convictions and as-pirations” (Schlenker et al., 1994, p. 634). Indeed, responsibility is seen to increase the more the linkages between the three elements are seen to be strong. The en-tire situation plays out before an audience of some kind. This may be an audience of observers in the organization, or one composed of more senior management. Even if the whole process of the complaint and its resolution involves only the complainant and the administrator, the administrator while “performing” the complaint resolution becomes their own audience as well (Goffman, 1956, p. 49). The administrator has to some extent internalized the expectations of parents, superiors, and community members; i.e. Mead’s internalized other. Mead (1967 (1934), p. 154) says that the “attitude of the generalized other is the attitude of the whole community”. Taylor’s (1994, p. 227) version is that “no one thinks totally alone ... I think with, sometimes also against, but largely at least in the terms offered by my community”.

Having the identity of the administrator called into question before this external or internalized audience can easily lead to a perverse outcome. Instead of leading to an



open re-examination of the complaint and its implications for a past decision or policy, it can lead a defense of the administrator's identity. The administrator, as we have seen, normally has a starting premiss that they are a fair person. Yet they can now feel a moral dissonance in the face of a complainant who alleges that an injustice occurred (Lowell, 2012). The dissonance is between the self-image as fair, and the event that the administrator is somehow implicated in, which was apparently not fair. This happens frequently because administrators who handle complaints tend to be more committed to equitable practices than the higher echelon executives who hire and instruct them (Lande et al., 1993, 501). Perhaps researchers will find a similar cognitive discomfort with moral dissonance as they found with nonconformity, as mentioned above. Alternatively, it may be concerns about agreement with and acceptance by an ingroup versus agreement with and acceptance by the complainant and their group that provoke the manager's distress. The easiest relief from this moral dissonance is to find an excuse for the event or a justification for the policy or decision. With that move, the problem can be left with the complainant to sort out for themselves. Worse, the move can go as far as to attribute a problem identity to the complainant as having provoked the issue, or as being a "squeaky wheel" that will not take their part of responsibility. Making the complaint a personal matter divorces the issue at hand from the larger legal and equity issues in which the complaint is em-bedded. Once the complainant is identified as the problem, the administrator has no reason to feel empathetic stress (Cooper & Scandura, 2012). Either way, the moral dissonance of the administrator is relieved. For Baumeister, the dissonance is always about self-presentation (1982).

Instead of an empathetic problem-solving, a re-examined decision, or an im-proved policy, then, the result can easily be a cycle of unresponsive administrative behaviors. The problem signaled by the complainant creates a) moral dissonance which is relieved by b) self-justification which convinced the administrator that they are above reproach, which leads to c) amplification of the pre-existing ap-proach (Lowell, 2012). In other words, the administrator does not question their identity, but may retain doubts about the complainant. The stress can be relieved and the self left unquestioned by the easy conclusion that what is required are the same policies and decisions, but in stronger and clearer terms – the "ampli-fication". All of this leaves the door open to a reoccurrence of the problem. And the more vulnerable the position of the administrator, the more likely they are to escalate their commitment to a failing policy (Tetlock, 1992, p. 346).

On the other side of the encounter, the complainant has their own identity issues. The move may be from productive employee to victim (or an adamant rejection of the victim label), or from valued team member to marginal survivor. The person may have had a "common affective tone" such as optimism or good humour that held for their professional and personal identities, but is now untenable (Swann et al., 2009, p. 16). The incident may unfairly highlight an aspect of the person's racial, cultural



or gender identity as problematic and a pretext for exclusion. These long-held identities may now cause tension with the person's professional identity. The person may no longer see the organization or the world in general as a safe place. Their identification with the organization and its mission may now be in question. For Goffman, this sort of conflict will bring the identities of both parties and the organization into question (1971, 343).

The greater the diversity of those involved, the more potential for misunderstanding abounds. In the case of race, the social constructionist view is useful. The alternative is "essentialism" or the idea that someone of a given race will have a predictable list of attributes--an approach will obviously not withstand scrutiny. A social constructionist view directs our attention to the ways that, for example, a gay African-American man from rural Alabama will have acquired a very different identity from a black female teacher from Dakar, Senegal or a black German-born accountant – their formative influences have nothing in common. Similarly, we learn very little if we are told that a new woman in our organization is Muslim and wears a head scarf. Is the hijab in question a protest against colonialism, against an *imposed* secularism (as it was for many in Tunisia under Ben Ali, or in spite of the ban in Turkey), part of a spiritual aspiration (true for many in Morocco and elsewhere), a possible indication of fundamentalism (as swept Algeria in the 90's), a way to keep a safe distance from men, or a simple cultural practice (Bennis, 2017)? Long-standing identities were formed at the intersection of *various* formative elements. The results are impossible to pre-judge based on race or religion alone.

Each person in this process, then, needs to learn more about the other's identity. The very nature of the perceived injustice causing the distress can link to assumed conceptions of fairness that are drawn from the communities of origin of administrator and complainant. Each person's view of what is moral has "some reference to a defining community" (Taylor, 1989, p. 36). The community of reference can impact minor yet upsetting questions such as directness or wording used in a conversation, how to disagree and assent, or what topics are considered appropriate or taboo in a given situation.

CONCLUSION

We are imagining an encounter between a person in an organization who has a complaint or a report alleging an injustice, and their administrator. One of the possible perspectives that can usefully be adopted is to see the encounter as an identity negotiation (Swann et al., 2009). Each party on entering the encounter desires to have their self-image confirmed by the other. Each person will make symbolic and linguistic gestures in an attempt to identify various positive aspects of themselves. Each person will have an aspect of their identity called into question.



The signals emitted by one and decoded by the other will be degraded when diverse identity issues, and the unshared assumptions that go with them, make understanding more difficult.

The administrator who is being pulled into the triangle of responsibility likely wished to preserve a self-image of being a fair person. The complainant may have a larger variety of identity issues, but these could easily include a distress about recognition because the administrator represents the organization. If the person's previous self-image was that of a productive and accepted team player, the injustice may have put that in question.

Both parties have "chronic" or long-standing identities from their communities of origin and their habitual ways of "doing" gender. When these are not shared, their "situated identities" in the organization are all the more crucial for their self-esteem and for their futures within the organization (Swann et al., 2009, p. 10). If the identity negotiation leads to an adequate understanding, we can expect a productive collaboration that also benefits from a broader diversity of perspectives.

One unexpected aspect of successful identity recognition is the role of negative identity issues and the recognition of weaknesses. Researchers have noticed that people prefer others to agree with their self-views, even when these views are negative. College students who view themselves negatively have expressed stronger intentions to live with roommates who share those negative views, and married couples have reported more satisfaction with spouses who confirm both positive and negative self-views. This preference for "identity congruence" does not include a short list of major attributes such as sex appeal, however (Swann et al., 2009, p. 4). The most productive working groups are those in which members feel that both their strengths and weaknesses are recognized. Recognition that is as accurate as possible does not deform, but, along with emotional warmth, empowers. Geijsel and Meijers's (2005, p. 420) call for "warm communication" and the place of authentic emotional expression is well-founded both for learning and for a salutary broadening of identities.

Future research and observation of identity issues in diverse workplaces and education institutions may yield new perspectives and practice suggestions for better intergroup communication and cooperation.

REFERENCES

- Aboulafia, M. (2001). *The cosmopolitan self; George Herbert Mead and Continental Philosophy*, Chicago, IL: University of Illinois Press.



- Addis, M. E., Reigeluth, C.S. & Schwab, J.R. (2016). Social Norms, Social Construction, and the Psychology of Men and Masculinity. Y.J. Wong & S.R. Wester, (Eds.), *APA handbook of men and masculinities* (pp. 82-96). Washington, DC : American Psychological Association
- Baumeister, R.F. (1982). A self-presentational view of social phenomena. *Psychological Bulletin*, 91(1), 3-26.
- Bennis, K. (2017). *Les monologues du voile; Des Québécoises se racontent*, Paris : Robert Laffont.
- Bradley, H. (2013). *Gender* (2nd ed.). Malden, MA: Polity Press.
- Chibbaro, J.S. (2007). School counselors and the cyberbully: Interventions and implications. *Professional School Counseling*, 11(1), 65-68.
- Cooper, C.D. & Scandura, T.A. (2012). Was I unfair? Antecedents and consequences of managerial perspective taking in a predicament of injustice. In Schriesheim et al., (Eds.), *Research in Management: Perspectives on Justice and Trust in Organizations*. (pp. 108-127). Charlotte, NC: Information Age Publishing.
- Dennett, D.C. (2003). *Freedom evolves*. Toronto, ON: Penguin Books.
- Eisenberger, N., Lieberman, M. & Williams, K. (2003). Does Rejection Hurt? An fMRI Study of Social Exclusion. *Science*, 302, pp. 290-292.
- Geijsel, F. & Meijers, F. (2005). Identity learning: The core process of educational change. *Educational Studies*, 31(4), pp. 419–430.
<https://doi.org/10.1080/03055690500237488>
- Germar, M., Thorsten, A., Voss, A. & Mojzisch, A. (2016). Social conformity is due to biased stimulus processing: electrophysiological and diffusion analyses. *Social Cognitive and Affective Neuroscience*, 11(9) 1449–1459.
<https://doi.org/10.1093/scan/nsw050>
- Goffman, E. (1956). *The Presentation of Self in Everyday Life*. Edinburgh: University of Edinburgh Social Sciences Research Centre.
- Goffman, E. (1971). *Relations in Public; Microstudies of the Public Order*. New York, NY: Harper Colophon Books.
- Hacking, I. (2001). *The social construction of what?* Cambridge, MA: Harvard University Press
- Lande, J., Edelman, L. & Erlanger, H. (1993). Internal Dispute Resolution: The Transformation of Civil Rights in the Workplace. *Law & Society Review*. 27, 497-534.
- Lawler, S. (2008). *Identity; sociological perspectives*. Polity Press: Malden, MA.



- Lowell, J. (2012). Managers and moral dissonance: Self justification as a big threat to ethical management? *Journal of Business Ethics*, 105(1), 17-25.
- Martin, R. & Barresi, J. 2006. *The Rise and Fall of Soul and Self; An Intellectual History of Personal Identity*. New York, NY: Columbia University Press.
- Mead, G.H. 1967 (1934). *Mind, self, & society; From the standpoint of a social behaviorist*. Charles W. Morris (Ed.), Chicago, IL: The University of Chicago Press.
- Messick, et al. (1985). Why we are fairer than others. *Journal of Experimental Social Psychology* 21, 480-500.
- Nicholson, L. (1996). To be or not to be: Charles Taylor and the politics of recognition. *Constellations* 3(1), 1-16.
- Nizet, J. et Rigaux, N. (2014). *La sociologie de Erving Goffman*. Paris : La Découverte.
- Resch, M. & Schubinski, M. (1996). Mobbing--Prevention and management in organizations. *European Journal of Work & Organizational Psychology* 5(2): 295-307. <https://doi.org/10.1080/13594329608414860>
- Schachter, E.P & Rich, Y. (2011). Identity education: A conceptual framework for educational researchers and practitioners. *Educational Psychologist*, 46(4), 222–238. <https://doi.org/10.1080/00461520.2011.614509>
- Schlenker, B.R., Britt, T.W., Pennington, J., Murphy, R., Doherty, K. (1994). The triangle model of responsibility. *Psychological Review* 101(4), 632-652.
- Schnuerch, R. & Gibbons, H. (2014). A review of neurocognitive mechanisms of social conformity *Social Psychology* 45(6), 466–478. <https://doi.org/10.1027/1864-9335/a000213>
- Swann Jr., W.B., Johnson, R.E. & Bosson, J.K. (2009). Identity negotiation at work *Research in Organizational Behavior*. <https://doi.org/10.1016/j.riob.2009.06.005>
- Taylor, C. (1989). *Sources of the self; The making of the modern identity*. Cambridge MA: Harvard University Press.
- Taylor, C. (1994). Charles Taylor replies. In James Tully, (Ed). *Philosophy in an age of pluralism; The philosophy of Charles Taylor in question*. (pp. 213-257). New York, NY: Cambridge University Press.
- Taylor, C. (1995). *Philosophical arguments*. Cambridge, MA: Harvard University Press.



- Tetlock, P.E. (1992). The impact of accountability on judgment and choice: Toward a social contingency model. *Advances in Experimental Social Psychology* 25.
- Verkuyten, M. (2014). *Identity and Cultural Diversity; What Social Psychology Can Teach Us*. New York, NY: Routledge.
- West, C. & Zimmerman, D.H. (1987). Doing gender. *Gender & Society* 1(2), 331-376.
- West, C. & Zimmerman, D.H. (2009). Accounting for doing gender. *Gender & Society* 23(1) 112-122.
- Wright, D.B., Busnello, R.H.D., Buratto, L.G., & Stein, L.M. (2012). Are valence and social avoidance associated with the memory conformity effect? *Acta Psychologica* 141 78–85.



DESIGN PROPOSITIONS FOR TECHNOLOGY- ENHANCED WORKPLACE LEARNING

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ABSTRACT

The goal of higher professional education is to enable students to develop into reflective practitioners, having both a firm theoretical knowledge base as well as appropriate, professional attitudes and skills. Learning at the workplace is crucial in professional education, because it allows students to learn to act competently in complex contexts and unpredictable situations. Reflection on learning during an internship is hard to interweave with the working process, which may easily result in students having little control over their own learning process while at work. In this study, we aim to discover in what way we can effectively use technology to enhance workplace learning, by synthesizing design propositions for Technology-Enhanced Workplace Learning (TEWL). We conducted design-based research which is cyclic in nature. Based on preliminary research, we constructed initial design propositions and developed a web-based app (software program for mobile devices) providing interventions based on these propositions. In a pilot study, students from different educational domains used this app to support their workplace learning. We evaluated the initial design propositions by carrying out both a theoretical and a practical evaluation. With the insights obtained from these evaluations, we developed a next version of the design propositions and improved the app accordingly. The research result is a set of design propositions for TEWL. For daily practice, the developed web-based app is available for re-use and further research and development.



INTRODUCTION

The goal of higher professional education is to enable students to develop into reflective practitioners, having a firm knowledge base with professional attitudes and skills. Becoming, being and remaining a professional is a choice and involves responsibilities, capacities and gains (Simons & Ruijters, 2014). Simons & Ruijters argue that professionalism is a self-chosen characteristic closely related to learning. Higher education should prepare students for this professionalism.

Learning at the workplace is crucial in professional education, since it allows students to learn to act competently in complex contexts and unpredictable situations. However, reflection on learning is hard to interweave with the working process, which may result in students having little control over their learning process while at work. In this study, we explore in what way technology can support learning in the workplace by offering support to create awareness of learning and the underlying learning process, as well as triggers to stimulate the learner to make decisions, and take actions, regarding their learning process.

THEORETICAL BACKGROUND

Workplace Learning

Billett (2001) describes the duality inherent to workplace learning. On the one hand, the workplace should afford opportunities to learn, for example by offering autonomy, a variety of tasks, engagement in knowledge sharing, etc. On the other hand, the learner has to choose to engage purposefully in the workplace by actively using the afforded opportunities to learn. This duality is also reflected in the term *supported participation*, recently coined by Nieuwenhuis et al (2017). Learning in the workplace is achieved by participation of the individual learner, but this learning should be supported in order to achieve the learning potential offered by the workplace.

According to Ruijters & Simons (2006), there are three main ways to learn in the workplace:

1. Practicing: learning experientially. This is mostly implicit learning taking place while performing work activities. This type of learning results in experiential knowledge and skills.
2. Researching: learning through inquiry. The learner acquires new knowledge and skills, often by explicit, self-directed learning. This type of learning results in new and explicit knowledge and skills.
3. Creating: learning through design. Developing a concrete product makes it possible to transfer knowledge and skills by creating something that can be



shared with others. This results in design knowledge, as well as insights into what is not known or possible yet.

To connect these three basic forms of learning in the workplace, it is necessary to reflect and connect learning experiences. It is essential to be(come) aware of one's learning and the underlying learning process to share the outcomes & improve their way of learning (Simons & Ruijters, 2014).

Workplace Learning in Higher Education

Learning in professional workplaces often is implicit in nature and results in tacit knowledge (Eraut, 2000). This makes it hard to explicate what is learned. In an effort to overcome this, educational institutes generally ask their students to set their own learning goals and reflect on them, to assess their workplace learning (Tynjälä, 2008). Achieving the full potential of workplace learning in higher education needs more profound study and a more elaborate design and integration of workplace learning in educational programs. The last decade this has been the subject of several studies (Billett, 2009; Nieuwenhuis et al., 2017) and theories have been developed on the pedagogy of workplace learning in higher education (Tynjälä, 2013; Zitter, Hoeve, & de Bruijn, 2016).

In higher education, workplace learning generally has three goals (Nieuwenhuis et al., 2017):

- 1) Orientation on professional practice;
- 2) Acquisition of professional skills; and
- 3) Participation in (future) community of practice.

Educators have to design support for learning in the workplace in a broad sense to achieve these goals. This implies a careful integration of workplace learning in their educational programs and corresponding learning environments.

A recent model to design such learning environments is the model of hybrid learning environments (Zitter et al., 2016); see Figure 1. In this model, learning processes are positioned according to two dimensions. Vertically, we see the dimension that positions learning processes on a spectrum from *Acquisition* to *Participation*. Horizontally, we see the dimension that positions the setting in which learning takes place on a spectrum from *Constructed* to *Realistic*. Pure workplace learning takes place in the lower right quadrant of *Realistic Participation*. However, to keep developing professionalism, learning processes should be triggered in the other quadrants as well. In this study, we focus on designing technology to support learning by learners that participate in realistic settings (workplaces) while making



connections to the other quadrants to enrich the workplace learning experience. These connections are illustrated by the dashed arrows in Figure 1.

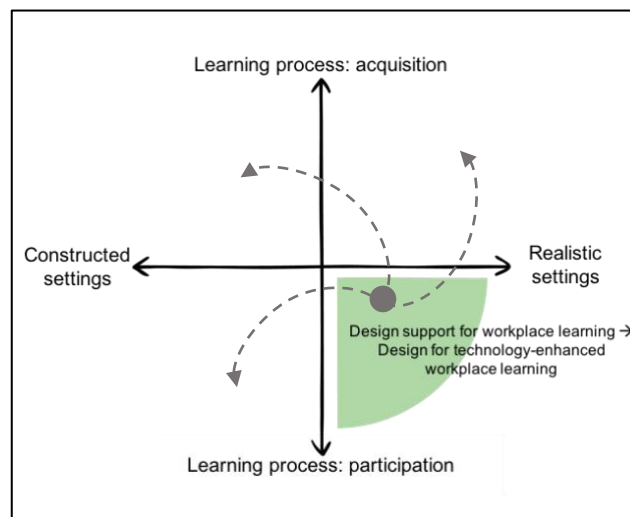


Figure 1: Hybrid curriculum model (Zitter, Hoeve & de Bruijn, 2016).

Technology-Enhanced Workplace Learning

The field of Technology-Enhanced Learning (TEL) studies the use of technology to enhance learning. In this study, we want to distil design knowledge on designing technological support for workplace learning.

In previous research, we identified two initial design principles for Technology-Enhanced Workplace Learning (TEWL): ease of technology use and technology-enabled surprise effect (van der Stappen & Zitter, 2016). Based on these results, we iteratively developed a prototype mobile application (app) together with ICT Bachelor students. This app provides data-driven personalized feedback and triggers feedforward to stimulate and facilitate increased awareness and reflection.

RESEARCH GOAL & QUESTION

This study aims to advance the domain of TEWL by synthesizing design knowledge in the form of design propositions. We cast these propositions in the form of CIMO-logic (Denyer, Tranfield, & van Aken, 2008), which describes that in a certain problematic context (C), an intervention (I) should be carried out, in order to trigger mechanisms (M) to achieve specific outcomes (O); see Figure 2.

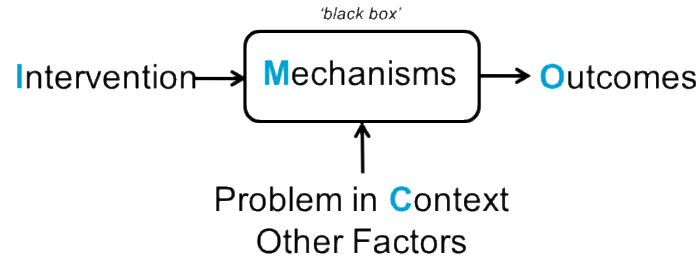


Figure 2: Illustration of CIMO-logic (adapted from (Andriessen & Kliphuis, 2011)).

Since reflection on learning is hard to incorporate into the working process, the number of TEWL tools is increasing rapidly. Our design propositions can guide practitioners and researchers designing and developing such tools. Tools based on these propositions will facilitate reflection and enable their users to increase control over their own learning process, which should ultimately result in improved outcomes.

As such, the main research question of this study is: *“Which design propositions can be formulated for technology that enhances workplace learning in higher professional education?”*.

METHODOLOGY

We take a design-based, cyclic research approach following Wademan’s Generic Design Research Model (van den Akker et al., 2007; Wademan, 2005); see Figure 3.

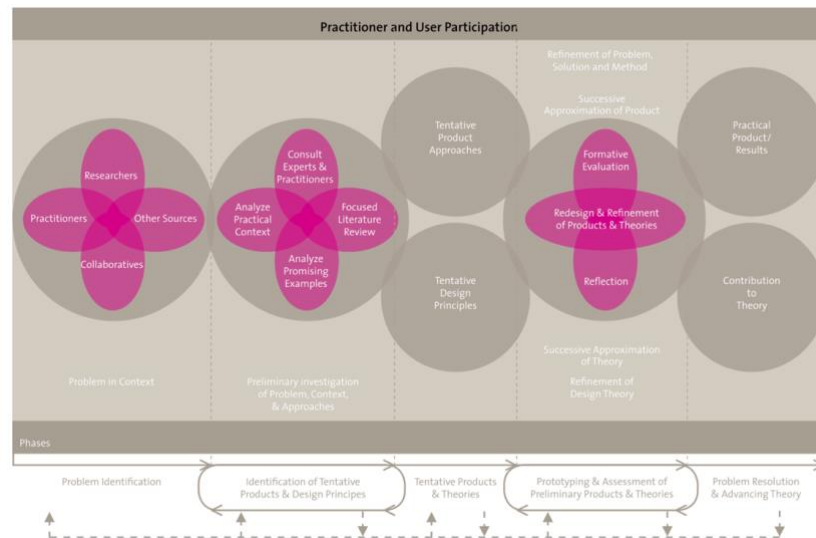


Figure 3: Generic Design Research Model (van den Akker, Bannan, Kelly, Nieveen, & Plomp, 2007; Wademan, 2005)

As mentioned above, based on preliminary research (van der Stappen & Zitter, 2016), we co-created a prototype app with ICT Bachelor students. Simultaneously, we constructed initial design propositions; the prototype provides interventions based on these propositions. These endeavours made up the first two phases of Figure 3 (*Problem Identification* and *Identification of Tentative Products & Design Principles*) and resulted in the Tentative Products & Theories depicted in the centre of the diagram.

Next, we conducted phases four and five of Figure 3 (*Prototyping & Assessment of Preliminary Products and Theories* and *Problem Resolution and Advancing Theory*).

In a pilot study performed in Spring 2017, 15 students from two different educational domains used the prototype. For practical validation, we used an online questionnaire. As one of the preliminary design principles was ease of use (van der Stappen & Zitter, 2016), we first measured the usability of the app. Usability can be defined as the degree to which a product or system can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use (ISO, 2011). To measure this construct, we adopted the widely used System Usability Scale (SUS; Sauro, 2011). In the same questionnaire, we asked the students to evaluate the initial CIMO-logic. Finally, a free text field was provided for other feedback and suggestions.



For theoretical validation, we used theory about workplace learning stipulating that even though a workplace might offer a positive learning climate, ‘individuals will decide how they will participate in and what they learn from what they experience’ (Billett, 2004, p.7). The design logic we propose is intended to facilitate and trigger individuals to make such decisions and ultimately *support participation* of the learner in the workplace (Nieuwenhuis et al., 2017).

RESULTS

Tentative Products

Over the course of six months, we simultaneously developed both the tentative product and theory. With a group of ICT Bachelor (Software Engineering) students, we co-created a mobile app. Meanwhile, the researchers developed the initial CIMO design propositions. As a result, we synthesized eight design propositions of which the first four were implemented in the mobile app; see Figure 4.

Design proposition	C	I	M	O
Awareness #1	Learner is submerged in working process and less aware of learning process	Easy way of registering learning activities with details (such as with whom, which theory, which problems, etc.)	Learner is actively becoming and staying aware of learning process	Learner builds awareness of learning process, which enables them to develop control over this process
Awareness #2	Learner is focused on work process, possibly not using learning potential	Provide clear overview of registered learning situations & activities	Learner is actively becoming and staying aware of learning process	1) Getting new ideas for learning actions 2) Knowing when to ask for support from colleagues or coach for these new ideas
Awareness #3	Learners don't know which subjects to discuss with the coach at work	Provide overview & analysis of registered learning situations & activities	Learner is actively becoming and staying aware of learning process	By having more insight into their own learning process, learners know when to ask support from the coach at work
Distanced coach	Coaching teachers are distanced and have little insight into learners' work	Provide coaches with an overview of working & learning activities	Coaching teachers gain detailed insight into their students' work	Coaches can give relevant & necessary coaching - in those areas the learners need it most
Using potential	Learners don't see which actions can utilize the learning potential in their workplace	Provide data-driven feedforward / triggering questions	Learners get stimulated to try new / other learning actions	Learner gains a broader repertoire of (learning) actions to use while working
Learning goals	Learners are having a hard time to formulate relevant learning goals	Give data-driven suggestions for (focus areas for) learning goals	Learners formulate data-driven learning goals together with coaches	Learners with learning goals that are more 'thought through' and linked to competences in which development is relevant
Reflection at fixed times	Learners only reflect on fixed moments, when asked by the university	Provide data-driven, just-in-time reflection questions	Learners reflecting at relevant times in the working process, when the experiences are 'fresh'.	More realistic and relevant reflections that are closely linked to experiences & functioning
Reflection aversion	Students are hardly motivated to reflect	Give data-driven suggestions for registered activities that are suitable for reflection and provide easy exports of these reflections	Learners reflect with less effort and start using reflection actively	More relevant reflections, which will enable learners to use reflection as a tool for professional development of learners

Figure 4: Initial design propositions.

Evaluation

As described above, we simultaneously performed both a practical and a theoretical validation of our tentative product (mobile app) and tentative theory (initial CIMO design propositions).



For practical validation, students from two educational domains (IT and Teacher Education) used the app during their work placement or internship. After ten weeks of using the app, we sent out a digital evaluation questionnaire to collect their opinions on both the usability and the proposed design logic. The students scored the prototype app on SUS with 65.8, which is marginally below the average SUS-score of 68 (Bangor, Kortum, & Miller, 2008; Sauro, 2011). This indicates that on the one hand, improvements should be made to increase the ease of use of the mobile app, while on the other hand the usability of the prototype is sufficient for students to evaluate the proposed design logic. Five of the seven initial CIMO-rules were recognized and valued by most of the respondents. The pilot participants also indicated valuable feedback in the open fields of the questionnaire, mainly suggestions to increase the usability.

For the theoretical validation, we carefully evaluated all initial design propositions against the theory about workplace learning indicated earlier (Billett, 2001, 2004; Simons & Ruijters, 2014). For example, let us observe the following initial design proposition.

Learning goals	Learners are having a hard time to formulate relevant learning goals	Give data-driven suggestions for (focus areas for) learning goals	Learners formulate data-driven learning goals together with coaches	Learners with learning goals that are more 'thought through' and linked to competences in which development is relevant

When evaluating this rule, we observed that the learner has a passive role in this rule. According to Billett (2001), the agency of the individual learner is a key aspect in workplace learning. Thus, we reformulated the rule to include a more active role for the learner.

Learning goals	Learners are having a hard time to formulate relevant learning goals	Give data-driven suggestions for (focus areas for) learning goals	Learners gain data-driven insight into their learning process, which is input to discussion on learning goals with their coaches/trainers	Learners with learning goals that are more 'thought through' and linked to competences in which development is relevant

We observe that with this set of design propositions, we aim to enable learners to increase their awareness of their learning process, which will eventually enable them to work (and learn) towards the three goals of workplace learning as recently stated by (Nieuwenhuis et al., 2017).

Consequently, based on the insights from both the practical and theoretical validation, we improved the design propositions to synthesize a next version of this logic; see Figures 5 and 6.



Initial CIMO-logic pilot study TEWL

Implemented for all students in pilot
Implemented for one educational domain in pilot study
Not implemented yet

Design proposition	C	I	M	O	Evaluation
Awareness #1	Learner is submerged in working process and less aware of learning process	Easy way of registering learning activities with details (such as with whom, which theory, which problems, etc)	Learner is actively becoming and staying aware of learning process	Learner builds awareness of learning process, which enables them to develop control over this process	57% positive Enhancement for app: Increase maximum size of text for reflection, add upload functionality for e.g. images.
Awareness #2	Learner is focused on work process, possibly not using learning potential	Provide clear overview of registered learning situations & activities	Learner is actively becoming and staying aware of learning process	1) Getting new ideas for learning actions 2) Knowing when to ask for support from colleagues or coach for these new ideas	67% positive Keep rule
Awareness #3	Learners don't know which subjects to discuss with the coach at work	Provide overview & analysis of registered learning situations & activities	Learner is actively becoming and staying aware of learning process	By having more insight into their own learning process, learners know when to ask support from the coach at work	100% positive Keep rule
Distanced coach	Coaching teachers are distanced and have little insight into Learners' work	Provide coaches with an overview of working & learning activities	Coaching teachers gain detailed insight into their students' work	Coaches can give relevant & necessary coaching - in those areas the learners need it most	36% positive Enhancement for app: Make sharing overview with coaches much easier

Figure 5: Evaluation of implemented CIMO-logic for TEWL.

Using potential	Learners don't see which actions can utilize the learning potential in their workplace	Provide data-driven feedforward / triggering questions	Learners get stimulated to try new / other learning actions and to exchange these ideas with peers	Learner gains a broader repertoire of (learning) actions to use while working	71% positive Reformulate rule
Learning goals	Learners are having a hard time to formulate relevant learning goals	Give data-driven suggestions for (focus areas for) learning goals	Learners gain data-driven insight into their learning process, which is input to discussion on learning goals with their coaches/trainers	Learners with learning goals that are more 'thought through' and linked to competences in which development is relevant	79% positive Reformulate rule
Reflection at fixed-times	Learners only reflect on fixed moments, when asked by the university	Provide data-driven, just-in-time reflection questions	Learners reflecting at relevant times in the working process, when the experiences are 'fresh'	More realistic and relevant reflections that are closely linked to experiences & functioning	50% positive Drop rule. Opinions differ largely. Subject to further research.
Reflection aversion	Students are hardly motivated to reflect	Give data-driven suggestions for registered activities that are suitable for reflection and provide easy exports of these reflections	Learners reflect with less effort and start using reflection actively	More relevant reflections, which will enable learners to use reflection as a tool for professional development of learners	93% positive Keep rule

Figure 6: Evaluation of not-yet implemented CIMO-logic for TEWL.

Finally, we analysed the open remarks with suggestions and feedback to conclude with the two most important app enhancements recommended by the students:

- Increase maximum word count for reflection; add upload functionality for e.g. images;
- Make sharing overview with coaches much easier.



We improved the app accordingly. In the figure below, screenshots of the app illustrate a sample of its functionality, based on the interventions from the proposed CIMO-logic.

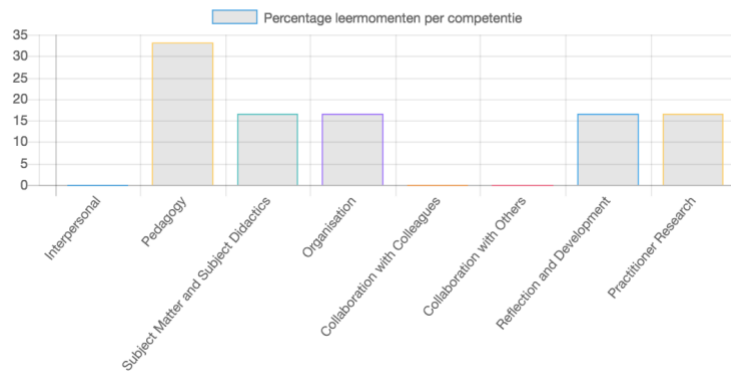
The screenshot displays the EAPRIL app's learning input interface. It features several sections for data entry:

- ACTIVITY**: Includes a date field set to '01-12-2017' and a calendar icon.
- SITUATION**: A large text area for describing the situation, with an 'Enlarge field' link at the bottom.
- CATEGORY**: A list of buttons for selecting a category, including 'No specific student group', 'H4A', 'Brugklas 1E', 'Anders (Toevoegen)', 'Workplace Coach', 'Fellow Student', 'Individually', 'University Coach', 'Leerlingen', 'Colleges vakgroep', and 'Other (Add)'.
- WITH WHOM?**: A list of buttons for selecting the person or group, including 'Workplace Coach', 'Fellow Student', 'Individually', 'University Coach', 'Leerlingen', 'Colleges vakgroep', and 'Other (Add)'.
- WITH WHAT THEORY?**: A list of buttons for selecting the theory, including 'None', 'Internet', 'Book/Artikel', and 'Anders (Add)'.
- WHAT DID YOU LEARN? WHAT IS NEXT?**: A text area for describing learning outcomes, with an 'Enlarge field' link at the bottom.
- WHAT DO YOU NEED FROM YOUR WORKPLACE?**: A text area for describing workplace needs, with an 'Enlarge field' link at the bottom.
- WHAT DO YOU NEED FROM YOUR SCHOOL?**: A text area for describing school needs, with an 'Enlarge field' link at the bottom.
- LEARNING QUESTION**: A dropdown menu for selecting a learning question, currently set to 'Unplanned learning mc'.
- COMPETENCE**: A dropdown menu for selecting a competence, currently set to 'Interpersonal'.
- COMPETENCES EN INDICATORS**: A section for selecting competences and indicators.
- EVIDENCE**: A section for selecting evidence, with a 'Choose file' button and a 'No file chosen' status.
- Save**: A blue button to save the entered data.

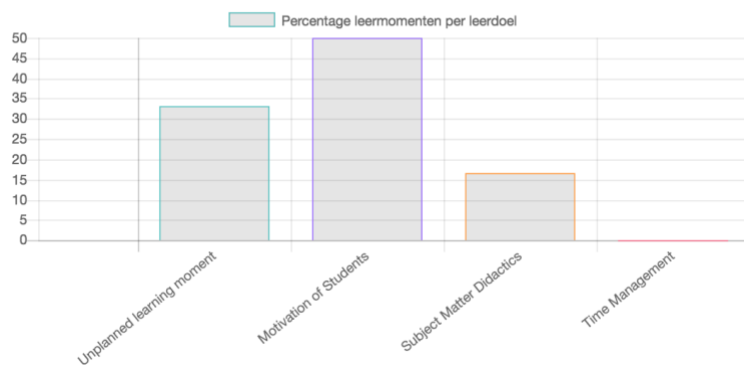
Figure 7: Screenshot of learning input functionality of the app.



GRAPH COMPETENCIES



GRAPH LEARNING GOALS



TIPS

Hint 1: Like tip

For 100% of your learning moments you don't use any theory. Maybe you don't know exactly which theory could be useful? You could ask for support from your coach. Maybe they can suggest specific theory that might help you.

Figure 8: Screenshots of analysis and data-driven feedforward functionality of the app.

CONCLUSIONS

We constructed design knowledge for TEWL, cast in the form of a set of CIMO-logic design propositions. Tools based on these design propositions will facilitate reflection and enable their users to increase control over their own learning process, which should ultimately result in improved learning outcomes.



The design propositions are based on theory about workplace learning and have been improved after a practical and theoretical evaluation in a pilot study in two different educational domains. The design propositions are geared towards known problems of learning at the workplace, such as, learners being submerged in the working process and being less aware of his/her learning process.

We also developed a web application, consisting of a set of interventions from the CIMO-logic, which might contribute towards learners overcoming such known problems. For daily practitioners, researchers and TEWL-developers, this application is published as open-source software on GitHub (HU Institute for ICT, 2018), for re-use and further research.

DISCUSSION

We have constructed a set of design propositions, improved after evaluation in practice within two educational domains. Although the two domains we considered – Information and Communication Technology and Teacher Education – are quite different from each other, we cannot be certain that our design knowledge is applicable to all other educational domains. Further study on the design of TEWL in other educational domains is needed in order to pursue our goal of generalised TEWL design knowledge.

There is a broad knowledge base on workplace learning and of course we could not incorporate all existing theories in this study. Also, new research on workplace learning appeared recently (e.g. (Nieuwenhuis et al., 2017)). Future studies extending our theoretical evaluation can thus elaborate the presented design knowledge. We believe that adding new theories to the theoretical evaluation can both deepen and broaden our set of design propositions.

Implications on Research and Practice

Prescriptive design knowledge for Technology-Enhanced Workplace Learning is scarce. Our research results add to this knowledge base by proposing design propositions in the form of CIMO-logic. This knowledge is generic in the sense that it transcends individual tools or technologies for workplace learning.

The design propositions can be used to develop other technological tools to enhance workplace learning. The developed app itself may be re-used or developed further. It is also available for immediate use, for which we ask to reciprocate in the form of evaluation data.



In the near future, this app will provide us with (large amounts of) data about the learning process of our students in the workplace. A next step is to develop a dashboard that presents this data in an insightful way to individual practitioners or entire educational institutes. This could be a step towards Workplace Learning Analytics in higher education, which is an emergent field of research (Ruiz-Calleja, Prieto, Ley, Rodríguez-Triana, & Dennerlein, 2017).

Another next step is to design & develop interventions that support the coaching process for teacher coaches and work coaches. CIMO-logic again seems a suitable approach to synthesize design knowledge on technological support for coaching processes in workplace learning.

REFERENCES

- Andriessen, D., & Kliphuis, E. (2011). Het gebruik van CIMO/logica om kennis expliciet te maken. In J. van Aken & D. Andriessen (Eds.), *Handboek ontwerpgericht wetenschappelijk onderzoek. Wetenschap met effect* (pp. 329–344).
- Bangor, A., Kortum, P. T., & Miller, J. T. (2008). An Empirical Evaluation of the System Usability Scale. *International Journal of Human-Computer Interaction*, 24(6), 574–594. <http://doi.org/10.1080/10447310802205776>
- Billett, S. (2001). Learning through work: workplace affordances and individual engagement. *Journal of Workplace Learning*, 13(5), 209–214. <http://doi.org/10.1108/EUM0000000005548>
- Billett, S. (2004). Workplace participatory practices: Conceptualising workplaces as learning environments. *Journal of Workplace Learning*, 16(6), 312–324. <http://doi.org/10.1108/13665620410550295>
- Billett, S. (2009). Realising the educational worth of integrating work experiences in higher education. *Studies in Higher Education*, 34(7), 827–843. <http://doi.org/10.1080/03075070802706561>
- Denyer, D., Tranfield, D., & van Aken, J. E. (2008). Developing Design Propositions through Research Synthesis. *Organization Studies*, 29(3), 393–413. <http://doi.org/10.1177/0170840607088020>
- Eraut, M. (2000). Non-formal learning and tacit knowledge in professional work. *British Journal of Educational Psychology*, 70(1), 113–136. <http://doi.org/10.1348/000709900158001>
- HU Institute for ICT. (2018). GitHub Repository Prototype App. Retrieved from <https://github.com/HUInstituteForICT/workplacelearning>



- ISO. (2011). ISO/IEC 25010:2011(en). Retrieved January 9, 2018, from <https://www.iso.org/obp/ui/#iso:std:35733:en>
- Nieuwenhuis, L., Hoeve, A., Nijman, D.-J., & van Vlokhoven, H. (2017). *Pedagogisch-didactische vormgeving van werkplekleren in het initieel beroepsonderwijs: een internationale reviewstudie*. Retrieved from https://www.nro.nl/wp-content/uploads/2015/09/reviewwerkplekleren_405-15-710.pdf
- Ruijters, M. C. P., & Simons, R.-J. (2006). Het leerlandschap van organisaties. *Develop*, (2), 54–63.
- Ruiz-Calleja, A., Prieto, L. P., Ley, T., Rodríguez-Triana, M. J., & Dennerlein, S. (2017). Learning Analytics for Professional and Workplace Learning: A Literature Review. In *EC-TEL 2017, LNCS 10474* (pp. 164–178). Springer International Publishing AG 2017. http://doi.org/10.1007/978-3-319-66610-5_13
- Sauro, J. (2011). MeasuringU: Measuring Usability with the System Usability Scale (SUS). Retrieved April 11, 2017, from <https://measuringu.com/sus/>
- Simons, P. R.-J., & Ruijters, M. C. P. (2014). The Real Professional is a Learning Professional (pp. 955–985). Springer, Dordrecht. http://doi.org/10.1007/978-94-017-8902-8_35
- Tynjälä, P. (2008). Perspectives into learning at the workplace. *Educational Research Review*, 3(2), 130–154. <http://doi.org/10.1016/j.edurev.2007.12.001>
- Tynjälä, P. (2013). Toward a 3-P Model of Workplace Learning: A Literature Review. *Vocations and Learning*. <http://doi.org/10.1007/s12186-012-9091-z>
- van den Akker, J., Bannan, B., Kelly, A. E., Nieveen, N., & Plomp, T. (2007). An Introduction to Educational Design Research. In T. Plomp & N. Nieveen (Eds.), *Proceedings of the seminar conducted at the East China Normal University*. Shanghai, China: SLO • Netherlands institute for curriculum development.
- van der Stappen, E., & Zitter, I. (2016). Exploring Design Principles for Technology-Enhanced Workplace Learning. In *29th Bled eConference: Digital Economy* (pp. 472–478). Bled, Slovenia. Retrieved from [https://domino.fov.uni-mb.si/proceedings.nsf/Proceedings/09D2882CFD2A6C2EC125800D00482C2E/\\$File/3_vanderStappen.pdf](https://domino.fov.uni-mb.si/proceedings.nsf/Proceedings/09D2882CFD2A6C2EC125800D00482C2E/$File/3_vanderStappen.pdf)
- Wademan, M. (2005). *Utilizing development research to guide People Capability Maturity Model adoption considerations. Instructional Design, Development and Evaluation - Dissertations*. Syracuse University. Retrieved from



http://surface.syr.edu/idde_etd/12

Zitter, I., Hoeve, A., & de Bruijn, E. (2016). A Design Perspective on the School-Work Boundary: A Hybrid Curriculum Model. *Vocations and Learning*, 9(1), 111–131. <http://doi.org/10.1007/s12186-016-9150-y>



INTEGRATING VISUAL ART, GEOMETRY AND CREATIVITY FOR PRIMARY SCHOOL TEACHERS: A PD TRAJECTORY

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ABSTRACT

Crossing boundaries between (traditional) school subjects is considered typical for 21st century learning. However, many Dutch primary schools focus their teaching on mathematics and language, without much references to other school subjects. The current project developed a PD trajectory for visual art, mathematics and creativity, partly based on a PD trajectory developed by Museum Boijmans Van Beuningen, where mathematics and language is connected to visual arts and creativity in teaching. In this initial PD trajectory mathematic learning was treated as an implicit element of creativity in teaching, and focussed on primary school students' free problems exploration. This turned out to be a good starting point for a more explicitly mathematics-focused training, with visual arts and creative research as starting point. A redesign was needed, which was realised in a design study. The research question in this study was: How could this redesigned PD trajectory for primary school teachers for integrated teaching of visual arts, geometry and creativity be optimized? Main findings of this study include that the redesigned PD trajectory should continuously regard contexts from the viewpoint of art, geometry and creativity, should learn teachers to also focus on mathematical language when describing art and should explicate different aspects of creativity.



INTRODUCTION

Context

In 2012 the Rotterdam Museum Boijmans Van Beuningen noticed a decrease in the number of primary school students visiting the museum. Other institutions in the city had the same experience. Teachers and management from schools pointed out that the falling numbers of visiting students was a consequence of a new education policy from the Municipality of Rotterdam (Gemeente Rotterdam/Rotterdamse schoolbesturen, 2011). This new policy was motivated by test scores for students in Rotterdam. These average standardized test scores ('CITO') was five points behind the national average (on a scale between 500 and 550 points), and the municipality wanted to tackle this with a stronger focus on language and numeracy. As a result, many schools neglected cultural education and museum visits, in order to devote more time to language and maths.

All the more reason for the museum to take its responsibility within this social development. The museum educational staff is convinced that language, numeracy and art are not separate worlds but can complement and supplement one another, and that the museum can be a rich learning environment, also for learning language and mathematics. In a three-year project (the Boijmans Language and Mathematics Programme) the museum educational staff together with two primary schools, the Fridjof Nansenschool in Rotterdam and De Taaltuin in Schiedam, and the artist Wolf Brinkman explored opportunities and possibilities for crossovers between art, maths and language (Schreuder, 2013; Brinkman, Miedema, & Schreuder, 2017). Museum, artist and schools considered many situations and themes where language/numeracy and arts overlap, for example geometric art and perspective in painting, experiencing that there were many of those situations and themes. But even more surprising was that mathematics learning is supported by skills and competencies that can be readily developed through art, like inquiry based learning, focus on learning process, and creativity.

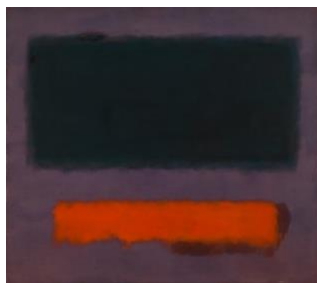


Figure 1. Mark Rothko. Grey, Orange on Maroon, no. 8, 1960 (collection Museum Boijmans Van Beuningen)



In one of the activities in the Boijmans Language and Mathematics Programme students for example investigated a painting by Mark Rothko on materials, size, forms and proportions, and discovered in their own way and by helping each other how the painting could be copied in exactly the same size and colours (fig. 1).

Among the products of the Boijmans Language and Mathematics Programme were new museum lessons and teaching materials for the classroom (Museum Boijmans Van Beuningen, sd; Brinkman, Miedema, & Schreuder, 2017). Many teachers and schools showed interest in these materials, but the museum noticed that many teachers had difficulty translating them to their classroom situation. Therefore the museum educational staff developed a training programme to enable teachers to apply these lesson methodologies and integrate them in their daily practice.

In 2015 the museum joined forces with the organiser of the Big Mathematics Day – Educational Development and Training, Utrecht University – to organise that year's Big Mathematics Day, which focussed on connecting arts and mathematics (Keijzer, 2015). Both the museum and Educational Development and Training were exploring new ways of teaching mathematics. The museum and the university decided to work together and to use the developed museum training as the basis for the joint project, the MACE-project (Math, Arts and Creativity in Education), that aimed at integrated teaching and learning of geometry, arts and creativity (MACE Project, UU, 2017).

The MACE-project

As indicated, the MACE-project is based on activities in two other projects, namely the Big Mathematics Day (Keijzer & Verschure, 2011; Keijzer, 2015) and the Boijmans Language and Mathematics Program (Brinkman, Miedema, & Schreuder, 2017). The Big Mathematics Day offers inquiry based mathematics lessons for primary schools. The Boijmans Language and Mathematics Program shows how an art museum can form a rich context for language and mathematics learning. These activities form the base for (1) the developed MACE teaching sequence in which geometry education and visual arts education are integrated and (2) the development of a professional development (PD) trajectory in which the integration between mathematics, visual arts and creative problem solving are central concepts.

Central to the MACE-project is the promotion of students' creative problem solving abilities. Research questions in the project focus on the effects of the teaching sequence on the students' development in creative problem solving, math and visual art. Furthermore research questions focuses on the effects of a PD trajectory in the form of teachers' skills to promote students' creative problem solving, math and visual arts development (Schoevers & Kroesbergen, 2017).



The focus in this paper is somewhat different. We here reconstruct the development of the PD trajectory in the MACE-project. Elaborating on the design work we concluded that developing this trajectory could well be considered as being a creative process that is similar to the creative processes aimed at for teachers and students.

BACKGROUND

Integrating geometry and visual arts

Many educators consider integrated curricula, where school subjects are intertwined and connected, as being typical for future learning (PlatformOnderwijs2032, 2016). Integration can be established on several levels, where in the most integrated curricula specific structures for domains are no longer visible (Gresnigt, Taconis, Van Keulen, Gravemeijer, & Baartman, 2014). In the MACE PD trajectory two domains are integrated, namely mathematics and visual arts. Integration is perceived as changing perspective within one context from mathematics to visual arts and the other way around (Hotze & Keijzer, 2017). Stimulating creativity serves as a linking pin, as it is an aim in both perspectives. By thus changing perspectives within one context, learning is connected (Akkerman & Bakker, 2011). One prominent aspect of integrating different domains is the use of a domain specific language, with domain specific words and expressions. When changing perspectives within a context, the language changes accordingly in a sense that different words are used in describing situations and some words or expressions will get new meanings (Keijzer, Smit, Bakker, & Munk, 2016).

The mathematics domain that is selected in the MACE-project is the domain of geometry (Schoevers, Kroesbergen, Keijzer, & Jonker, 2016). Geometry is a mathematical way of observing the world around (Gravemeijer, et al., 2016). In mathematizing the world, students learn to experience the world, explain geometrical phenomena and connect these to other geometrical phenomena (Freudenthal, 1983). Arts education provides many opportunities for mathematizing and explaining geometrical phenomena, when arts education focuses on three components (Oostwoud Wijdenes & Haanstra, 1997), namely reception, production and reflection.

Reception is about looking at, questioning and talking about art by professional artists and the work of other pupils. Since artworks often contain geometry, this provides an opportunity for teachers to talk about geometrical features within an artwork. Visual art reception, by using Visual Thinking Strategies, can help to develop students' visual perception and spatial reasoning which are both important in geometry and visual arts education (Winner, Goldstein, & Vincent-Lancrin, 2013;



Tishman, MacGillivray, & Palmer, 1999). Visual art production involves exploring materials and techniques, applying them and translating experiences and ideas into a concrete art product. Within this project, these products are often products that can be related to both visual arts and geometry. Furthermore during this production, students work with materials and form visuospatial and sensorimotor representations of their personal experiences, which can help them in thinking and reasoning about geometry (Núñez, Edwards, & Matos, 1999). Lastly, reflection means looking at one's own work and process, making connections between products and underlying ideas, explaining choices and experiences, and recognising growth or change. This can help students to make explicit their implicit visual arts and geometrical knowledge and skills obtained during the activity. Reflection could extend and modify the existing knowledge, since students have to clarify what was going on and what they have learned (e.g. Chi, De Leeuw, Chiu, & La Vancher, 1994).

Creativity

Within the MACE project, creativity serves as a linking pin in integrating geometry and visual art. Creativity is defined as the interaction among attitude, process, and environment by which an individual or group produces a product that is both novel and useful (Plucker, Beghetto, & Dow, 2004). Within education products are novel and meaningful for a specific person (Kaufman & Beghetto, 2009). The product may be an artistic expression such as a painting, but can also be an idea, a solution to a problem or the creation of a problem. In arts a product does not always have to be functional or meaningful, but can also be latent functional or aesthetic (Cropley & Cropley, 2005).

Creativity serves as a linking pin in integrating geometry and visual arts, since (creative) problem solving plays a role in both mathematics (Silver, 1997) and visual arts (Cawelti, Rappaport, & Wood, 1992; Kozbelt, 2003). Students need to find novel and meaningful solutions within geometry, while the same hold for visual arts (e.g. 'How can one visualize this building in a two-dimensional way?'). Doing so student explore and experiment, look at a problem from various viewpoints and are inquisitive. They make new connections, develop new problems or questions and test things in order to move a step further. The creative processes are the similar in both disciplines and include orientation, idea generation, idea evaluation and execution (Schoevers & Kroesbergen, 2017). Starting, promoting and guiding these creative processes in students are also similar.



Teacher development

It is the teachers' task to provide possibilities for enhancing students' creativity development. This is not an easy task. In arts education in the Netherlands teacher inability in stimulating creativity is considered the most prominent obstacle in teaching (Huij, 2017). For primary school teachers the aim in teaching visual art is often instrumental, namely stimulate students' social and personal development by producing school art. In this way most teachers focus on making art products and not on a creative process which is considered central to arts education. Furthermore in teaching visual art there is often no focus on the core goals, namely production, reflection and reception (Haanstra & Damen, 2003; SLO, 2015).

In a sense the same is true for the domain of mathematics. Namely, mathematics is hardly considered as school subject stimulating creativity (Bolden, Harries, & Newton, 2010). Moreover, stimulating creativity in mathematics teaching demands teachers' specific content knowledge and a specific attitude in solving mathematical problems (Keijzer & Kool, 2012; Oonk & De Goeij, 2006). However, there are concerns whether primary school teachers possess this specific content knowledge and attitudes (KNAW, 2009). Furthermore, mathematics teacher educators discuss how this knowledge and attitudes are related to prospective teachers' pedagogical content knowledge and their teaching of mathematics (Gardebroek-van der Linde, Keijzer, Van Doornik-Beemer, & Van Bruggen, this volume).

To change current teaching practices of visual art and mathematics education in primary school, professional development (PD) is needed. Effective professional development requires that the PD content is related to the practice of teaching, that the PD trajectory consists of cycles of experimentation and reflection and that there is collective participation of teachers of the same school (Borko, Jacobs, & Koeller, 2010).

RESEARCH QUESTION

The MACE-project was established to explore links between the domain geometry in mathematics, visual arts and creativity in problem solving, aiming at developing primary school students' mathematics skills. One of the activities in the project is the redesign of the PD trajectory from the Boijmans programme. This redesign is subject of this paper. We will answer the following question:

How could this redesigned PD trajectory for primary school teachers for integrated teaching of visual arts, geometry and creativity be optimized?



METHOD

This research focusses an educational problem in teachers' professional development, namely the difficulties these teachers experience in integrated teaching mathematics and visual art. Therefore design research is an appropriate research method (Van den Akker, Gravemeijer, McKenney, & Nieveen, 2006). Design research consists of one or more research cycles wherein a prototypical design is developed and tested, and where next results from try-outs are analysed in order to adapt the prototypical design. As the PD trajectory is based on the trajectory from the 'Boijmans Language and Mathematics Programme', this research could be viewed as a second cycle in designing the trajectory.

In line with the aim 'stimulating creativity' in the PD trajectory we choose the creative process as means of designing. This meant that designers with different backgrounds including mathematics, art and creativity oriented on experiences from the original program. They next in several rounds got involved in a process of formulating and evaluating ideas based on their experiences as a teacher educator in the PD trajectory of the museum and on the evaluations by teachers that followed the PD trajectory. These ideas were derived from specific interpretations of teacher learning, notions of connections between domains, and aims in the PD trajectory. Evaluations of ideas brought forward were lead down in notes which next were transformed in the actual design (Schoevers & Kroesbergen, 2017).

RESULTS

Initial design

The training that was developed within the 'Boijmans Language and Mathematics Programme' was carried out in an experimental setting at a primary school in Rotterdam. Evaluation of this pilot showed that teachers were positive about using creativity in their lessons, about connecting arts to other subjects, about learning to look closely at art.

This PD trajectory from the 'Boijmans Language and Mathematics Programme' and this evaluation was the starting point for the design of the MACE PD trajectory. There were four meetings in Boijmans PD trajectory: an orientation on the trajectory, a meeting on visual art, one on creativity and a final meeting on geometry. In the first meeting the three perspectives were touched upon. In the second meeting visual arts was presented in the context of the museum, where the focus was on exploring pieces of visual art, with a focus on for example: look at art, talk about and reflect on it, talk about feelings and ideas, use it as a starting point for an assignment and discover the possibilities for language and mathematics (Plucker, Beghetto, & Dow,



2004). The aim of the second meeting was to raise awareness about these learning opportunities and offer teachers skills to guide students in their personal and creative reception of a piece of art. The third meeting on creativity presented creativity as free exploration only. Teachers were stimulated to have students follow their own ideas. Key message in this meeting was: there are no wrong answers, every answer is 'valuable', as long as a student can explain it. In the fourth meeting the focus was turned to mathematics. The idea now was to reformulate previous experiences in the trajectory in terms of mathematical language or (more precisely) geometrical language. This turn to the supposedly familiar mathematics served as a means to reflect on previous experiences. This final meeting was meant to explicitly focus on mathematics, which in the first three meetings remained somewhat implicit.

Reflection

The general idea behind the Boijmans PD trajectory was that creativity was new for teachers, and that teaching practice did not leave much room for free exploration. Moreover, as mathematics teaching is done on a daily basis, this was considered to be clear for teachers. Therefore, reformulating experiences in mathematical language would not be a real problem for the teachers.

However, in piloting this first design we found that for the teachers involved the link between visual art, creativity and mathematics was not obvious enough. They experienced reformulating their experiences in mathematical language in the fourth meeting as a test and not as reflection on the links between the three aspects of the trajectory. We thus decided that a triple focus, on visual art, mathematics and creativity, was needed from the start and should be focus for reflection on teachers' classroom activities in every meeting. Moreover, we reconsidered the role of geometry in the trajectory. We needed to consider geometry teaching as new for teachers. As a consequence we decided that the teachers were in need for examples showing the triple focus clearly.

New PD trajectory

In the new PD-trajectory we implemented the triple focus on visual art, creativity and geometry from the start of the PD-trajectory. Moreover, we presented the integration of school subjects as a change of perspective between visual arts and geometry within one context. Through this, teachers no longer experienced the meeting on geometry as a test of their knowledge. We stimulated teachers to use mathematical language when discussing art with their students. Teachers felt comfortable doing so. And last, we viewed creativity as the tool for idea development and thus as link between visual arts and geometry.



The triple focus was integrated in a set of nine MACE lessons that were assigned to the teachers as homework to do with their students. The view on creativity as a tool was integrated in the last meeting of the PD-trajectory where teachers were challenged to explore and design integrated geometry and visual arts activities themselves.

Typical experience in the new trajectory

In the end of the new trajectory teachers were asked to design an integrated geometry and visual art activity. In one of the designed activities, a teacher used a painting of two girls playing hide and seek by William Merritt Chase (1888) (for an image of the painting see The Phillips Collection: <http://www.phillipscollection.org/collection/browse-the-collection?id=0298>). With this artwork he had the aim to ask his fifth grade students to imagine what could be happening around the scene of the painting. Afterwards, students had to do an open assignment to create a new piece of art from the scene, but seen from a different viewpoint. In doing so he changed the perspective from viewing the piece of art from an arts education point of view to one from geometry.

Creative design process

The development of the PD trajectory, as described above might suggest that the design process was a straight forward process. However, it was not. The outcomes reported were the result of discussions among designers exploring the others' point of view and learning the (professional) language used by the expert with a background in visual arts or in mathematics education. Exploring what is central in geometrical reasoning and in visual arts led to formulate new or adapted activities in the PD trajectory. Newly discovered links between geometry teaching and arts education were made explicit for both designers of the PD trajectory, but also for teachers in the (new) trajectory. Major discussions between designers focused on 'there is no wrong' as interpretation of creativity, finding that initially there are no wrong ideas, however reasoning and interpretations can be wrong. This idea fits the notion of creativity as a process of divergent thinking leading to many ideas, followed by convergent thinking, where ideas are valued and really taken into account.

CONCLUSION AND DISCUSSION

This study aim is to redesign a PD trajectory for integrated teaching of visual arts, geometry and creativity. The redesigned trajectory should offer optimal support for teachers willing to integrate visual arts, geometry and creativity in their teaching. We found that such a PD trajectory can benefit from a multiple focus from the start.



The phrase ‘teach as you preach’ applies to this finding, as teachers in the PD trajectory are asked to also choose for such a multiple perspective. Secondly we found that, when integrating visual arts and geometry, creativity can be the linking pin. Both visual arts and geometry teaching benefit from creativity. This is evident for visual art, but also learning geometry benefits from creatively addressing a problem from different angles.

Secondly, in a PD-trajectory for integrating teaching of visual arts and geometry teachers need to be explicitly taught to also use and expect mathematical language when describing art. Namely mathematics generally depends on reasoning and thus language (Gibbons, 2009).

Lastly, learning to be creative can only take place in a context. Visual arts provides such a context in which there is no right answer. The absence of a final solution triggers not only the imagination, but also creative thinking skills. Geometry provides a context for creative problem solving in which there is a right answer, but many ways to get there. The combination of visual arts and geometry helps develop creativity. Furthermore the integration of subjects might help students, teachers and researchers to be creative, think in a more flexible and non-fixed way, since they cannot only rely on subject-related knowledge and therefore have to ‘break out’ their predominantly thinking focus.

The aforementioned PD trajectory is the result of a creative design process undertaken by designers and researchers with different backgrounds, namely mathematics, arts education and (general) education. As creative processes are personal of nature, the result of the process, that is the PD trajectory, is too. On the one hand this makes that this PD trajectory could be different if developed by another team. This is even true when this other team includes people with exactly the same backgrounds. But we do not consider this as a problem. We sought for a result meeting certain conditions. The final PD trajectory should connect its three components mathematics, arts and creativity in a way that teachers are supported in elaborating situations that are meaningful for students as such that these are viewed from the two domain perspectives, while asking for creativity. We established that the developed trajectory meets these conditions.

We characterized the overarching pedagogy as changing perspectives within a context from one domain specific pedagogy to another. This idea could also be used in integrating other domains in the curriculum. Doing so teachers more and more need to gear between domain specific structures and the meaningful world of students. This is special in a sense that not many teachers are able to manage this, but on the other hand this is not different from what teaching actually is about.



REFERENCES

- Akkerman, S. F., & Bakker, A. (2011). Boundary crossing and boundary objects. *Review of Educational Research*, 81, 132-169.
- Bolden, D. S., Harries, T. V., & Newton, D. P. (2010). Pre-Service Primary Teachers' Conceptions of Creativity in Mathematics. *Educational Studies in Mathematics*, 73(2), 143-157.
- Borko, H., Jacobs, J., & Koeller, K. (2010). Contemporary approaches to teacher professional development. *International encyclopedia of Education*, 7, 548-556.
- Brinkman, W., Miedema, E., & Schreuder, C. (2017). *Kunst=Taal en Rekenen. Drie jaar Boijmans Taal- en Rekenprogramma [Art=Language and Mathematics. Three years of Boijmans Language and Mathematics programme]*. Assen/Rotterdam: Van Gorcum/Museum Boijmans Van Beuningen.
- Cawelti, S., Rappaport, A., & Wood, B. (1992). Modelling artistic creativity: An empirical study. *The Journal of Creative Behaviour*, 26, 83-92. doi:10.1002/j.2162-6057.1992.tb01164.x
- Chi, M. T., De Leeuw, N., Chui, M.-H., & LaVancher, C. (1994). Eliciting Self-Explanations Improves Understanding. *Cognitive Science*, 18, 439-477.
- Cropley, D., & Cropley, A. (2005). Engineering Creativity: A Systems Concept of Functional Creativity. In J. C. Kaufman, & J. Baer (Eds.), *Creativity across domains: Faces of the muse* (pp. 169-185). Mahwah, NJ: Lawrence Erlbaum Associates.
- Freudenthal, H. (1983). *Didactical Phenomenology of Mathematical Structures*. Dordrecht: Springer.
- Gardebreek-van der Linde, J., Keijzer, R., Van Doornik-Beemer, H., & Van Bruggen, J., The mathematical knowledge base and the quality of mathematics instruction in primary education, EAPRIL Conference Proceedings 2017, Paper presented at the EAPRIL 2017 Conference, Hämeenlinna, 148-161.
- Gemeente Rotterdam/Rotterdamse schoolbesturen. (2011). *Programma Beter Presteren. Rotterdams Onderwijsbeleid 2011-2014 (deel 1) [Program Better Achievements. Rotterdam Educational Policy 2011-2014 (part 1)]*. Rotterdam: Gemeente Rotterdam.
- Gibbons, P. (2009). *English learners, academic literacy, and thinking*. Portsmouth, NH: Heinemann.



- Gravemeijer, K., Figueiredo, N., Feijs, E., Van Galen, F., Keijzer, R., & Munk, F. (2016). *Measurement and Geometry in Upper Primary School*. Rotterdam/Boston/Taipei: Sense Publishers.
- Gresnigt, R., Taconis, R., Van Keulen, H., Gravemeijer, K., & Baartman, L. (2014). Promoting science and technology in primary education: *Studies in Science Education*, 50(1), 47-84.
- Haanstra, F., & Damen, M. (2003). Van kunstzinnige vorming tot kunsteducatie. 25 jaar onderwijs en onderzoek in de kunsten. *Cultuur + Educatie*, 7, 6-29.
- Hotze, A. C., & Keijzer, R. (2017). Samenhang tussen rekenen-wiskunde en wetenschap en technologie [Coherence between mathematics and science education]. *Volgens Bartjens – ontwikkeling en onderzoek*, 36(5), 41-51.
- Huij, E. (2017). Beeldend onderwijs voor de leraar basisonderwijs: de kern telt! [Art education for the primary teacher: key points count!]. In G. Geerdink, & I. Pauw, *Kennisbasis lerarenopleiders. Katern 3: Inhoud en vakdidactiek* (pp. 51-58). Eindhoven: Velon.
- Kaufman, J. C., & Beghetto, R. A. (2009). Beyond big and little: The four c model of creativity. *Review of General Psychology*, 13, 1-12. doi:10.1037/a0013688
- Keijzer, R. (Ed.). (2015). *Meetkunde uit de kunst in de klas (Grote Rekendag 2015) [Geometry from art into the classroom (Big Mathematics Day 2015)]*. Utrecht/Den Bosch: Universiteit Utrecht / Malmberg.
- Keijzer, R. (Red.). (2015). *Meetkunde uit de kunst in de klas (Grote Rekendag 2015) [Geometry from art into the classroom (Big Mathematics Day 2015)]*. Utrecht/Den Bosch: Universiteit Utrecht / Malmberg.
- Keijzer, R., & Kool, M. (2012). Mathematical Knowledge for Teaching in the Netherlands. *Paper presented in TSG23, ICME12*. Seoul.
- Keijzer, R., & Verschure, C. (2011). Onderzoekend leren op de Grote Rekendag [Inquiry based learning at the Big Mathematics Day]. *Zone*, 10(1), 21-23.
- Keijzer, R., Smit, J., Bakker, A., & Munk, F. (2016). Promoting teachers' scaffolding of students' mathematical language in a professional development programme. In C. Max (Red.), *Proceedings EAPRIL 2015* (pp. 97-110). Belval, Luxembourg: University of Luxembourg.
- KNAW. (2009). *Rekenonderwijs op de basisschool. Analyse en sleutels tot verbetering [Mathematics education in primary school. Analysis and key for improvement]*. Amsterdam: KNAW.
- Kozbelt, A. (2003). Problem solving strategies that distinguish creative artists. In R. Alterman, & D. Hirsh (Ed.), *Proceedings of the 25th Cognitive Science*



- Society* (p. 1367). Boston, MA/Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- MACE Project, UU. (2017). *MACE project*. Retrieved January 8, 2017, from <https://meetkunst.sites.uu.nl/en/>
- Museum Boijmans Van Beuningen. (sd). *Onderwijs - Museum Boijmans Van Beuningen*. Opgeroepen op December 22, 2017, van Home - Museum Boijmans Van Beuningen: <https://www.boijmans.nl/onderwijs/primair-onderwijs>
- Núñez, R. E., Edwards, L. D., & Matos, J. F. (1999). Embodied cognition as grounding for situatedness and context in mathematics education. *Educational Studies in Mathematics*, 39, 45–65.
- Oonk, W., & De Goeij, E. T. (2006). Wiskundige attitudevorming [Mathematical attitude development]. *Tijdschrift voor nascholing en onderzoek van het reken-wiskundeonderwijs*, 25(4), 37-39.
- Oostwoud Wijdenes, J., & Haanstra, F. (1997). *Over actief, receptief en reflectief*. Utrecht: LOKV.
- PlatformOnderwijs2032. (2016). *Ons Onderwijs2032. Eindadvies [Our Education 2032. Final Advice]*. Den Haag: PlatformOnderwijs2032.
- Plucker, J. A., Beghetto, R. A., & Dow, G. T. (2004). Why isn't creativity more important to educational psychologists? Potentials, pitfalls, and future directions in creativity research. *Educational psychologist*, 39(2), 83-96. doi:10.1207/s15326985ep3902_1
- Schoevers, E. M., & Kroesbergen, E. H. (2017). Enhancing creative problem solving in an integrated visual art and geometry program: A pilot study. In D. Pitta-Pantazi (Ed.), *The 10th Mathematical Creativity and Giftedness International Conference - proceedings* (pp. 27-32). Nicosia, Cyprus: Department of Education, University of Cyprus. Retrieved from http://www.cyprusconferences.org/mcg10/files/Proceedings_MCG10_FinalPublication.pdf
- Schoevers, E. M., Kroesbergen, E. H., Keijzer, R., & Jonker, V. (2016). Meetkunde, kunst en creativiteit [Geometry, art, and creativity]. *Volgens Bartjens*, 36(2), 26-28.
- Schreuder, C. (2013). *Projectplan Boijmans Taal- en Rekenprogramma [Project plan Boijmans Language and Mathematics Programme]*. Rotterdam: Museum Boijmans Van Beuningen.
- Silver, E. A. (1997). Fostering creativity through instruction rich in mathematical problem solving. *ZDM*, 29, 75-89. doi:10.1007/s11858-997-0003-x



- SLO. (2015). *Nieuw elan voor Kunstzinnige oriëntatie in het primair onderwijs* [New elan for Arts in primary education]. Enschede: SLO.
- Tishman, S., MacGillivray, D., & Palmer, P. (1999). *Investigating the Educational Impact and Potential of The Museum of Modern Art's Visual Thinking Curriculum: Final Report to the Museum of Modern Art*. New York, NY: Museum of Modern Art.
- Van den Akker, J., Gravemeijer, K., McKenney, S., & Nieveen, N. (Eds.). (2006). *Educational design research*. London: Routledge.
- Winner, E., Goldstein, T. R., & Vincent-Lancrin, S. (2013). *Art for Art's Sake? Overview*. Paris: ECD Publishing.



(RE)CONSTRUCTING PROFESSIONAL IDENTITY THROUGH PERSONALIST INTERACTIVE REFLECTION- A CASE STUDY OF A PEDAGOGICAL SUPERVISOR

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ABSTRACT

In this paper we report the findings of a case study aimed to understand how pedagogical supervisors construct their continuing professional development (CPD) and what factors shape the (re)construction of their professional identity. One particularly interesting finding of our study suggests that, in order to have greater impact on pedagogical supervisors' CPD and consequent (re)construction of their professional identity, reflection should develop in a dialogical cycle of intra-subjective, intersubjective and intra-subjective reflection. It is the intra-subjective moment of the reflective cycle that works out as a catalyst between the two first reflective moments and helps bring in a reflexivity element to the process.

INTRODUCTION

Teacher educators form a heterogeneous group of professionals. Depending on the different roles they play as scholars, researchers, methodologists, school visitors, supervisors, mentors, and coaches (Ducharme, 1993; Lunenberg, Dengerink, & Korthagen, 2014) they are responsible for the training and education of teachers at various levels from teaching various subjects to supervising the *practicum* in pre-service training programmes to supporting the induction and further professional development of certificated teachers.

This heterogeneity accounts to a large extent for the scarcity of systematic research on the development of a professional identity of teacher educators, although there is evidence to suggest that there is a two-way relationship between professional



development and professional identity: involvement in professional development activities contributes to developing a sense of “[b]elonging [...] which binds them as a professional group” (Davey, 2013, p. 7), whereas adherence to continuing professional development depends on the way professionals perceive and construct their professional identity (Díaz-Maggioli, 2004; Jones, 2015).

In the teaching profession most of the research undertaken on reflective practice has been with student and practicing teachers, and focused mainly on purposes for, time and content of reflection, impact of reflection on practice, and approaches to teachers’ reflective supervision (e.g. Zeichner & Liston, 1996; Dinkelman, 2000; Avalos, 2011; Impedovo & Malik, 2016). Less is known about how teacher educators in general, and pedagogical supervisors in particular perceive their role as reflective practitioners and the processes whereby they develop their reflective abilities for professional growth and development of their professional identity.

In this paper we report the findings of a case study of a pedagogical supervisor. This is part of a larger case study of a group of pedagogical supervisors at a Portuguese Higher Education Institution aimed to understand how the pedagogical supervisors’ construct their continuing professional development (CPD) and what factors contribute to shaping the (re)construction of their professional identity.

Whereas reflective practice has been described in relation with the time dimension and focus of reflection (e.g. Argyris & Schön, 1974, 1978; Schön, 1983, 1987; Gibbs, 1988) and the underpinning interests (Mezirow, 2009; Brookfield, 2017, among others), in our study we address reflective practice from a different lens: that of the relationship of the individual with others, which we have tentatively designated as “personalist interactive” approach, in which the total is larger than the sum of the parts.

TEACHER EDUCATORS’ PROFESSIONAL IDENTITY – A “JANUS-LIKE” JOURNEY

The construction of the professional identity is a dynamic process that involves accommodation to, and identification with the culture of one particular professional group, which in turn is strongly influenced by how professionals see themselves, and how professionals perceive they are seen by others and the society in general (Beijaard, Meijer & Verloop, 2004). Despite a number of similarities that exist between the challenges faced by faculty in other disciplines and teacher educators, there are distinct differences “which make teacher educators a particular type of academic” (Murray & Male, 2005, p. 136). Unlike most faculty in other disciplines, teacher educators are usually recognised as “expert teachers” upon entrance to academic life, and do not benefit from induction support to acquire new knowledge



and extended pedagogical skills required for teaching to teach, which places them in “the unique position of *expert become novice* [...] as an academic group” (Murray & Male, 2005, p. 136).

In the particular case of pedagogical supervisors this process is complicated by a number of factors related with the heterogeneity of the professional group and access to the career. Like most teacher educators, pedagogical supervisors form a heterogeneous group whose identity can be characterized as “Janus-like” (Ducharme, 1993, p. 4). They may work in a variety of contexts with a broad scope of tasks and responsibilities, and face a number of challenges when transitioning from a career in teaching to a career in supervision. The transition from being “first-order practitioners” in the “first-order setting” of the school to becoming “second-order practitioners” in the “second-order setting” of the HEI (Murray, 2002) requires the development of a new professional identity. This is a complex process of alignment of the “situational self” (which is developed from interaction with others) with the “substantial self” which is informed by self-defining beliefs that need to be reframed according to the circumstances of the new professional setting (Murray & Male, 2005). The knowledge base and understanding of teaching gained from experience as school teachers represents a major asset (Murray & Male, 2005). However, there is empirical evidence to suggest that the transition from school teacher to teacher educator is a stressful process given the challenges in meeting the expectations of HE, namely the feelings of uncertainty about the academic bases and pedagogical skills required to work with adult learners (Hatt, 1997; Murray, 2003). The difficulties in dealing with, and overcoming these challenges can lead to a “deficit model” of teacher educators as they “continue to adhere to models of teacher educator professionalism in which professional credibility centres on their identities as school or ex-school teachers, attitudes to research are ambivalent or negative, and the predominant senses of responsibility and commitment are to the school sector” (Murray & Male, 2005, p. 127). This can be even more complicated in cases where teacher educators maintain a connection with both work settings as they serve as supervisors or mentors of student teachers while also being school teachers themselves.

Understanding the process of supervision means recognizing the tension caused by the fact that the supervisory process occurs in different spaces guided by different logics. The logic of the academic space lies on the production and reproduction of knowledge and it is organized in order to privilege such logic. The training field, in turn, is located in the school, a space governed by the institutional logic of service that purges all that does not belong to the provision of services. Thus it should not be surprising that the student-teaching experience is neither simple nor straight forward, and various complexities are likely to arise with the student teacher and supervisor relationship during the student-teaching experience (see e.g. Asplin & Marks, 2013).



The supervisor is likely to have the permanent necessity to lead, design and establish learning objectives, transmit knowledge, evaluate and assess. Besides role modelling and presenting teaching techniques and strategies, pedagogical supervisors are expected to provide emotional support such as affirmation and encouragement, and engage the student-teacher in reflective practice (Asplin & Marks, 2013).

Given that there are no simple solutions to the challenges and dilemmas faced by supervisors in responding adequately to the demands of the different logics of different work contexts, an extensive professional knowledge base is required. Therefore, the adoption of a reflective stance to practice as a process of continuing professional development can be particularly relevant for pedagogical supervisors whose professional identity and sense of professional belonging needs to be constructed and balanced between the first-order and the second-order professional settings, as is the case in our present study.

REFLECTION AS A MULTI-LAYERED LEARNING LOOP PROCESS – A CONCEPTUAL FRAMEWORK

Reflective practice, although not a sufficient condition for the professionalization of teaching is seen as the “bedrock of professional identity” (Finlay, 2008, p. 2). Following the work of Donald Schön (1983, 1987) many elaborations have been introduced on his reflective practitioner model and many definitions have been suggested of the concept of reflection and reflective practice. Reflective practice has been variously described as a highly personal cognitive and affective process involving deliberate thinking about action aimed at exploring and articulating own ideas and knowledge in order to create new understandings (Boud, Keogh & Walker, 1985; Hatton & Smith, 1995; Daudelin, 1996; Osterman & Kottkamp, 2004). Common to the different definitions is the view of reflection as a cognitive construct that tends to operate at the personal level. However, this cognitive dimension has been questioned on the account that “reflection, in its purely cognitive sense, will not be responsive to the social dilemmas the global community is faced with and cannot contribute to the improvement of human society” (Akbari, 2007, p. 197). Furthermore, supervision does not happen in a vacuum. It is an important dimension of the training and professional development of teachers whose professional activity is located in schools and HEI which are more and more expected to function as learning organisations (Senge, 1990/2006). This requires reflection to be more than an individual endeavour guided by technical or practical interests (Habermas, 1987) to address most immediate aspects of practice. Reflection on being and action as social practice with the presence of significant others has been regarded as integral to the formation of professional identity (Zeichner, 1994; Hoffman-Kipp, Artiles & Lopez-Torres, 2003). Considering that it is this latter type of reflection that has the



greatest potential to promote meaningful learning, it is relevant to discuss reflective practice within the framework of loop learning as a system that yields four levels of learning.

Single and double-loop reflective learning

The most basic response to a difficult situation is to try alternative ways to solve the problem. In professional terms, the emphasis is placed on the technical aspects of practice, and any reflection, if it really exists, is directed towards making the techniques more effective (Usher & Bryant, 1989) leaving personal goals, values and beliefs unquestioned. At this level, described by Argyris and Schön (1974) as *single-loop learning*, practitioners notice that one particular strategy did not produce the expected result and decide to adopt a different line of intervention without really exploring why the expected result was not achieved.

An alternative response is to question taken-for-granted assumptions and subject personal values and beliefs that govern practice to critical scrutiny. In doing this, practitioners engage in a process of *double-loop learning*, a process of reflection involving the challenging of taken-for-granted aspects of practice through exploration of technical and practical thought as well as critical interrogation of practice and its underlying assumptions (Argyris, 1991, 1993). In other words, this kind of learning and reflection involves “thinking outside the box”, creativity and critical thinking skills. Double-loop learning occurs when practitioners engage themselves and others in discussing the reasons for change and innovation in order to make informed decisions about future practice.

Triple-loop reflective learning

At another level, learning is derived from reflecting on how we learn. This is the level of *triple-loop learning* whereby practitioners reach beyond the scrutiny and critical understanding of their actions and underlying principles to gain self-awareness as learners by reflecting not only on what needs to be changed and why, but also on how they come to challenge their practice and to envisage alternative ways of doing things. It is through triple-loop learning that individual practitioners and the ones they work with can determine how to develop innovative and effective approaches to dealing with complex issues and create transformational change. The results of reflection at this level include enhancing ways to comprehend and change one's purposes, developing better understanding of how to respond to the environment, and the theoretical and practical reasons to account for professional decisions (Flood & Romm, 1996; McNamara, 2006; Hargrove, 2008). Triple-loop reflection occurs when, after having engaged in reflecting with others on reasons for change and innovation practitioners discuss the dynamics of that reflection including



how it was conducted, the learning that was produced, and how that learning was produced.

Quadruple-loop reflective learning

At a more deeply reflective level, the level of *quadruple-loop learning*, practice is perfected through reflecting philosophically on its foundations, justifying rationales for action, and uncovering/discovering new paradigms by which decisions can be made among various possibilities. This includes a new dimension of reflection which “is potentially more complex than being reflective, in that the potential for understanding the myriad ways in which one’s own presence and perspective influence the knowledge and actions which are created is potentially more problematic than the simple searching for implicit theory” (Fook, 2002, p. 43). Quadruple-loop reflection occurs when practitioners, individually or collaboratively, critically challenge the moral and ethical dimensions of their practice as well as the socio-cultural and political factors that shape their practice.

THE STUDY

The present study is a case study (Yin, 2014) of a pedagogical supervisor. This particular case is a fair representation of the results of a larger study conducted with a group of pedagogical supervisors at a Portuguese Higher Education Institution. The study aimed to understand how the pedagogical supervisors construct their continuing professional development (CPD) and what factors shape the (re)construction of their professional identity.

Given the exploratory nature of the study we adopted a phenomenological approach (Moustakas, 1994) within the life story tradition of research (Atkinson, 1998). Acts of speaking convey a particular sense of agency, and therefore, identity (e.g. Duranti, 2004), and teachers’ professional identities emerge in the telling, sharing, and legitimization of their experiences (Golombek, 1998).

Following the narrative inquiry method (Connelly & Clandinini, 1990) data were collected through in-depth face-to-face interviews (Seidman, 2013), and treated following Braun and Clarke’s (2006) thematic analysis model.

The beginning of a career - building a professional project

Sally (the pseudonym of our participant) holds a BA in Pre-School Education and a Master degree in Educational Psychology. She has a Certificate Degree in Special Education and is currently undertaking Doctoral studies in Teacher Education.



Sally started her teaching career 23 years ago as a trained pre-school teacher. As Sally put it, “in the first years working with young children I felt things could be done differently but couldn’t explain exactly why. It was probably my experience as a daughter and mother that raised this feeling in me as a teacher”. This attempt to find an explanation for her disquietudes dictated the decision to run her own kindergarten in order to be able to develop a project that would challenge the traditional approaches to childhood education she had been trained in. Running a kindergarten where she and her colleagues could work according to what she felt “would be the best for the children was a dream come true”. Questioning taken-for-granted practices and principles acquired from her teacher training and getting involved with her colleagues in thinking and implementing new ways of doing things represented a process of engagement in double-loop reflective practice. According to Sally, the urge to validate her practice was the main reason for enrolling in and completing a Master programme in Educational Psychology.

The transition from the “first-order” to the “second-order” setting - becoming a teacher educator

Soon after having completed her Master Degree, Sally joined a Higher Education institution where she has worked as pedagogical supervisor for about 17 years. One of the main challenges Sally faced when entering this new setting while also serving as a school teacher was to align the new demands, expectations and dynamics of the HEI with the realities of the school she was familiar with:

For me, personally, being in both roles, I mean teacher and supervisor, we have both sides [...] and that requires that we have skills in several areas and start to look at teaching from both perspectives and to adapt our practice of pedagogical supervision to help our student teachers to understand the meaning and the underlying principles of their classroom observations and interventions.

In the process of adaptation to the new professional reality not only did she have to adjust to the ethos of the HEI, but she also had to find ways to combine the dynamics of both educational settings. This was the time when Sally started to develop and consolidate her approach as supervisor:

I felt the best way was to have this kind of shared supervision to involve the student-teachers in the process and guide them in reflecting about whatever they are doing and being able to justify what they are doing. [...] The important thing for me is to help the students to resist the temptation to



simply reproduce the practices and models acquired in the training without understanding the rationale for their action.

As a reflective practitioner Sally started to distance herself from the level of practical reasoning (Schön, 1987) for most immediate changes in practice to reach a level of reflection about herself as a professional and the process of her own development:

I had to adapt to the curriculum of the institution, meet the demands of being a teacher who guides students at this level of education, and in terms of pedagogical supervision it is the reflection made over the years and finding a group of colleagues with whom to share, reflect, and constantly review our practices, year by year, moment by moment. We constantly reformulate our practice as supervisors and the instruments we use.

Sally saw this approach to reflection as an opportunity to gain greater self-awareness as a professional and a learner:

I looked back to aspects of my practice and drew lessons to improve my future practice, so I have become more conscious of myself and started to question the best ways for me to learn how to do things differently and assess the results [...] so in a way I got more and more interested in understanding what worked best for me and how I could improve my work as a supervisor.

Engagement in collaborative reflection on action and for action (Eraut, 2004) was instrumental to embarking in a process of self-scrutiny as a professional and a learner. This process of reflective practice illustrates Sally's progress from being a double-loop-level reflective practitioner to adopting a triple and quadruple-loop learning reflective stance.

Personalist interactive reflection – the reflective spiral

One of Sally's professional concerns is her own construction as a pedagogical supervisor. In her view, a good supervisor is the one "who not only shows the way, guides and supports, but also grows with the supervisees". One of her biggest challenges is to be more than just a role model for her student-teachers to imitate, but provide them with the tools they can use to find and walk their own way. As she stated:

people need to be called to think [...] a model of supervision that does not give students answers that they can find in textbooks, and recipes for them to copy [...] but encourages students not to just wait



for an answer but think, discuss with others, and reflect to find their own answers.

This view of the role of the supervisor aligns with Sally's own approach to and practice of reflection. One reason provided by Sally to explain how reflection is critical to her developmental process was the involvement of significant others followed by a stage of self-reflection. She explained:

In order to reflect on my practice I need to distance myself from it in order to analyse what I do and share with my students and also share my reflections with colleagues and others. And then I take whatever comes out of my sharing with others and I turn to myself and I sort of take a retrospective view of the reflections, a kind of round-off, and try to see where I am in the whole picture as a person and professionally, and what lessons I gain for the future.

In considering how her involvement in reflection has shaped the way she sees herself as a pedagogical supervisor Sally emphasizes the critical role of significant others to her own transformation as a teacher and a teacher educator:

And I need to have my own time and space to reflect but having others to reflect with me helps me to be more aware of myself as a teacher and a supervisor. I no longer see myself as a teacher and a supervisor as separate jobs. In my reflections I sort of combine whatever I do with my students at school and what I do with the student-teachers in my classes and observations. It is like both experiences complete each other. I no longer think of myself as a school teacher who has a parallel job in higher education [...]. I see myself as a teacher who happens to live in two different sides of the same territory.

The process of reflection described by Sally has contributed to her professional development and improvement of her practice, as well as to mould the way she has reconstructed her professional identity.

According to Sally "this can be a never ending process, since I need to always bring others into my reflection before I draw my own conclusions". Given its ongoing nature, this process of involvement in reflection can be described as developing in three interconnected developmental stages to form a reflection spiral (Fig. 1): one first moment of reflection at an individual level, i.e. intra-reflection, which is then enriched by engagement in reflection with others, i.e. inter-reflection, leading to one third moment of self-reflection, i.e. intra-reflection. The third moment of reflection may mark the beginning of a new reflective cycle.

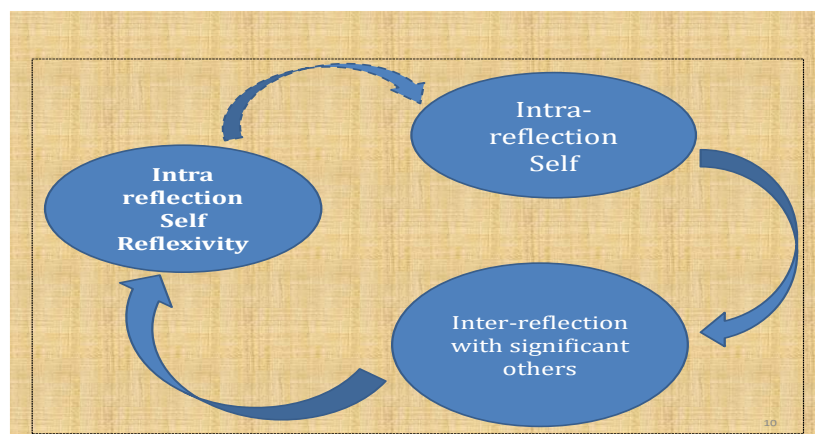


Figure 1 - Personalist interactive reflection

Concluding remarks

The outcomes of the process of involvement as reflective practitioner described by Sally are twofold: it has served as a developmental process with impact on her approach to, and practice of supervision, and it has contributed to the reshaping of her identity as a professional.

By making the “self” strange through focusing attention upon own actions, thoughts, feelings, and values, and by involving significant others in order to reach a level of greater insight, self-scrutiny and self-awareness, practitioners engage in a process of reflection that incorporates Fook’s (1999) concept of “reflexivity” as “a position” where reflexivity (the quality of being reflective) is “a general process” given that “[a]t the heart of this differentiation is the thinking that a position of reflexivity, of an ability to locate yourself in the picture, is complemented by a process of reflectivity” (p.11)

Reflexivity involves becoming aware of the way one is experienced and perceived by others, and being able to deal with personal uncertainty, critically informed curiosity, and flexibility to consider changing deeply held ways of thinking and being, leading to what Mezirov (2009) has described as “transformative learning”. In the particular case of Sally, the moment of reflection with significant others appears to be the catalyst to the following level of self-reflection and reflexivity.

Sally’s example as reflective practitioner shares a lot of communalities with the experiences of involvement in reflective practice described by some equally experienced pedagogical supervisors involved in our study. However, given the



small number of our sample and relatively large professional experience and high academic qualifications of our participants, these results need to be looked at with caution. More research studies are required similar to the present one with less experienced pedagogical supervisors in contexts similar to the one where the present study was located, before attempting to make claims for the transferability of our findings to a wider population of pedagogical supervisors in a variety of teacher education contexts.

REFERENCES

- Akbari, R. (2007). Reflections on reflection: A critical appraisal of reflective practices in L2 teacher education. *System*, 35, 192-207.
- Argyris, C. (1991) Teaching smart people how to learn. *Harvard Business Review*, 69(3), 99-109.
- Argyris, C. (1993) *Knowledge for Action: A guide to overcoming barriers to organizational change*. San Francisco, CA: Jossey Bass.
- Argyris, C., & Schon, D. (1974) *Theory in practice: Increasing professional effectiveness*. San Francisco: Jossey Bass.
- Argyris, C., & Schon, D. (1978) *Organisational learning: A theory of action perspective*. Reading, Mass: Addison Wesley.
- Asplin, K. S. & Marks, M. J. (2013). Increasing the influence of university supervisors during student teaching. *The Professional Educator*, 37(1), 1-10.
- Atkinson, R. (1998). *The life story interview*. Thousand Oaks, CA: Sage.
- Austin, A. E. (2002). Preparing the next generation of faculty: Graduate school as socialization to the academic career. *The Journal of Higher Education*, 73(1), 94-122.
- Avalos, B. (2011). Teacher professional development in Teaching and Teacher Education over ten years. *Teaching and Teacher Education* 27(1), 10-20.
- Beijaard, D., Meijer, P. C., & Verloop, N. (2004). Reconsidering research on teachers' professional identity. *Teaching and Teacher Education*, 20, 107-128.
- Boud, D., Keogh, R. and Walker, D. (1985) Promoting reflection in learning: a model. In D. Boud, R. Keogh and D. Walker (eds.) *Reflection: Turning experience into learning* (pp. 18-40). London: Kogan Page.
- Braun, V., & Clark, V. (2006). Using thematic analysis in psychology, *Qualitative Research in Psychology*, 3(2), 77-101.



- Brookfield, S. D. (2017). *Becoming a critically reflective teacher* (2nd Edition). San Francisco, CA: Jossey-Bass.
- Connelly, F. M., & Clandinin, D. J. (1990). Stories of experience and narrative inquiry. *Educational Researcher*, 19 (5), 2-14.
- Daudelin, M. W. (1996). Learning from experience through reflection. *Organizational Dynamics*, 24(3), 36-48.
- Davey, R. (2013) *The professional identity of teacher educators: Career on the cusp?* London: Routledge.
- Díaz-Maggioli, G. (2004). *Teacher-centered professional development*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Dinkelman, T. D. (2000). An inquiry into the development of critical reflection in secondary student teachers. *Teaching and Teacher Education*, 16(2), 195-222.
- Ducharme, E. (1993). *The lives of teacher educators*. New York: Teachers College.
- Duranti, A. (2004). Agency in language. In A. Duranti (Ed.), *A companion to linguistic anthropology* (pp. 451–473). Malden, MA: Blackwell.
- Eraut, M. (2004). The practice of reflection. *Learning in Health and Social Care*, 3(2), 47-110.
- Finlay, L. (2008). *Reflecting on 'reflective practice'*. PBPL paper 52. The Open University, Practice-based Professional Learning Centre.
- Flood, R. L. & Romm, N. R. A. (1996). Plurality revisited: Diversity management and triple loop learning. *Systems Practice and Action Research*, 9(6), 587–603.
- Fook, J. (2002). *Social work: Critical theory and practice*. London: Sage.
- Gibbs, G. (1988). *Learning by doing: A guide to teaching and learning methods*. Oxford, UK: Centre for Staff and Learning Development, Oxford Polytechnic.
- Golombek, P. (1998). A study of language teachers' personal practical knowledge. *TESOL Quarterly*, 32(3), 447–464.
- Habermas, J. (1987). *Knowledge and human interests*. Boston, MA: Polity Press.
- Hargrove, R. (2008). *Masterful coaching* (3rd. ed.). San Francisco, CA: Jossey-Bass.
- Hatt, A. (1997). Teacher into tutor: a personal account of the move from primary teaching to initial teacher education. *Multicultural Teaching*, 19(2), 43–47.



- Hatton, N. & Smith, D. (1995). Facilitating reflection: Issues and research. *Forum of Education*, 50(1), 49-65.
- Hoffman-Kipp, P., Artiles, A. J. & Lopez-Torres, L. (2003). Beyond reflection: Teacher learning as praxis. *Theory into Practice*, 42(3), 248-254.
- Impedovo, M. A. & Malik, S. K. (2016). Becoming a Reflective In-service Teacher: Role of Research Attitude. *Australian Journal of Teacher Education*, 41(1), 100-112.
- Lunenberg, M., Dengerink, J., & Korthagen, F. (2014). *The professional teacher educator: Roles, behaviour, and professional development of teacher educators*. Rotterdam/Boston/Taipei: Sense Publishers.
- McNamara, C. (2006). *Field guide to consulting and organizational development: A collaborative and systems approach to performance, change and learning*. Minneapolis, Minnesota: Authenticity Consulting, LLC.
- Mezirow, J. (2009). Transformative learning theory. In J. Mezirow, and E. W. Taylor (Eds), *Transformative learning in practise: Insights from community, workplace, and higher education* (pp. 18-32). San Francisco, CA: Jossey-Bass.
- Moustakas, C. (1994). *Phenomenological research methods*. London, UK: Sage.
- Murray, J. (2002). Between the chalkface and the ivory towers? A study of the professionalism of teacher educators working on primary initial teacher education courses in the English education system. *Collected Original Resources in Education (CORE)*, 26(3), 1-503.
- Murray, J. (2003). New teacher educators' needs: Perspectives from research and practice. London: Teacher Training Agency.
- Murray, J. & Male, T. (2005). Becoming a teacher educator: Evidence from the field. *Teaching and Teacher Education*, 21, 125–142.
- Osterman, K. F. & Kottkamp, R. B. (2004). *Reflective practice for educators: Professional development to improve student learning*. Thousand Oaks, CA: Corwin Press.
- Schön, D. (1983). *The reflective practitioner: How professionals think in action*. New York, NY: Basic Books.
- Schön, D. (1987). *Educating the reflective practitioner*. San Francisco, CA: Jossey-Bass.
- Senge, P. M. (1990/2006). *The fifth discipline: The art and practice of the learning organization*. London: Random House.



- Seidman, I. (2013). *Interviewing as qualitative research: A guide for researchers in education & the social sciences* (4th ed.). New york: Teachers college.
- Usher, R. and Bryant, I. (1989) *Adult education as theory, practice and research*. London: Routledge.
- Yin, R. K. (2014). *Case study research design and methods* (5th ed.). Thousand Oaks, CA: Sage
- Zeichner, K. M. (1994). Research on teacher thinking and different views of reflective practice in teaching and teacher education. In I. Carlgren, G. Handal & S. Vaage. (Eds.). *Teachers' minds and actions: Research on teachers' thinking and practice* (pp. 9-27). London: Routledge
- Zeichner, K. M. & Liston, D. P. (1996) *Reflective teaching: An introduction*. Mahwah, NJ: Lawrence Erlbaum Associates Publishers.



TO WHAT EXTENT DO STUDENT TEACHERS DEVELOP THEIR MATHEMATICAL PROBLEM SOLVING ABILITY BY SELF-STUDY?

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ABSTRACT

A primary teacher needs mathematical problem solving ability. That is why Dutch student teachers have to show this ability in a nationwide mathematics test that contains many non-routine problems. Most student teachers prepare for this test by working on their own solving test-like problems. To what extent does these individual problem solving activities really contribute to their mathematical problem solving ability? Developing mathematical problem solving ability requires reflective mathematical behaviour. Student teachers need to mathematize and generalize problems and problem approaches, and evaluate heuristics and problem solving processes. This demands self-confidence, motivation, cognition and metacognition. To what extent do student teachers show reflective behaviour during mathematical self-study and how can we explain their study behaviour? In this study 97 student teachers from seven different teacher education institutes worked on ten non-routine problems. They were motivated because the test-like problems gave them an impression of the test and enabled them to investigate whether they were already prepared well enough. This study also shows that student teachers preparing for the test were not focused on developing their mathematical problem solving ability. They did not know that this was the goal to strive for and how to aim for it. They lacked self-confidence and knowledge to mathematize problems and problem approaches, and to evaluate the problem solving process. These results indicate that student teachers do hardly develop their mathematical problem solving ability in self-study situations. This leaves a question for future research: What do student teachers need to improve their mathematical self-study behaviour?



INTRODUCTION

The need for mathematical problem solving ability

Modern society needs people who can identify and solve mathematical problems both in daily life and professionally. That means that these people can use their mathematical problem solving ability to construct new problem approaches for non-routine mathematical problems (Drijvers, 2015). They try to combine and adjust problem approaches they already possess to make them applicable in new situations.

It is important that student teachers who want to become primary teachers develop enough mathematical problem solving ability, in the first place because they are members of modern society. Like all other members of society they need problem solving ability to face the challenges of daily life. But more importantly, one day they will become primary teachers, responsible for preparing their students for modern society. This implies that they will need to coach and stimulate their students to develop their mathematical problem solving ability. That is why, in their third year in teacher education, all Dutch primary student teachers have to pass a nationwide mathematics test, which consists of many non-routine problems. Figure 1 shows an example of a non-routine mathematics problem on the level of the nationwide mathematics test.

Oefensite
Kennisbasistoets
Rekenen

Given:
A shoe shop had a very special way of giving discount. If you buy two pairs of shoes, for the cheapest pair you will get this discount: subtract 20 euros and thereafter decrease the price by 20%. For the most expensive pair they first decrease the price by 20% and thereafter subtract 20 euros. A customer buys two pairs of shoes and she ends up paying the same price for both pairs.

Question: What was the difference in euros between the original prices of the two pairs of shoes?



The expensive shoes



The cheap shoes

Figure 1: An example of a non-routine mathematics problem on the level of the nationwide mathematics test for primary student teachers.



Student teachers have to show enough mathematical problem solving ability to solve the problems of the test. During their education they work hard to develop this.

DEVELOPING PROBLEM SOLVING ABILITY BY REFLECTION

Mathematical problem solving ability consists of two components. Cognition, consisting of knowledge of mathematical problems and problem approaches, and metacognition consisting of knowledge of heuristics and problem solving processes (Pólya, 1990; Selden et al., 2000; Drijvers, 2015). Heuristics are – sometimes informal – methods to construct a problem approach for a problem if a suitable problem approach is not available. Heuristics support people to work systematically on non-routine problems. Examples of mathematical heuristics are for instance: look for a pattern, draw a diagram, make a graph or table, guess and check, simplify the problem, make a model, or work backwards (Verschaffel et al., 1999; Keijzer et al., 2016). The well-known problem solving process devised by Pólya consists of the following four steps:

1. Understand the problem;
2. Devise a plan;
3. Carry out the plan;
4. Look back, reflect on your work.

(Pólya, 1990)

Many variations on this four steps problem solving process have appeared over the years, but they have many similarities.

To solve non-routine mathematical problems one needs mathematical knowledge about problems and problem approaches and knowledge about the process of problem solving.

As mentioned before, Dutch primary student teachers work hard to develop their mathematical problem solving ability. To achieve this, they attend meetings with fellow students guided by a teacher educator. They also practice problem solving at home, where they try to solve test-like non-routine mathematical problems on their own. Solving these problems can be a good way to start, but to develop mathematical problem solving ability, just solving problems is not enough. Like Pólya and many others previously explained, it is important that after trying to solve a problem one reflects on and evaluates the mathematical work. One needs to relate discoveries, experiences and new knowledge to present knowledge (Van Streun, 2001; Ambrose et al., 2010).

Reflecting on problem solving activities involves:

- looking for the underlying mathematical structure of the problem and relating the problem to comparable ones (horizontal mathematizing),



- generalizing and abstracting the given problem approaches to construct mathematical knowledge (vertical mathematising),
 - reflecting on and evaluating heuristics and the problem solving process.
- (Gravemeijer, 1994; Nelissen, 2007)

Mathematical reflection is a challenging job. In addition to cognition and metacognition about problem solving, it also requires an appropriate attitude, consisting of self-confidence, perseverance and motivation, to really do the reflection (Verschaffel et al., 1999; Kostons et al., 2014). It is a demanding task for student teachers to show reflective mathematical behaviour, particularly in self-study situations.

RESEARCH QUESTION

During meetings in teacher education teacher educators invite and stimulate student teachers, after they have worked on a non-routine mathematical problem, to reflect on their work. They show the student teachers how they can relate new and present knowledge and let them evaluate and discuss about problem approaches and problem solving processes. Student teachers appreciate this, but the teacher educator's time is limited. This means that student teachers also need to prepare themselves for the nationwide mathematics test through self-study. To do this, they ask their teacher educators to provide them with non-routine mathematical problems on the level of the national test, that they can use to practise problem solving. Many teacher educators advice their student teachers to use the problems from the knowledge base test website¹. This is a popular website that contains a good amount of suitable problems to practise for the test. Each problem on this website is solved in different ways, and after the student teachers have tried to solve the problem themselves they can reflect on their work using the provided problem approaches. Although this website offers good opportunities to develop mathematical problem solving ability and it is widely used, teacher educators experienced that their student teachers did not make the most of the available opportunities, and they doubted the yields of the self-study behaviour of their students.

That leads us to the following research question:

To what extent are student teachers' self-study activities supportive for developing their mathematical problem solving ability? And how can we explain their study behaviour?

We worked on this research question using the following sub-questions:

¹ <https://sites.google.com/site/oefensitekennisbasistoets/> (in Dutch).



1. To what extent do student teachers working on non-routine mathematical problems:
 - look for the underlying mathematical structure of the problems and relate the problems to comparable ones (horizontal mathematising);
 - generalize problem approaches to construct mathematical knowledge (vertical mathematising);
 - reflect on and evaluate their use of heuristics and the problem solving process?
2. With which attitude (intention, self-confidence and motivation) do student teachers work on non-routine mathematical problems?

METHOD

This study explores the behaviour of student teachers preparing for the mathematics test in self-study situations. As there are many variables that might influence student teacher behaviour, a case study is appropriate here (Yin, 2009).

97 third-year student teachers spread over seven groups from seven different teacher training institutes voluntarily participated in the project in their own time. This took place a few weeks before they could take part in the nationwide mathematics test.

The participants worked for 45 minutes on ten non-routine mathematical problems on the level of the nationwide mathematics test for student teachers. These problems had been selected from the popular website mentioned before. Each problem was provided with multiple video recorded problem approaches. During the experiment the participants could use this material, problems and problem approaches, in their own way and self-chosen order.

Although 10 to 15 student teachers were sitting together in the same room, they worked individually on their computer with headphones, without asking questions. Scrap paper use was allowed. The teacher educator who was around observed the student teachers, but was not allowed to answer substantive questions.

Four instruments were used to collect data: a survey, an interview, teacher educator's observational notes and the student teachers' scrap paper.

- a survey; after their time working on the problems was over, the student teachers completed a digital questionnaire,
- a group interview; immediately after they completed the individual questionnaires, the student teachers participated in a group interview. The teacher educator who took the group interview repeated the questions from the survey and invited student teachers to provide their answers with examples, arguments and explanations. Each interview was recorded.



- In the survey and the group interview the questions focused on three subjects:
 1. The student teachers' behaviour when working on the problems.
 2. The student teachers' use of:
 - a. the problems and the problem approaches;
 - b. the heuristics and problem solving process; and their reflection on these.
 3. The student teachers' attitude – intention, motivation, self-confidence – when they were working on the problems.
- The teacher educator observed the student teachers and made notes to describe their behaviour when they were working with the material.
- The teacher educator collected student teachers' scrap paper or took pictures of it in case the student teacher wanted to keep the scrap paper.

All four elements, survey, interview, teacher educator's field notes and student teachers' scrap paper, were used in data analysis. The analysis focused on the way student teachers reflected on problems structures and problem approaches (cognition), on heuristics and problem solving processes (meta-cognition), and on their intention, self-confidence and motivation to work with the materials (attitude).

RESULTS

During the 45 minutes the participating student teachers worked hard and seriously. The available time enabled them to work on about six of the ten given problems. Almost all the student teachers started with the first problem and continued in the presented order. They could solve about half of the problems correctly. They were satisfied with the problems because they recognized them as test-like items, which made it useful to work on them. They used their time to solve problems, but they hardly looked at the problem approaches. After trying to solve a problem, most students checked their answer. If it was correct, they immediately continued to the next problem. If the answer was wrong, they quickly glanced at the problem approaches, but even then they preferred to go on with the next problem. They were a bit more willing to look at the available problem approaches when they had no idea how to solve the problem themselves, or occasionally if they could recognize at once a problem approach that was more efficient or easier than their own. In the interviews some student teachers stated they only looked at the problem approaches to find confirmation of their own problem approach. As soon as they had found their problem approach, they continued to the next problem.

Overall the participants hardly used the presented problem approaches. During the group interview they explained why:



- They did not realize that comparing problem approaches and reflecting on their own work was important for developing mathematical problem solving ability.
- They found it hard and confusing to compare problem approaches. They were afraid that studying alternative problem approaches would disturb them. They preferred to use their own problem approaches during the stressful nationwide mathematics test.
- They preferred solving more problems superficially over only a few problems in depth, as time was limited.

The student teachers' scrap paper contains many calculations (see figure 2 for a typical example).

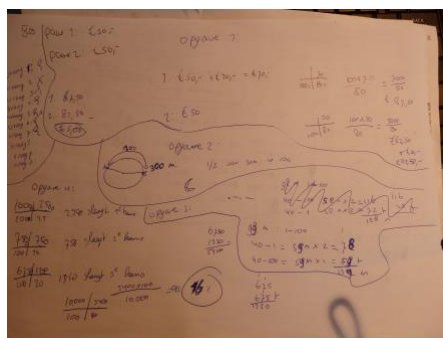


Figure 2. Scrap paper of a student teacher. Calculations without mathematical or problem solving remarks.

This makes it clear that they really worked hard during the given time, but notes about problem approaches, problem structures, heuristics or steps in the problem solving process are lacking completely. Specific mathematical or heuristic learning outcomes were not reported by the student teachers.

When the student teachers were asked what they had learned from participating in this experiment, they did not mention examples of mathematical knowledge or heuristics or aspects of problem solving processes. In spite of this, they were very enthusiastic about their participation, because it was a good opportunity to reach for their own goal. This goal was not developing mathematical problem solving ability, but getting an impression of the nationwide test. They wanted to get acquainted with test-like problems, and they wanted to investigate whether they were already prepared enough to solve these problems. They actually wanted to know if they were already able to pass the test. They hardly used the provided problem approaches, because they did not realise that these could be used to reflect on their own problem



approach, to develop mathematical problem solving ability. Besides that, they lacked the self-confidence to compare their problem approach with alternative problem approaches. They were afraid that this would confuse them.

CONCLUSIONS AND DISCUSSION

The research question we start with was to what extent student teachers' self-study activities are supportive for developing their mathematical problem solving ability, and how we can explain their study behaviour. Since reflection on cognition and metacognition is the most important activity to develop mathematical problem solving ability, we focused our research on this aspect.

The results of the research made it clear that student teachers working in self-study situations on test-like non-routine mathematical problems and problem approaches hardly reflect on their work. They do not look for the underlying mathematical structure of problems, they do not compare and generalize problem approaches, they do not evaluate heuristics and problem solving processes.

There are several reasons for this behaviour. Student teachers do not realize that they have to develop mathematical problem solving ability and what that requires, they lack self-confidence and motivation to study alternative problem approaches, they do not want to spend time on it, and the most important reason for this behaviour is the fact that they use the problems to reach their own goal: getting acquainted with as many test-like items as possible and investigating if they can solve these already. They work hard towards this goal, that is to say that they study many problems rather superficially. It is not clear if this is an effective way to reach their own goal, but it is crystal clear that these non-reflective self-study activities will not contribute to the development of their mathematical problem solving ability.

The next question is what we can do to change the behaviour of student teachers during mathematical self-study activities, to challenge them to reflect in these situations and develop their mathematical problem solving ability.

A peer review with Dutch mathematics teacher educators

We discussed this question with Dutch teacher educators at the ECENT/ELWIER-conference in Utrecht on the 19th of May 2017. These teacher educators were convinced that to change their self-study behaviour, student teachers first need knowledge. They need to know that solving non-routine mathematical problems means that they cannot use a memorised standard approach. They must realise that non-routine problems are new unknown problems that only can be solved by constructing their own new problem approaches. To construct these, student teachers need knowledge of mathematical problems and problem approaches, but also of



heuristics and problem solving processes. Student teachers need to experience that they can develop their mathematical problem solving ability by reflecting on their own problem approaches, for instance by comparing them with alternative problem approaches. But even if student teachers are conscious of this, they need a suitable attitude to actually do it. They must be convinced that it is valuable to work on this goal, and they also need much time, challenge and support.

The teacher educators had many suggestions to improve the self-study materials. They believe that showing non-routine problems and several problem approaches is a good start, but the student teachers need enough time, support and challenge to use the materials in an effective, that is to say reflective way. To reach this one can:

- add reflections to the problem approaches, for instance reflections of experts who make explicit the mathematical features of the several approaches and also draw attention to the used heuristics and the problem solving process,
- provide student teachers with hints during their problem solving. These hints can anticipate on alternative problem approaches, or make student teachers conscious of the use of heuristics or the steps of the problem solving process,
- connect an extra problem to each problem. This problem must look different at first sight, but must have a link to the first problem, for instance because of its mathematical problem structure, or perhaps because of the heuristics that can be used to solve the problem. This can stimulate student teachers to reflect on the first problem, because that can help them to solve the second one,
- impulses to stimulate student teachers to work together on the non-routine problems. Let them compare and discuss problem approaches with other student teachers. In this way the reflection and the constructing knowledge about mathematics or problem solving processes can happen more naturally.

It is worthwhile to test these suggestions in a new research. But in spite of that, many teacher educators doubt whether it is possible to develop mathematical problem solving ability without a teacher educator.

A teacher educator can for example give hints, ask questions, stimulate student teachers to reflect on their work and on alternative problem approaches (Engle, 2006). Zimmerman (2010) and Kostons et al. (2014) state that hints and impulses to develop cognitive and metacognitive knowledge and skills are more effective if they are given by a teacher in a face-to-face situation. And perhaps most important: teacher educators can give task appreciation and encouraging process feedback, which means affective support and motivation (Hattie & Timperley, 2007; Kostons et al., 2014).

It is clear that it is complicated to develop mathematical problem solving ability without the support and challenge of a teacher educator. But student teachers who



have to do this deserve our attention to design and evaluate the best materials to support them as much as possible.

REFERENCES

- Ambrose, S.A., Bridges, M.W., DiPietro, M., Lovett, M.C., & Norman, M.K. (2010). How Do Students Become Self-Directed Learners? In Ambrose et al., *How Learning Works: Seven Research-Based Principles for Smart Teaching* (pp. 188–216). Jossey-Bass: San Francisco.
- Drijvers, P. (2015). *Denken over Wiskunde, onderwijs en ICT* [Thinking about Mathematics, education and ICT]. Inaugural speech, University Utrecht, Freudenthal Instituut.
- Engle, R. (2006). Framing Interactions to Foster Generative Learning: A Situative Explanation of Transfer in a Community of Learners Classroom. *The Journal of the Learning Sciences*, 15(4), 451–498.
- Gravemeijer, K. (1994). *Developing Realistic Mathematics Education*. (Diss.) Utrecht: Freudenthal Instituut.
- Keijzer, R., Faarts, J., & Garssen, F. (2016). Handig gebruiken van kladpapier bij de kennisbasistoets [Clever use of scrap paper with the knowledge base test]. *Volgens Bartjens – Ontwikkeling en Onderzoek*, 36(2), 41–46.
- Kostons, D., Donker, A., & Opdenakker, M. (2014). *Zelfgestuurd leren in de onderwijspraktijk. Een kennisbasis voor effectieve strategie-instructie*. GION onderwijs/onderzoek Rijksuniversiteit Groningen.
- Nelissen, J. (2007). Recent onderzoek naar transfer [Recent research on transfer]. *Reken-wiskundeonderwijs: Onderzoek, ontwikkeling, praktijk*, 26(1), 11–18.
- Pólya, G. (1990). *How to Solve It*. Londen: Penguin Mathematics.
- Selden, A., Selden, J., Hauk, S., & Mason, A. (2000). Why can't calculus students access their knowledge to solve non-routine problems? In Dubinsky, E., Schoenfeld, A., & Kaput, J. (Eds.) *Research in collegiate mathematics education. IV* (pp. 128–153). Providence, RI: American Mathematical Society.
- Van Streun, A. (2001). *Het denken bevorderen*. s.n.
- Verschaffel, L., De Corte, E., Lasure, S., Vaerenbergh, Bogaerts, H., & Ratinckx, E. (1999). Learning to solve mathematical application problems: A design experiment with fifth graders. *Mathematical Thinking and Learning*, 1(3), 195–229.



- Yin, R. (2009). *Case study research: Design and methods*. Fourth edition. Thousand Oaks, CA: SAGE Publications.
- Zimmerman (2010). Becoming a Self-Regulated Learner: An Overview. *Theory into Practice*, 41(2), 64–70.



FROM HOMER TO HOMER SIMPSON: HOW MIGHT KS2 CHILDREN'S STORY-WRITING SKILLS BE SUPPORTED AND DEVELOPED THROUGH THE USE OF CONTEMPORARY PHYSICAL AND DIGITAL RESOURCES?

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ABSTRACT

The storytelling of Homer in The Iliad and The Odyssey, which literary critics readily accept as great works of literature, is now widely considered by many historians and other scholars to have actually been composed through talking (or more accurately through singing) rather than through writing (Corbett, 2010). Often such stories were improvisations (similar to contemporary jazz, jamming, rap or traditional music and folk-songs) where one performance is seldom the same as another. In today's literate society it is difficult to imagine how magnificent works of art, great stories and legends came to be composed in the absence of any form of reading or writing. On the contrary, it now seems that these shared worlds of meaning came into being through the interplay of a range and combination of storytelling 'technologies' and resources. These include orally shared mental pictures, familiar sounds and words, remembered rhymes or rhythmic phrases, individual and collective accounts of day to day human experience, and the heroic tales and legends which have carried the imagination, hopes and fears of our ancestors across the ages. Carter (2000) and Duncan (2009) point out that literacy in the form of the written word has only existed for three per-cent of the time humans have used language. The other ninety-seven per-cent comprises of oral storytelling and the spoken word. This paper reports the findings of a small-scale practitioner-research project which worked with reluctant writers in a primary school in the North of England to explore the role of oracy in the development of literacy.



SECTION 1: Literature Review

Across the field of human history, storytelling is one of the most highly developed and widely used ways in which we make sense of ourselves, each other and the world we live in. Carter argues that telling stories is a deeply human activity, which allows people to connect with the storyteller, writer, or visionary whose ideas have inspired the story. He also points out that stories allow people to convey emotions which some may find hard to express in other forms of media and means of communication. Stories enable us to share our wants, fears and passions with a wider audience, connecting people across the ages through the power of the spoken and written word.

Andrews and Smith (2011) show how the National Curriculum (NC) in England has to date, privileged writing and reading over speaking and listening. It also assumes reading and writing to be more reciprocal than speaking and writing.

Andrews and Smith (2011) argue that,

“This has resulted in more time being given to reading and writing separately (with not enough time devoted to their reciprocity) and proportionately less to speaking and listening (which are almost always seen as ‘going together’)”.

Andrews and Smith (2011, p. 7).

The above authors, are critical of such assumptions and point to the *generative* relationship between speaking and writing in that they are both skills involving high intellectual load and language *production* (original emphasis). They draw attention to how each can complement and give rise to expression in the other (pp. 5-6). They go on to argue that the link between speaking and writing development is complex and multi-faceted and claim that this link has yet to be given full attention by the academic community.

Corbett (2011, p. 1) notes that it is ‘impossible to write a sentence pattern without being able to say it – and you cannot say it if you haven’t heard it’. In order to enable children to develop as writers, he claims they need to become familiar with the rhythms and patterns of the language in forms which they can hear and say.

“Language is primarily learned through interactive ‘hearing’ and ‘saying’ and the more varied the language patterns, the better the writing will be.”

(Corbett 2011, p.2).



The importance of the pre-requisites of literacy in speech advanced by the above authors, would not have been lost on Homer, his contemporaries or indeed his ancestors who would have recognised the importance of the ‘technologies’ of interactive hearing and saying. These include, shared language, imagery, language and sound patterns, social relationships and a sense of confidence in, and belonging to, a community engaged in the composition and sharing of the stories through which we make sense of ourselves and our world. Making sense of ourselves and our world is, and always has been, inextricably related to our language.

Wittgenstein observes,

The limits of my language are the limits of my world
(Wittgenstein, 1922).

To accept as a starting point that the limits of our language are the limits of our world, is not to suggest that the reach of our minds, of what we can say, think, appreciate, and judge, is trapped within the borders of our society, our country, our class, or our time. On the contrary, it is to see that the reach of our minds, the range of signs we ‘manage to interpret, is what defines the intellectual, emotional, and moral space within which we live’ (1985, p.263).

Geertz goes on to argue that the more we can imagine and understand ‘other worlds’ and what it might be like to be other people, the clearer we become to ourselves, both in terms of what we see in others, that seems remote to us, as well as that which we see in others that seems familiar. Corbett (2010) reminds us how we live stories in our imagination and that,

Story helps us to understand our lives - to explain who we are, what has happened to us, what might happen...Narrative is like a template we place upon our lives, so that we can understand our selves and our world. It is through narrative that we can step out of the darkness of ourselves...It is to do with the genuine functions of education.
(Corbett 2010, p. 4).

Fisher points out that ‘every lesson is a lesson in language’ and that ‘talking and writing are forms of thinking’ (1998, p.204). Carter (2000) and Perkins (2012) show how talk can help children to imagine other worlds, to structure their ideas and their thinking and to find the best words to use and the best ways to use them. Perkins advocates that, before any writing activity, children need to have opportunities for lots of talk individually, in pairs and small groups and in large groups. Through the work of Corbett (2008), Perkins argues that language acquisition involves internalising patterns of language. Echoing the work of Carter (2000) and Corbett (2011) she illustrates how these can subsequently be extended to ‘learning patterns



of narrative with accompanying actions' (Perkins 2012, p. 93). Following Corbett (2011), Perkins links story-making and story-telling to 'talk for writing' on the grounds that these strategies give children content, purpose, motivation and skills for writing. For Corbett (2008, 2011), the developmental exploration through talk, of the thinking and the creative processes involved in being a writer are crucial to the development of children as writers.

Vygotsky (1986) acknowledges that, in the act of writing thought has the longest distance to travel. He notes also that writing is a relatively new development in the field of human communication. Carter (2000) draws attention to how, to date, writing represents only three percent of the history of human discourse, with the other ninety-seven percent being conducted through the medium of talk alone.

Research Question:

In view of the above, I was interested in how KS2 children's story writing skills might be supported and developed through the use of contemporary physical and digital storytelling resources?

SECTION 2: METHODOLOGY

Context

This small-scale research project was conducted in an urban school in the North East of England. The school is located on a large housing estate mainly comprised of local authority housing. In this small-scale research study, I explored the use of *Rory's Story Cubes* as an app for IOS and Android devices and as a physical set of storytelling dice. I wanted to explore if these resources might enable the development of children's storytelling abilities and improve their motivation to write. I was also interested in finding out if the use of physical and digital storytelling resources influenced the quality and quantity of children's writing.

The Research Study

The research study was conducted over five consecutive days in November 2013. The research population consisted of twelve children who had been identified by their class teacher as reluctant writers, many of whom did not enjoy tasks that required them to use their imagination. In the first three sessions I worked with four children (two pairs at a time). There were also two focus children in the study, a child with Special Educational Needs (SEN) and 'Nicola' a child with highly developed mathematical skills for her age who was clearly disinclined to using her imagination when it came to creative writing. There were also two high-achieving



English as an Additional Language (EAL) children in the group, whose parents were from affluent professional backgrounds.

Data Collection Methods

Data was collected in the following ways:

1. Classroom observations (paired small groups and whole class).
2. Audio recordings of children telling their stories using *Rory's Story Cubes* in the form of physical dice.
3. Transcripts of audio recordings.
4. Photographs of storylines produced by *Rory's Story Cubes* in physical dice form.
5. Photographs of children's poems produced using *Rory's Story Cubes* in a digital form.
6. Analysis of individual children's stories and poems.

Data Analysis

1. During the course of this research emerging data sets were discussed and findings authenticated with the class teacher.
2. Following the data collection period, transcripts of audio recordings, written stories produced by paired groups and individual children together with poems produced by individual children were analysed to identify categories and frequency of language devices being used.
3. Research field notes and classroom observation data were analysed to identify critical incidents.
4. Categories of data were then clustered thematically.

SECTION 3: DATA ANALYSIS

Research Field Notes and Critical Incidents.

The following extracts from my field notes were made during the course of the five-day period during which the research was conducted. They are taken from classroom observations of children as they participated in each of the *Rory Story Cubes* research sessions. They present critical incidents from each of the sessions and lend support to the findings of the quantitative data also analysed and presented in this study.

The critical incidents (*in blue font italics*) discussed below are extracts from research field notes.



Qualitative Analysis of Critical Incidents and Findings

Critical Incident 1: *The children asked me if they would need their books and their pencils for this literacy lesson. I told them that they wouldn't. This seemed to please and intrigue the children all at the same time*

Finding: This incident lends support to the teacher's assessment that the children in the study did not regard writing as something enjoyable or something that they wanted to do. It may also indicate that they normally experienced some anxiety when faced with writing tasks.

Critical Incident 2: *Two EAL children often struggled to link all nine images on the dice. They decided to turn over 'problematic' dice so that they could choose other images to help them with their story. The images they chose included battle-axes and laser guns. When I asked them why they were choosing different images to the ones they rolled, they told me they were "looking for more boys' pictures". However the girls were happy to use any image dice to form their stories. The EAL children in this group while drawing their pictures and annotating them would often look at the other sides of the cubes to see if they could elaborate on a particular panel on their storyboard. This proved to be a coping strategy for both boys when tasks became difficult and offered them a vehicle to push through difficult sections of their story.*

The two EAL children (both boys) framed their stories often around science-fiction and themes (usually involving guns, armies and death). This strategy allowed them to shape their stories in creative ways drawing upon a range of literary devices to create their story.

Finding: This provides evidence that the two EAL boys had developed a unique collaborative coping strategy, which was in itself quite creative! It is also interesting to note however how they explained their choices of alternative images in terms of being "more boys pictures", while the girls in the group were happy to work with any random image generated by throwing the dice. From the limited nature of the data in this study it is not possible to make any gender-based inferences here but this is an aspect of the study worthy of further exploration,

All stories produced in this group were well thought-through with good use made of a high number of literacy devices indicating that both of the EAL boys and the girls in the group were able to use the story cubes to develop their ideas and stories.

Critical Incident 3: *The focus child on this day, who was identified as having high attainment in mathematics but was a reluctant writer who did not usually engage with creating story writing activities. Classroom Observation data showed that she was highly engaged with the study and use of the media. The focus child used*



adjectives to breathe life into her story. Her enthusiasm for story telling translated well from the oral story telling session to the more conventional written sessions. She was eager to write down her ideas and produce high quality stories. In the storyboard activity where both art and literacy worlds collided she worked cooperatively with her partner discussing what to draw in each box and who would draw in which boxes. The annotations below these boxes showed that both children worked together well and worked creatively. With her partner they produced two well thought through stories using a wider range of vocabulary and creative literary devices than the class teacher would have expected.

Finding: This indicates that the story cubes helped the focus child to ‘see’ story writing in a new way, which not only enabled her engagement but also resulted in the use of a wide range of literary devices. The focus child’s use of the story cubes showed that if motivated properly and given the right tools to spark imagination in a fun and fluid way children who do not often engage with creative tasks can and will do so.

Critical Incident 4: *... the SEN child, who formed part of the study group engaged positively with the study and the story cube media and despite claiming that he had no ideas for stories he produced two very well thought through pieces of work, which he retold with intonation using a wide range of vocabulary. Prior to this session the class teacher had reported that this child struggled to come up with his own stories and simply used his “safety net ideas” reproducing events from a video game he enjoyed*

Finding: This indicates that the story cubes enabled the SEN child to develop and be more creative in his thinking. His use of intonation in telling his story implies ownership of and even pride in his story as well as pointing to an increase in his confidence as a storyteller.

Critical Incident 5: *For children who normally were not positive about writing they genuinely seem to enjoy creatively using the media and were positive themselves about their work. A tangible “feel good factor” was evident in the sessions.*

Finding: This indicates that children in this study were motivated and may have been experiencing a sense of achievement for the first time in relation to a writing task. This lends support to the claim that the story cubes were enabling them to compose, develop and get to the end of a story. This was evident in the way that the children could not wait to tell their story as soon as they had finished them. Children were very excited by the idea of having their stories audio recorded so that they could listen to them back at a later date.



Critical Incident 6: *One of the children, identified by the class teacher as normally being a very reluctant writer wanted to write their stories down before the end of session as they wanted to remember them for tomorrow.*

Finding: The fact that this child expressed the need to write their story down so early in the intervention (after this first session) underscores the extent to which this child was engaging in storytelling, as well as the extent to which the experience was motivating them to write. At least one child in each of the other groups asked if they could write their story down at the end of the **first** session.

Critical Incident 7: *Children were happy to hear that their stories were being audio recorded and that they would hear them again the next day.*

Finding: This seemed to signal to the children that their story was important and that it would not be lost just because it had been written down yet. They also seemed to welcome the opportunity to listen to it again the next day.

Critical Incident 8: *All groups demonstrated enhanced use of language and produced high quality storyboards based on the second story they composed and told on the first day.*

Finding: This provides evidence that the use of the story cubes and the story boards enhanced children's use of language and creative literary devices across the research population.

Critical Incident 9: *The girls in Group 2 worked well collaborating on their pictures in their storyboards. They attempted to signal in the images on their storyboard that were coming up later in the story (in much the same way as you would do on a comic strip). When I asked why they did this they said "It will keep miss interested when she reads them".*

Finding: This illustrates how the use of the story boards and the story cubes might have encouraged the use and development of visual literacy as these two children were using images to enhance their stories and their story telling.

Critical Incident 10: *The engagement of the focus child was possibly more positive in this second session. She developed her story to provide more clarity in the story she had created with her partner in the session. There was a real desire to articulate the story, and ensure that the story was framed and shaped in a conventional manner, i.e. produce a recognizable story yet retain both her and her partner's imaginative input to the story in session 1.*



Finding: This demonstrates progression and confidence building in that the focus child was becoming more and more positive about her story making and writing abilities.

Critical Incident 11: *The SEN child managed to develop their story further and found it easier to elaborate after drawing the corresponding picture for the cube. These pictures were all interpretations of what the child was imagining and what he could see on his dice. The SEN child demonstrated that he had many varied and interesting ideas often requesting words he did not know how to spell and asking for them to be added to the group's word bank of interesting words for others to use.*

Finding: This indicates that there is a link between the interpretations of the symbols on the dice, discussion of potential meanings of symbols on the dice and the development of children's language. This may be of particular interest due to the fact that the child in this case was an SEN child. This incident also provides evidence that the use of the story telling cubes encourages the development of sociocultural learning and practice. What is of particular importance here is that it provides some evidence of Vygotsky's (1986) Zone of Proximal Development (ZPD) at work, as children gained confidence in asking how to spell words they did not know and in adding to the groups word bank of interesting words for use later.

Critical Incident 12: *All of the groups knew prior to this session that the activity would end with an individual neat 'write up'. The first group were eager to personalize and customize their pair's story. All the children took different approaches to writing their individual stories. Some wrote their stories in the third person whereas others wrote theirs in the first person. Many children adapted their paired story so that the theme was the same but some of the characters differed. This was common across many of the stories. In the case of the two EAL children they wrote very different stories to each other.*

Finding: This indicates that although children composed their original stories together, they felt confident and able enough to use a variety of creative linguistic devices to make the story into their own unique version of the paired story. This provides evidence that the original story, far from limiting their imagination provides a platform for the creation of new individual stories.

Critical Incident 13: *One EAL child only used the main character from the story and used some of the settings from his paired story, whereas his partner tried to build more on the paired story and continued it past where it ended on the storyboard. This made this child frustrated as he had used all of the images on the dice he felt he could use. He was eager to use the cubes to build on his story but could not decide which images to use to personalize his story.*



Finding: Again this incident points to the ways in which children can use the cubes to develop their stories in different ways. It also shows how they can use them to expand upon and extend previous stories beyond their original endings. However it also indicates how in at least one case the child was becoming dependent on the cubes to help him generate new ideas.

Critical Incident 14: *Both the SEN and focus child produced individual and unique versions of their paired stories. They both displayed more advanced use of creative literary devices.*

Finding: This lends support to the claim that SEN children as well as children with high attainment in mathematics may benefit in particular from the use of the story cubes in developing their writing.

Critical Incident 15: *The class responded well to the APP version of the cubes. The children in the class had only heard about the story cubes but had not used them. The core focus here was not to write a story but to write a poem using one or more of the cubes. This resulted in many children using more than one cube to produce interesting rhyming poems containing metaphors and similes, most children produced more than one poem often using the same cube and interpreting the picture on the cube differently.*

Finding: This demonstrates the whole class potential of the iPad App of *Rory's Story Cubes*. It also provides evidence of how *Rory's Story Cubes* can be used to develop thinking and writing from the genre of fictional story to the genre of poetry. It is interesting to note and a point worthy of further study that while the children did not use simile and metaphor in any of their stories they used them extensively in their poems.

Critical Incident 16: *The SEN child claimed that his ideas were only for stories and that the cubes could only be used for stories, as their name was Rory's Story Cubes. After some encouragement from his class teacher the SEN child managed to produce a poem not based on the on screen cubes but from his video game 'safety net'.*

Finding: In contrast to the above however it is worth noting that the SEN child was the exception to the transfer of skills from one genre of writing to another claim. However it is important to note that with additional encouragement from staff and peers he was able to make the transfer. Over the course of the week it can be seen that the SEN child was engaged for some length of time by the cubes and was highly motivated to produce stories that used his own ideas. It encouraged him to think about how he could build on his stories and improve them and gave him the control to decide where his stories were going to go. Although he did not use the cubes in his final session he did use the techniques he acquired from the sessions to create an



interesting piece of poetry. It is also important to note that the SEN child managed to produce a poem not based of the on screen cubes but from his video game ‘safety net’.

Critical incident 17: *Children used cubes to help them recall and tell their stories. During the session with the first group the two girls used hand actions to help them recall and tell their story. This was a method they had learnt in class through Corbett’s Talk for Writing.*

Finding: This indicates that the story cubes not only served to support creative storytelling but also as a recall/memory aid for already created stories.

Critical incident 18: *Most groups used the cubes to tell their story. However two girls Group 2 used their knowledge of Corbett’s Talk for Writing scheme (which they had experience of using in class) to recall, tell and develop their story. This allowed them to enhance the storytelling experience for the other groups by showing them another strategy to use in storytelling through physical actions, tapping into an ancient style of storytelling performance not to dissimilar to that used by Homer and his contemporaries in ancient Greece.*

Finding: This shows that the children were highly engaged, using and developing creative methods to enhance not just their own story telling experience but the story telling experience of others. This could signal the early development of the early ‘sharing’ conventions of a story-telling/story making community.

Quantitative Analysis From Audio Transcripts and Written Stories

In each of the oral story telling sessions, transcripts of the children’s work were gathered. Once the transcripts had been created the total number of creative devices used in each story were quantified and analysed. This was also done for the hand-written stories to allow for comparisons across all of the sessions. The following tables present the results of this process.

Frequency Tables for Creative Literary Devices

Creative Literary Device	Total in Story 1	Total Story 2
Proper Nouns	5	9
Common Nouns	56	59
Verbs	36	39
Short Sentence	19	7
Adjectives	16	13
Adverbs	6	9



Prepositions	15	13
Metaphor	0	0
Simile	0	0
Total Creative Devices	132	149

Data collected from Written Story.

Total Number of Creative Devices Used 381

Use of Proper Nouns 49

Use of Common Nouns 133

Use of Verbs per story 91

Use of Short 10

Use of Adjectives 84

Use of Adverbs 13

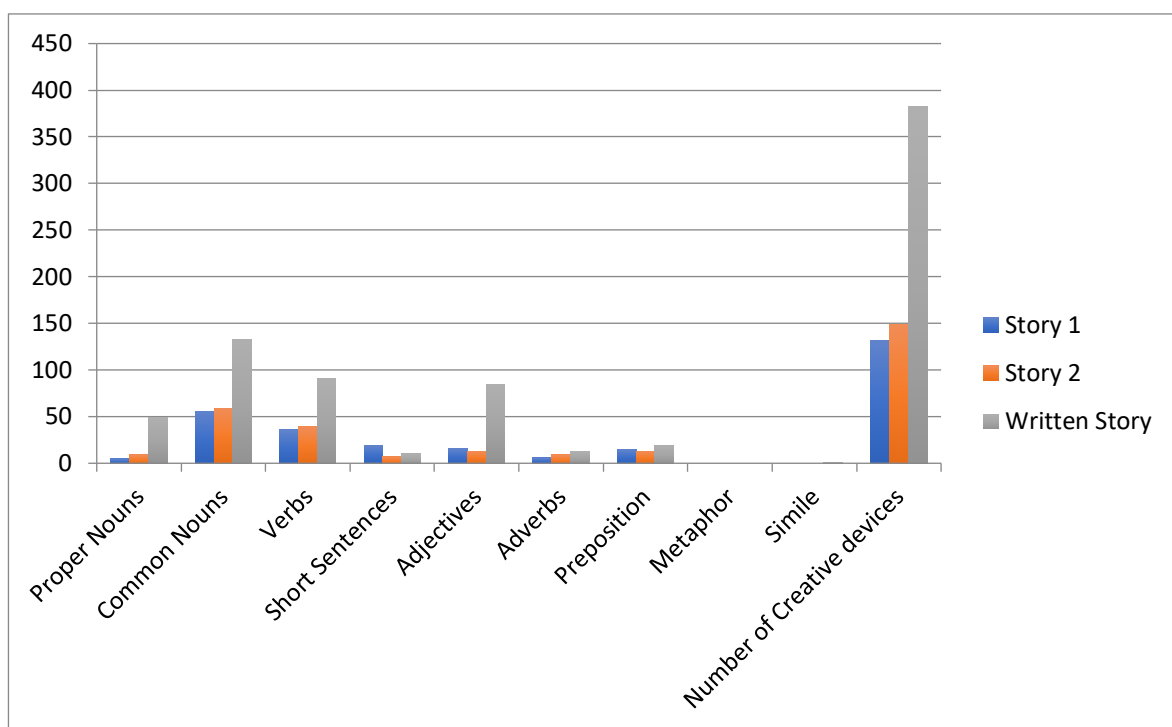
Use of Prepositions 19

Use of Metaphors 0

use of Similes 1



Comparison Table: Use of Creative Linguistic Devices for both Oral and Written Stories



Analysis of Quantitative Data

The quantitative analysis indicates that:

1. A significant overall increase in the use of creative devices used in the children's story telling. The improvement is particularly striking when comparing the number of such devices used in the first oral story 132 as compared with the 382 used in the written piece of work an increase of 189% in the their use. Although the improvement between the first and second oral stories was 132 to 149, it is not as marked, however this still represents a 13% improvement, which in itself is significant.
2. Regarding metaphors and similes (which were only used by the children in their poems) there was zero usage of these linguistic devices in all 3 pieces of story writing work and with the exception of short sentences there was an increase in the use of all other creative devices. Two key questions are why there was a fall in the use of short sentences; and why children only used metaphors and similes in their poems? Both of these are worthy of further



investigation. Classroom observation data indicates that children were motivated by the use of the story cubes and generally engaged with the work. The fall in the use of short sentences might therefore be attributed to an overall increase in the complexity of sentence construction used by the children in their work.

3. Of particular note is the increase in the number of proper nouns used when comparing the first oral story (5 incidences) with the written work (49 incidences). The number of common nouns increased from 56 to 133, the usage of verbs increased from 36 in the first oral story to 91 and the usage of adjectives increased from 16 to 84. However it is important to note that the study was limited by the time available and the research having to fit in with other school activities. The study would have benefited from the children carrying out further written work so that a comparison of more written texts could have been carried out. However even allowing for potential sampling bias and the scale and length of the study these improvements are significant and worthy of further investigation.
4. The use of more complex creative devices show notable improvements. The use of adverbs is up by 116% with 6 being used in the first oral story and 13 in the written work and preposition usage increasing from 15 to 19 (27%).
5. These differences could be explained by the children's use of more complex and formal language in their written work as compared with spoken language. This certainly could account for some of the differences between the first oral story and the written work, However as these children were regarded by their teacher as "reluctant writers" changes of this magnitude when comparing the children's spoken and written work would certainly point to the use of the story cubes as being a positive intervention in their learning.
6. Analysing the children's work in this way as part of a longer study would I feel assist teachers in identifying where more targeted intervention and combinations of pedagogical interventions are needed e.g. the targeted development of metaphor and simile.

SECTION 5: Strengths and Limitations of the Research Methods in the Study

Research population / sampling

The Research population was identified by the class teacher who had identified all of the children in the sample as being reluctant writers. This could be seen as a strength of the research as the class teacher had in-depth knowledge about each child and their approaches and attainments in the development of writing. On the other hand, it could be argued that for this reason, the sample may not be representative of the whole population of reluctant writers in other classes and schools (Bell 2005,



p.13). Furthermore the selection of the sample may be open to criticisms of potential bias from the class teacher's perception and choice of the research sample (Ball 2005, pp. 132 – 133).

Scope, Scale and Timing of The Research.

The small size of the research population in this study, together with the limited time over which the study was conducted, does mean that the findings must be treated with care and that any generalizations we may be able to draw from this work will at best be 'fuzzy',

*"The fuzzy generalization arises from studies of singularities and typical claims that it is **possible, likely or unlikely** that what was found in the singularity will be found in similar situations elsewhere"*

(Bassey 1999, p.12).

Clearly this research project would benefit from a further larger scale and more longitudinal piece of work. However, the positive outcomes indicated by the quantitative analysis, my classroom observation and the positive views of the class teacher are encouraging and worthy of further investigation.

Multi-Method Approach

A particular strength of the study is that it has not relied solely on qualitative or quantitative research methods but used a multi-method balance of both to 'triangulate' data and demonstrate 'concurrent validity' (Cohen and Manion 2000, p. 122) to strengthen the warrant of the findings of this research study.

Classroom Observation.

Bell (2005) points out how observation can often reveal characteristics of groups or individuals that would not have been possible to discover by other means. The unstructured nature of the observations in this study enabled me to spot significant events / critical incidents during the intervention. This is also a limitation of the study in that events that seem significant to me may not be deemed to be significant by others. Perkins (2012) cautions that classroom observation is not easy. She offers seven principals of observation, focus; expectations of the lesson; record objectively; reflect on what you have observed; ask question; drawn conclusions and plan future learning. While the open ended nature of this study precluded a predetermined focus for observation, the design conduct, analysis and reporting of this study endeavour to encompass Perkins' remaining six principals of observation.



Naturalistic Approach

The research design did not adopt a positivistic-experimental approach which would have necessitated the use of control groups and experimental groups and my acceptance of the role of detached observer capable of complete objectivity. Instead, I opted for a more interpretive paradigm which rejects the subject-object view of reality in favor of the view that,

“The social world can only be understood from the stand point of the Individuals who are part of the on going action being investigated”

(Cohen, Manion and Morrison, 2000 p.19).

In addition, this research study had to be designed to fit in with the demands of the existing mid-term plan. This meant that the intervention had to be flexible enough to accommodate the medium term curriculum plan, the challenges across the school preparing for the Christmas performance and constraints of pupil availability.

Research Ethics Confidentiality and Anonymity

In accordance with the British Educational Research Association (BERA) Guidelines (2011) the confidentiality and anonymity of all research participants in this study and the sites in which this research was conducted have been respected and protected throughout the study though the use of pseudonyms. The ethos of ‘protecting participants from harm’ (Norton, 2009, p. 187) has been at the forefront of this research. I have done my best to ensure that this research has not harmed learners in any way particularly in relation to their academic performance, their self-esteem or their academic confidence.

Reporting the Research

In conducting and reporting my research I have been guided by the of Coles and McGrath (2010) who advise in using the ‘rule of three’ in presenting the findings of research. While the detailed findings of this study are presented earlier I hope that the following summary may provide an indication of the significance of my work.

SECTION 6: SUMMARY AND CONCLUSION

The findings of this small-scale research study support the work of Carter (2000), Corbett (2008, 2011) and others, who draw attention to the important relationship between speech and writing development. Overall, this research study lends qualified support to claims that the use of *Rory’s Story Cubes* in the form of both digital and physical media, progressively increased children’s motivation to write



and improved their use of creative linguistic devices. Children's increased motivation, deeper engagement in their learning and greater confidence in themselves, as storytellers and creative writers, were evident in both the qualitative and quantitative data strands of this research. An interesting follow-up to the study would be to repeat the *Rory's Story Cubes* research intervention as described in this article and to follow this up with more targeted interventions using Corbett's (2011) *Talk for Writing*. This complementary use of the open-ended nature of the pedagogy underpinning *Rory's Story Cubes*, coupled with the clear structures and research-informed principles supporting Corbett's (2011) *Talk for Writing*, could help to identify if/how this combination of pedagogical interventions might lead to improvements in children's language and writing development.

Finally, Andrews and Smith (2011, p.2) note with concern that 'writing practices are getting out of touch with the multi-modality and practices of the digital age'. While I share their concerns, I would go further and argue that many of today's writing practices are not only getting out of touch with the multi-modality and practices of the digital age, they are also losing touch with the multi-modality and practices through which our pre-literate ancestors became literate in the first place!

If we underestimate the vital link between oral storytelling and writing in the pedagogical practices we use to develop children as writers, then we will lose much of the legacy of Homer and others who sparked the flame of literacy. In closing, I hope my small contribution to educational research will demonstrate the value of teachers engaging in educational research to bring about improvements in practice. Otherwise, as Wellington (2000) asks 'Why do it?'

REFERENCES

- Andrews, R., and Smith, A. (2011) *Developing Writers: Teaching and Learning in the Digital Age*. Maidenhead: Open University Press. \
- Bassey, M. (1999) *Case Study Research in Educational Settings*. Buckingham: Open University Press.
- Bell, J. (2005) *Doing your Research Project*. Maidenhead: Open University Press.
- British Educational Research Association (BERA) (2011) *Ethical Guidelines for Educational Research*. London. British Educational Research Association.
- Carter, D. (2000) *Teaching Fiction in the Primary School: Classroom Approaches to Narratives*. Abingdon: David Fulton Publishers.
- Cohen, L. Manion, L. Morrison, K (2000) *Research Methods in Education*. London: Routledge Farmer.



- Coles, A, and McGrath, J. (2010) *Your Education Research Handbook*. Harlow: Pearson Education Ltd.
- Corbett, P. Strong, J. (2011) *Talk For Writing Across The Curriculum*. Maidenhead: Open University Press.
- Corbett, P. (2001) *Fiction Writing: at Key Stage 2*. New York: Routledge.
- Duncan, D. (2009) *Teaching Children's Literature: Making stories work in the classroom*. Abingdon: Routledge.
- Fisher, R. (1998) *Teaching Thinking*. London: Continuum.
- Norton, L. S. (2009) *Action Research in Teaching and Learning: A practical guide for conducting pedagogical research in universities*. New York Routledge
- Perkins, M. (2012) *Observing Primary Literacy*. London: Sage.
- Vygotsky, L (1986) *Thought and Language*. Cambridge MA: MIT Press.
- Wellington, J. (2000) *Educational Research: Contemporary Issues and Practical Approaches*. London: Continuum
- Wittgenstein, L. ([1922] 2007) *Tractatus Logico-Philosophicus*. New York: Cosimo. (First published 1922).



MAKING TOGETHER: THE WORKING GROUP AMONG TEACHERS. CONDITIONS AND CRITICAL POINTS

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ABSTRACT

In this paper, we address the issue of teamwork in schools, asking what needs to be done to encourage the development of a collaborative culture among teachers. In the contemporary era, competence in group participation and collaborative work with others is a fundamental requirement. Yet, although research shows that teamwork enhances the quality of students' learning, collaborative cultures and practices are rarely well-established in schools, or among teaching staff. We therefore examine teachers' current teamworking practices, going on to identify possible strategies for fostering collaborative attitudes and teamwork, based on the outcomes of an action research project conducted with two Italian schools in the city of Bergamo (Northern Italy).

THE IMPORTANCE OF BEING...COLLABORATIVE

Groups are undoubtedly the leading phenomenon of everyday social life (Quaglino, Casagrande & Castellano, 1992, p. 7). We spend our lives transiting from one group to another: family, colleagues, sports teams, friends. From birth onwards, participation in groups is our means of acquiring the knowledge, behavior and skills we need to survive in the world: the group offers us meaning perspectives that enable us to engage with reality (Mezirow, 1991).

The value of the group dimension is increasingly being acknowledged in face of the progressive individualization of society (Bauman, 2010). For this reason, knowing



how to participate in a group and work collaboratively with others is a crucial requirement in our contemporary era.

Richard Sennet, in a book entitled "Together," (Sennet, 2012) described collaboration as the core skill needed to meet the most urgent of contemporary challenges: living with people who differ in the globalized world. The loss of a collaborative culture and the consequent spread of tribalism "in the form of nationalism" are among the main factors underpinning the crisis that has been underway in Western society for some years now. Hence, Sennett proposes a return to rituals and policies of collaboration.

Knowing how to be part of a group is not only a key social competence required for healthy psychological development, but increasingly also a competence that is demanded in the workplace.

Schein recognized that organizations are born of the need to harness the potential of the group: work groups are formed due to the awareness that certain activities may only be successfully implemented via a process of mutual co-operation (Schein, 2009). This emphasis on collaboration has grown even stronger in light of recent societal change.

In the knowledge society, organizations are becoming leaner and less hierarchical, increasingly stressing the importance of knowing how to share knowledge and collaborate in pursuit of a common goal (Slavin 1983; Johnson & Johnson, 1994; Gilles & Adrian, 2003; Gjurovikj, 2013). For this reason, when companies are recruiting staff, candidates' ability to work as part of a team is one of the first characteristics to be assessed at both individual and group interviews; corporations are also investing more in fostering teamwork and training managers in how to coordinate work groups.

Although we are constantly immersed in groups, and although collaborative skills are increasingly valued, knowing how to interact and work with others as a team is not a simple skill. It becomes even more complex in work groups, not just because these groups are formed to achieve goals and because the members frequently have not joined the group by choice, but also because the work group is different in itself to other kinds of group (Quaglino, Casagrande & Castellano, 1992). The main difference is that while a non-work group is a plurality of interactions, a work group is a plurality of integrations. The latter is characterized by progressive psychological bonding and the harmonization of similarities and differences. By integration, we mean the process whereby members become aware of their mutual dependence and represent the network of their interrelationships according. The unity of work groups is thus based on an acknowledgement of difference and clear recognition of the reciprocal nature of exchange. Working as a group rather than individually implies



expecting to obtain a product that is substantially different from what each of the individual group members could produce alone; however, this can only come about if all members collaborate. Finally, the work group is constrained by the need to complete its task.

Therefore, we need to study the dynamics involved in group work and invest in teaching collaborative skills, because only by experimenting with and learning about teamworking strategies, can the potential of any group be fully harnessed.

GROUP WORK AT SCHOOL

Given the key importance of collaborative skills for students' personal and professional development, schools - as agencies whose mission is to provide a simplified form of social experience, offering students the opportunity to learn valuable lessons for their future lives (Dewey, 1916) - should set teaching children to work in groups as one of their primary goals.

In recent years, cooperative learning is increasingly being deployed as an educational method whereby students work together in small groups with the aim of enhancing their learning (Johnson, Johnson & Holbec, 1994). Compared to competitive and individual learning, cooperative learning leads to improved outcomes in terms of motivation, reasoning and critical thinking skills, positive relationships among students, and psychological wellbeing (Johnson, Johnson & Holbec, 1994, p.20). However, there is also growing educational interest in group work among teachers: ultimately, the issue of cooperation among students is part of a wider problem concerning the way that schooling is organized (Johnson, Johnson 1994; Johnson, Johnson, Holbec, 1994). For decades, schools have functioned by compartmentalizing tasks, entrusting them to individual teachers who - isolated from their colleagues - work alone, in their own classroom, with their own students and on their own subject. Students too are viewed as interchangeable parts of the educational "machine" (Johnson, Johnson & Holbec, 1994).

Recently, several major studies have focused on how the teachers in a school relate to one another as a professional community, concluding that collaboration has a key part to play in the drive to improve education. Teachers' modes of interaction outside of their classrooms can crucially impact on efforts to restructure children's educational experience.

Group work among teachers is important for several reasons. First and foremost, when teachers coordinate their work more favorable outcomes are attained at the school level. Numerous recent studies have demonstrated the importance of knowing how to work in teams and the benefits that a collaborative culture can bring to any



organization (Lee, Dedrick, & Smith, 1991; Lee & Smith, 1996; Louis, 1992; Newmann & Wehlage, 1995; Peterson, McCarthy, & Elmore, 1996; Rosenholz, 1989). For example, Barczac, Lassk & Mulki (2010) showed that working as a team is a key prerequisite for any organization to achieve positive results, because the spread of a collaborative culture fosters emotional intelligence and creativity, multiplying the capacity to identify innovative solutions. Seashore Louis and colleagues (Seashore Louis, Marks & Kruse, 2017; Seashore Louis & Marks, 1998) reported that developing the ability to work as a group has a knock-on effect on classroom organization and thereby on teacher efficacy and student learning: “Through a combination of supportive structural conditions (such as shared decision-making and time to meet and plan) and human and social resources (such as facilitative leadership, feedback on performance, and focused professional development) teachers can coalesce around a shared vision of what counts for high quality teaching and learning and begin to take the collective responsibility for the students they teach” (Seashore Louis, Marks & Kruse, 2017, p. 535). Spillane (1999) found that the teachers who improved their practices the most were those who engaged in ongoing deliberations with colleagues that helped them translate new ideas into practices. When different teachers work with the same students, the ability to coordinate their efforts is key to achieving consistent results. Finally, the spread of a collaborative culture among teachers also offers a positive model to students. Students can only learn teamworking if they are exposed to it, and teachers can only transmit a culture of collaboration if they themselves are able to work together as a team.

THE ITALIAN SITUATION

Despite the current emphasis on fostering a culture of collaboration and collaborative skills as required by EU education and training objectives, especially where students are concerned, group work is not a common practice in schools generally, nor among teachers.

In Italy, teachers most often carry out their duties alone, lacking settings in which to share their practices, reflect on the meanings and consequences of these practices, and identify joint strategies for enhancing students’ school experience (Dewey, 1938; Cappa, 2014).

The structural dispositive (Foucault, 1975; Massa, 1987) inherent in the organization of Italian schools – i.e., generally rigid timetables, little or no opportunity for teachers to overlap in the classroom, and a lack of institutional space and time for them to discuss and jointly design an integrated educational offering proposal for their students – hinders the spread of a collaborative approach. There is also immense resistance to the introduction of teamworking, where this has not previously been



part of school culture. The group is perceived as a place of great opportunity but also of threat (Agosti, 2006); on joining a group, teachers may fear losing their freedom of action, being conditioned by others or judged by others (Rezzara, 2000). These issues informed our decision to investigate the practice of teamwork among teachers.

THE RESEARCH PROJECT

The present study arose from an educational consultancy project carried out in Bergamo (one of the main cities in Northern Italy).

The action research design involved two groups of teachers from two different schools.

The aim of the study was to build up a “picture” of the current status of teamwork in these two schools, by first describing the teamworking practices already deployed by teachers and subsequently trying to understand how the implementation of these practices could be reinforced.

The goals of the two groups of participants were to:

1. Reflect on current teamworking practices in their respective schools and
2. Identify strategies for fostering a collaborative culture and teamworking practices in each of the two teaching communities

RESEARCH QUESTIONS

The research questions concerned two main areas: current teamworking practices in the school, and strategies for developing a collaboration culture

We first asked:

- In what ways do the teachers already work together as a team?
- Are they aware of the competences that they currently draw on in working collaboratively with their colleagues?
- How do they perceive their individual contribution to the teams they are part of?
- In what contexts do teachers currently work together?

Then we enquired with a view to the future:

- How may a culture of teamworking be encouraged?
- What conditions facilitate teamworking among teachers?
- And what conditions hinder it?

The research project was designed to answer these questions.



THE RESEARCH DESIGN

The research was conducted in parallel with two different groups of teachers in Bergamo who were working at two different “istituti comprensivi” (small groups of state-run groups under the same school principal): one group comprised 19 teachers, and the other 21.

Both groups were composed of infant, primary and lower secondary school teachers. Each of the groups attended seven sessions with the researchers, taking part in a range of different activities – games and simulations, writing and reflection – and experiencing a variety of group settings - plenary sessions, small groups, and pair work. Each meeting was audio-recorded and transcribed. In keeping with the ecological epistemological paradigm, and in particular a Participatory Action Research framework, the data were analysed by identifying categories (from particular to general) and questions (Guba & Lincoln, 1985). These categories and questions were discussed step by step with the participants, and the categories were modified as a result.

RESULTS

The results of the research are divided into two main parts, reflecting our two sets of research questions.

First, the research process provided insight into how the teachers currently functioned as a professional team, as well as their thoughts and feelings about teamworking. Second, it led to joint reflection on the conditions that can facilitate or hinder teamwork and collaboration among teachers.

Representations, meanings and feelings about the practice of teamworking

Given the nature of the chosen methodology, which engaged the participants in a recursive process of thinking about and discussing their current teamworking practices, the teachers’ representations of, meanings attributed to, and feelings about teamwork at school underwent changes in the course of the study. The results therefore reflect the outcomes of a learning process.

Let us now examine these learning outcomes in detail.

First, the overall meaning that the participating teachers attributed to working as a group changed as a result of the research process. At the outset of the study, the participants saw teamwork as something that was “*taken for granted*” in their daily professional lives. By the end, they had come to see teamwork as continuously



“*evolving*”. They no longer saw it as “natural” or “given”, but on the contrary, as requiring conscious awareness and effort, both on the part of the school and on the part of individual teachers. In addition, the teachers’ representations of work groups in the school setting were considerably wider-ranging at the end of the project: the teachers now recognized different kinds of work groups, differentiating among them on the basis of their specific tasks, size (large or small) and composition (groups comprising teachers of different subjects or the same subject, or teaching at the same or different levels of schooling – infant, primary, secondary, etc.), and whether participation was voluntary or not (the participants distinguished between “spontaneous groups” and “compulsory groups”).

Second, the *logic* underpinning teachers’ thinking about teamwork shifted *from “normative” to “descriptive”*. In other words, the teachers initially defined participating in groups as something that had to be done, and in the right way (“we must form a group”, “we must collaborate”): teamwork was seen as a matter of obligation. During the process, however, they began to think about working as a team by reviewing the specific ways in which groups form and function. This led to the awareness that there is no one “right way” of engaging in team work, but many ways, which vary according the characteristics of the team members, and which may be more or less effective with respect to the specific context and the specific educational task in hand.

The third result is related to the second. The shift from a normative to a descriptive perspective corresponded to another change in representations of teamwork among teaching colleagues. Namely, the teachers progressed *from a linear to a complex vision* of working as a group. At the outset of the study, they expected that, once an educational task and goal had been defined, teachers would join the relative working group by virtue of their teaching expertise and/or subject knowledge. They were persuaded that having these competencies was enough. By the end of the process, they recognized that working together is structurally problematic: being aware of the team’s objectives and the competencies of the participants was not sufficient to guarantee that the team would be effective. They found out that other factors come into play, which we now outline.

Teachers changed their minds about *the value of individual difference* for a team. Initially, they perceived differences between individuals (e.g., age, training and work experience, personality) as an impediment; vice versa, being similar was viewed as a prerequisite for working well together as a group. By the end of the research, the participants had recognized that their individual differences were unavoidable and structural and had implications for group members’ professional identity and personal motivation. They discovered that these differences needed to be acknowledged and that group strategies and multiple and complex roles were



required to attribute value to these differences and harness them as resources for the work of the team.

In keeping with this shift in perspective on difference, participants' perception of the role of emotions and feelings also changed. Initially, emotional dynamics were perceived as dangerous. Specifically, teachers viewed conflict as a disruptive and destructive dynamic, which was to be avoided. During the research process, they began to think about emotions and feelings as crucial factors to be taken into account and addressed. This led them to see conflict differently too, although they continued to perceive it as a critical event or situation.

Finally, *the teachers developed a more complex vision of teamwork* because they learnt to take into account the broader contexts within which their teams were operating. In other words, contexts that had previously been *invisible* to them were now *visible*. Initially, the participants were blind to the material, cultural and organizational settings of their groups. By the end of the process, they were able to define these contexts and their peculiar features. They saw that both the local area (with its geographic and cultural characteristics, e.g. urban) and the institution (e.g., big or small school) influenced how easy or difficult it was for them to form a work group or even to meeting their colleagues in both formal and informal circumstances. Material and organizational constraints or possibilities were discovered to be factors influencing a team's functioning and efficacy. The participants thus concluded that these factors need to be managed by the school in such a way as to foster a culture of collaboration and teamworking.

CONDITIONS FOR TEAMWORKING IN SCHOOLS

Hence, the research process ultimately shed light on both the conditions that can facilitate teamworking and collaboration, and the conditions that can hinder them.

Conditions that facilitate teamworking

First, it emerged that it was important for the teachers, head teacher and, more broadly, the organizational framework of the school to support a *process of caring for the functioning of the various work groups*.

Concerning the teachers' own contribution to this process, the research process yielded the insight that, in caring for the functioning of a group, relying on the personal aptitudes and goodwill of individual teachers is a necessary but insufficient condition. It is crucial that teachers learn to implement and share teamworking strategies as a function of the specific challenges facing the group.

The main strategies identified by the participants were the following:



- *Caring for relations* among teachers that work in the same school or ‘comprehensive institute’: these strategies include sharing basic knowledge about the running of the school (from basic information about parking arrangements, lunch facilities, etc. to written and un-written rules, established practices and procedures, etc.), making a greater effort to welcome new staff members, providing informal opportunities for teachers to meet (e.g., coffee breaks) and share their ideas and experience, and defining formal settings (e.g., staff meetings) in which to analyse the impact of the organization, culture and educational traditions of the school on team functioning and activities;
- *Caring for communication within the team*: this strategy involves defining explicit and implicit rules for improving reciprocal listening among the members of a team and creating an atmosphere of dialogue that can facilitate the discussion of difficulties or problematic situations (e.g., pacing the discussion; coming up with a sustainable meetings schedule, etc.);
- *Caring for the group task*: this involves ensuring that the team never loses sight of its identity as a “work group” but remains committed to the educational task for which it was formed. This is a key strategy because it encourages team members to continuously focus on their shared project or task. The task defines their “common ground of action” and suggests how their individual contributions may be of value;
- *Caring for conflict*: Participants labelled their preferred strategies for dealing with conflict as “mediation” and “seeking alliances”. *Mediation* is viewed as a function that cannot be taken for granted and may be fulfilled by a member of the group itself, but also by a teacher (or other education professional) who is external to the team. Similarly to the previous strategy, one of the main purposes of mediation is to get all team members to refocus on the group task, while recognizing their different positions, opinions, feelings and emotions, and seeking new perspectives that provide a closer understanding of the educational situation in question. Thus, mediation is intended to establish shared bases on which to pursue a shared task.

The *quest for an alliance* among the members of a group may be seen as a complementary relational strategy. It involves “joining forces” with the team member who is perceived as having the closest understanding of a situation. If a member of a team (especially but not necessarily the leader) succeeds in forming an alliance with one or more other members, he/she will then be in a position to persuade the remaining team members of the direction to be pursued;
- *Caring for self*: this is viewed as a strategy of *self-legitimacy* leading to improved *social acceptance*. It is designed to enhance individual team members’ awareness of their capabilities, their contribution to the team, and their reasons for taking part. It contributes to teachers’ professional development, because it not only increases their awareness of their specific role, limitations and potentials, but also



their competence in communicating what they can contribute to the team effort and how;

- *Caring for the reflexivity of the group*: the participants saw this as a research strategy, which they suggested may take three possible routes: the team may decide to devote more time to developing its understanding of a (problematic) situation, postponing intervention while collecting the information required to identify and agree on the best forms of action; evaluate new educational or teaching practices implemented by teachers to establish how they may best be incorporated at the school level in the future; reflect on their own practices and behaviours.

All these strategies combine personal and “human” dimensions with professional ones: in the teachers’ opinion, this was why they found it challenging to identify and name them.

Conditions that hinder teamworking

The research outcomes suggest that teamworking is driven by the personal and professional needs of individual teachers, but that in order to facilitate and improve it, the school should support the practice of working in groups through its institutional and organizational decisions and actions, which are embodied in the process of caring for the functioning of the group. Therefore, the conditions that make teamworking difficult appear to be related to a *lack of care for the group* at the institutional and organizational level.

The participants reported that this happens when in a school:

- there are no specific strategies for generating good teamwork: groups are formed but the members are not helped to familiarize with one another or with the broader context in which they are meant to be operating; nor are they guided to implement the strategies outlined in the previous section;
- there is no opportunity to reflect (individually or as a group) on modes of teamworking or on the practices, procedures, tasks that a group has developed or inherited;
- no thought or preparation is devoted to defining the places (e.g., for formal meetings, informal discussions, etc.), times (task duration, frequency of meetings, etc.), roles (e.g., leader and assistant) or rules (of communication, of behaviour) required for optimal teamwork;
- the task and goal are imposed on the group, following a top-down logic.

When the school fails to care for the functioning of the group, being able to work successfully together seems to predominantly rely on the personal commitment of individual team members. During the research process, the teachers became aware that, in this scenario, individual differences are more evident and become obstacles to collaboration; relational dynamics are more difficult, because members may not



recognize the contributions of others, and mediation strategies are rarely or never adopted.

STRENGTHS, LIMITATIONS, AND FUTURE RESEARCH PROSPECTS

In conclusion, this research process displayed strengths, but also limitations. It is critical that we reflect on both, with a view to defining directions for future research.

Strengths

The key strengths of this action research project are related to the fact that it not only offered participating teachers the opportunity to take part in a process of enquiry, but also provided them with a new form of group experience. While working together as a research team, the participants were given the opportunity to reflect on this novel teamworking experience in the “here and now” of the research situation. Therefore, the group accomplished something more than fulfilling its research brief. The teachers directly experienced the effects of the strategies, methods, and leadership styles that were brought to bear in the research group itself, and were thus uniquely placed to reflect on these and on their lived experience. At the final session with the researchers, they indicated that participating in the research group had offered them a means of learning about teamwork and how they could individually enhance their teamworking skills.

Limitations and future research prospects

The limitations of the study allow us to define what themes future research might usefully explore. During the research process, participants were particularly interested in acquiring knowledge and awareness about factors that directly impact on their teamworking practices. Hence, other topics that the literature highlights as critical to contemporary educational experience (see the theoretical background to this research) were not explored in depth.

Therefore, follow-up studies might both test the strategies for forming and caring for teams identified in the current research, and investigate the following additional themes:

- the relationship between fostering a collaborative culture and the school’s educational identity;
- the effects of teachers’ teamworking practices on students’ experience of school, and, in particular, on students’ own cooperative competencies and skills;
- the effects of teamworking on practices of inclusion.



REFERENCE

- Agosti, A. (2006). *Gruppo di lavoro e lavoro di gruppo. Aspetti pedagogici e didattici*, Milano: Franco Angeli.
- Barczac, G., Lassk, F. & Mulki, J. (2010). Antecedents of Team Creativity: An Examination of Team Emotional Intelligence, Team Trust and Collaborative Culture in *Creativity and Innovation Management*, vol. 19, n. 4.
- Bauman, Z. (2010). *La società individualizzata*, Milano: Il Mulino.
- Cappa, F. (2014). *Qualità e metodo dell'esperienza scolastica*, Milano: Franco Angeli.
- Foucault, M. (1975). *Surveiller et punire. Naissance de la prison*, Paris: Gallimard.
- Dewey, J. (1916). *Democracy and education*. New York: Kappa Delta Pi.
- Dewey, J. (1938). *Experience and Education*. New York: Kappa Delta Pi.
- Gilles, R.M., & Adrian, F. (2003). *Cooperative Learning: The social and intellectual Outcomes of Learning in Groups*. London: Farmer Press.
- Gjurovikj, A. (2013). Knowledge Management as a Competitive Advantage of Contemporary Companies, *Proceedings of the International Conference on Intellectual Capital, Knowledge Management & Organizational Learning*.
- Guba, E. & Lincoln, Y. (1985). *Naturalistic Inquiry*. Newbury Park: Sage.
- Johnson, D.W & Johnson, R. (1994). *Learning together and alone: Cooperative, competitive and individualistic learning*. Englewood Cliffs, NJ, Prentice Hall.
- Johnson, D.W, Johnson, R. & Holbec (1994). *The nuts and bolts of cooperative learning*, tr.it. Apprendimento cooperativo in classe, Trento Erikcson (1996).
- Lee, V. E., Dedrick, R., & Smith, J. (1991). The effect of the social organization of schools on teachers' efficacy and satisfaction. *Sociology of Education*, 64, 190-208.
- Lee, V. E., & Smith, J. (1996). Collective responsibility for learning and its effects on gains in achievement and engagement for early secondary students. *American Journal of Education*, 104, 103-1.
- Louis, K. S., & Kruse, S. D. (1995). *Professionalism and community: Perspectives on reforming urban schools*. Newbury Park, CA: Corwin.
- Louis, K. S. (1992). Restructuring and the problem of teachers' work. In A. Lieberman (Ed.), *The changing contexts of teaching 91st yearbook of the National Society for the Study of Education*, Vol. 1, pp. 138-156. Chicago: University of Chicago Press.
- Massa, R. (1987). *Educare o istruire. La fine della pedagogia nella cultura contemporanea*. Milano: Unicopli.



- Mezirow, J. (1991). *Transformative Dimensions of Adult Learning*. San Francisco: Jossey-Bass.
- Newmann, F. M., & Wehlage, G. (1995). *Successful school restructuring: Highlights of findings*. Madison: University of Wisconsin, Center on the Organization and Restructuring of Schools.
- Peterson, P., McCarthey, S., & Elmore, R. (1996). Learning from school restructuring. Teachers' Community in *Restructuring Schools American Educational Research Journal*, 33, 119-153.
- Rezzara, A. (2000). *Pensare la valutazione. Pratiche valutative scolastiche e riflessione pedagogica*, Milano: Mursia.
- Rosenholz, S. (1989). *Teachers' workplace: The social organization of schools*. New York: Longman
- Quaglino, G., Casagrande, S., Castellano, A. (1992). *Gruppo di lavoro, lavoro di gruppo. Un modello di lettura della dinamica di gruppo, una proposta di intervento nelle organizzazione*, Milano: Cortina.
- Schein, E. (2009). *Le relazioni di aiuto come costruire e sostenere relazioni efficaci*. Milano: Cortina.
- Seashor Louis, K. & Marks, H. (1998). Does Professional Community affect the classroom? Teachers' work and Student Experiences in Restructuring School, in *American Journal of education*, n. 106.
- Seashore Louis K., Marks, H., Kruse ,S., (2017). Teachers' Professional Community in Restructuring Schools in *American Educational Research Journal*, Vol. 33, No. 4, pp. 757-798.
- Sennet, R. (2012). *Together: The Rituals, Pleasures, and Politics of Cooperation*, Yale.
- Slavin, R. (1983). "When does cooperative learning increase student achievement?". *Psychological Bulletin*. [doi:10.1037/0033-2909.94.3.429](https://doi.org/10.1037/0033-2909.94.3.429)
- Spillane, J. P. (1999). "External Reform Initiatives and Teachers Zones of enactment" in *Journal of Curriculum Studies*, 31, pp. 143-175.
- Spillane, J. P. (2006). *Distributed leadership*. San Francisco, CA: Jossey-Bass.



EMPOWERING STUDENTS IN HIGHER EDUCATION. PERSPECTIVES ON EPORTFOLIOS' CONTRIBUTIONS

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ABSTRACT

In this article we present and discuss some of the preliminary national results of the project “Empowering Eportfolio Process” (EEP), an Erasmus+ KA2 program. At this stage of the research, the Portuguese team of the College of Education of the Polytechnic Institute of Setúbal (ESE-IPS) will present some of the emerging ideas that have come to light from the first stage of the ongoing qualitative study, which is focused on the students’ perspectives on the use of ePortfolios — more specifically the students of the International Semester. We will discuss into what extent these practices can contribute to students’ empowerment and to develop transformative capabilities — such as autonomy, reflexivity, critical thought, creativity and cooperation, amongst others. We also intend to discuss these practices implications to Higher Education, particularly orienting the discussion to the scope of pedagogy.

INTRODUCTION

In the framework of the Project “Empowering Eportfolio Process” (EEP), an Erasmus+ KA2 project, which is currently been developed by five education institutions in Europe (HAMK-Finland, VIA-Denmark, KH Leuven-BE & KU Leuven-BE, MIE-Ireland, ESE-IPS Portugal). One of its aims is to emphasize the ownership of students in their learning process and their central role in creating their own ePortfolios, which can be used as workspaces during the learning processes but also as showcases, when they want to find a job or connecting with the world of work (Kunnari *et al*, 2017). Since the beginning of the project, in September of 2017,



the Portuguese team of School of Education - Polytechnic Institute of Setúbal (ESE-IPS) has developed several strategies related to the aims of the project, such small-scale exploratory studies and pilots. In this paper we present the reflections arose from one of the pilots focused on the use of ePortfolio, developed in the academic year of 2017/18.

The article is organised in three main parts: in the first one we contextualise the ongoing study with a brief literature review, highlighting the relevance of the use of ePortfolios in Higher Education. Secondly, we present the methodological option taken in the study, which is qualitative and interpretative, we characterize the context and the group of students that have participated and the technical procedures used to collect and analyse the information. In the third part of the paper we discuss the main ideas that have emerged from this stage of the research. In the conclusions we highlight some of the most relevant pedagogic issues related to the students' perspectives on the use of ePortfolios in Higher Education.

EPORTFOLIOS IN HIGHER EDUCATION

The focus of EEP project is to develop student-centred education in HE, through an empowering and dynamic approach to the ePortfolio process — articulating learning, assessment and guidance practices. The aim is to increase students' academic success and to develop learning and career management competences, looking for active citizenship, social participation and professional success within the digital world (Kunnari & Laurikainen, 2017). The project is focused in the use of ePortfolios as learning and assessment tools in Higher Education, aiming to study several aspects which can contribute to making students more involved in their learning process and take responsibility for it.

In a previous publication we had analysed ePortfolio definitions (Rodrigues, Pires & Pessoa, 2017-b) that depends, fundamentally, on the purpose for which it is developed and on whether using it is optional or compulsory (Beckers, Dolmans & Merriënboer, 2016). We agreed with Barrett (2006) on the idea that it is a collection of materials which are gathered, selected and reflected upon, through which it is possible to evaluate the evolution in competencies.

Within the framework of EEP project, the definition of ePortfolio refers to “student-owned digital working and learning spaces for collecting, creating, sharing, collaborating, reflecting learning and competences, as well as storing assessment and evaluation. They are platforms for students to follow and be engaged for their personal career development, and actively interact with learning communities and different stakeholders of the learning process” (Kunnari & Laurikainen, 2017, p. 7). Theory gives light to the idea that learning portfolios (digital or not) promote processes of reflection and identification, reinforcing the sense of authorship and responsibility. Research has shown the contributions of *reflexive* portfolios in HE as



processes of construction of knowledge, transformation of practices and contexts, professional emancipation and pedagogical innovation (Gonçalves & Ramalho, 2009; Sá-Chaves, 2005). According to Morgado *et al* (2009), the pedagogic principles of a learning portfolio are reflexivity, democraticity, creativity and innovation, which promote the development of conscious and active students, therefore contributing to their empowerment.

One of the exploratory studies developed by this research team within the framework of the EEP project highlights the contribution of ePortfolios to the development of students' critical thinking and reflexivity, as well as creativity, sense of ownership and spirit of cooperation (Rodrigues, Pires & Pessoa, 2017-b). Other study has shown that ePortfolios experiences have contributed significantly to their learning and development processes, from a multiple and integrative perspective (Pires, Rodrigues & Pessoa, 2018). Students considered that have developed digital competences/technological skills and a wide range of transversal and transformative capabilities linked to the process in itself, such as creativity, autonomy, reflection and logical thinking, capability to select and organize information, systematization, collaboration and sharing, between others (Pires, Rodrigues & Pessoa, 2018).

METHODOLOGY OF THE STUDY

The nature of the study is qualitative (Bogdan & Biklen, 1994; Azevedo, et al, 2010; Amado, Crusoe & Vaz-Rebelo, 2014), emphasizing the comprehension of the educational phenomenon in its complexity. The main goal of this stage of research was to identify students' perspectives on the use of digital portfolios in HE, based on the experience of particular settings and groups of students. Three types of information collection procedures were used, suiting the nature of the information to collect and considering the resources and time constraints: questionnaires (anonymous, passed before and after the course), participant observation (during classes) and final reflections written by the students, close to open questionnaires or compositions (Amado, 2014).

The initial and final questionnaires were constructed with the *Google Forms*. Qualitative and thematic content analysis was developed with data from questionnaires, registers and students' written reflections.

The research questions that were the starting point of the study were related to the students' experiences and perspectives of the use of ePortfolios. The aim was to understand the engagement process and the personal and organizational conditions that trigger students in the creation of ePortfolios: the perceptions on the benefits and challenges, the type of relations established between students and teachers, the type of competences are needed and developed with the ePortfolio process.



Context of the study

We have chosen to present one of the pilots of the ongoing EEP project, focusing on the experiences of the students enrolled in the curricular unit Digital Storytelling, which belongs to the study plan of the ESE-IPS's International Semester. The International Semester, launched in 2016/17, is conceived to all undergraduate students (*incoming*) in the context of transnational mobility programs of Higher Education, who intend to study at ESE during the 2nd half of the academic year. The main purpose of the International Semester is to contribute to the development of broader perspectives of understanding and knowledge of other realities, for the extension of personal contacts and the deepening of interpersonal relationship skills, and to enhance knowledge of other cultures and ways of being and doing. It aims to promote meaningful learning — through student centred methodologies, contextualized projects involving the coordination / integration of knowledge and skills from different curricular units and articulated with the wider community. The principles that underlie the construction of these curricular units are flexibility, transversality and articulation. Students can choose what are the curricular units that better suits their interests, in fields of knowledge that are transversal to the areas of their courses.

Like the other International Semester's curricular units, Digital Storytelling adopts an approach focused on the student. It has been organized to enable students to establish contact with the recent systematization of the oral tradition of stories, with their evolution to digital stories, ending with the construction of a digital story, thus developing their digital skills. Students are guided in the discovery and exploration of instruments that contribute to the construction of digital stories. The theme of the story must be negotiated with the teacher and, if the student is also attending to other curricular units of the international semester, he/she can choose any item of the programs and negotiate with both teachers.

The students must create a blog, which is the support for the digital portfolio, that will be a common tool to all the International Semester's curricular units: it was conceived to be an integrative and formative learning strategy, working as a support for learning and for assessment. The blog is the work space and the showcase of the work developed during the semester.

Participants

Although there were a total 15 undergraduate students enrolled the International Semester, the curricular unit Digital Storytelling had 8 students enrolled, all women, five from four different European countries (Austria, Belgium, Turkey, Finland) and three students from Brazil. The studies they were doing in their countries were mainly in the areas of education, social work and media studies.



Age	20	21	23	24	28
Number of students	3	1	1	2	1

Table 1 – Age of the students

RESULTS AND DISCUSSION: WHAT TRIGGERS STUDENTS TO CREATE EPORTFOLIOS?

In this part we articulate data from the questionnaires and some excerpts from the written reflections elaborated by the students. Data collected from the initial questionnaire evidence that all students had already had experiences with ePortfolios, all related to their courses, with the aim of developing and presenting academic works. A student has referred that “I have mine since I started college, to keep my creations stored and available for others to see. Whenever I had a job interview I could log in quickly and show my work to the employers.”

The digital supports that students have used in the construction of the ePortfolio were: Mahara, Moodle, Wiki, Blogue, Tumblr and other websites.

Four students rate their digital competences as weak (in a scale from 1 to 6, two students they rate themselves with 2 and other two with 3); the other four students rate their digital competences as good (one with 4), very good (two with 5) and one as excellent (6).

What triggers students to create ePortfolio?

By the end of the semester, students refer that they are triggered by different aspects of ePortfolios. They highlight both the process and the content: making knowledge acquisition easier and assessing learning on a continuous way: “*Making knowledge acquisition easier and assessing learning process throughout the academic life*” or “*to create an ePortfolio is an excellent idea for we students, because it ampliant our experiences and our learning a lot different things.*” as well as working better in groups :“*It makes the work in the group a lot easier*”, developing competences: “*become better in ICT tools*” and doing things that they had not done before: “*(...) it was very interesting for me because I never worked with a blog*”.

They also highlight personal aspects, such as “*Learning new tools to impress yourself*”, or related to freedom “*The freedom to post your own things*”, and feeling proud to acknowledge what they have achieved “*make me think of a close-future*”.



idea of looking back at my work and feeling proud of what I've done in my interchange program."

In previous studies with ePortfolio, freedom was also highlighted by the students (Rodrigues, Pires & Pessoa, 2017-a). This dimension can be related to students' autonomy. Autonomous students need to feel free to choose and to explore the situations and resources available.

What are the benefits?

Students recognize that ePortfolios have several benefits, like portability and accessibility —" *I can take my eportfolio anywhere - as long as there's internet (which isn't something hard to nowadays)", or "You don't have to print any documents, it is useful after your studies because you can look it up whenever you need it", and "Digital form, everyone can see around the world and it is easy to share everything, get the modern style working skills"*.

The permanent updating and the sharing possibility between colleagues was highlighted: "*I had possibility to update the ePortfolio in every moment, always when was necessary. I can share with my colleagues every homework and also I had access to their blogs. I had a possibility to compare the advance of works during the semester.*", and "*You can share your work with the other students very easy and it saves a lot of time"*.

They also recognize its transferability to working life: "*I can take it to a job interview, for example, without trouble. For me, it feels practical and easy to use."*

They point out that it is sustainable for the environment "*It is also very good for the environment because you don't have to print every work"*.

It was also stated that ePortfolio also contributes to effective learning and motivation: "*ePortfolio gives students to collect their works and resources which are crucial for effective learning. Therefore, students' acceptance, motivation, assessment and the using of technology increase their creativity to ePortfolio."*

These findings are in line with previous results of EEP project.

What are the challenges?

After the semester, some students considered that they did not had any difficulty: "*I didn't have any challenges! I loved the experience and will definitely keep doing it", and "I think there are no challenges in relation with eportfolio, platforms or tools"*.

However, other students felt difficulties and faced the need of ICT skills: "*computer skills because starting point to the programs was a zero and how to get them work as you wanted to take a lot of time of course.*", "*The biggest challenge for me was to create the blog because I am really bad with using the computers and it was confusing for me.*", "*This blog was at the beginning difficult because I wasn't*



familiar with the settings and everything. At my school we use an Eportfolio that is connected to our online platform that we use and it works different.” or “Students may need to upgrade their computer skills to use an e-portfolio managing the use of it”.

Competences that are needed

The majority of students consider that they need basic ICT competences to create a ePortfolio successfully: *“Knowing basics about the platform you're using to create your eportfolio, digital skills, finding information and using digital programs”, “First you need the skill to be able to work with the internet because you need to be able to do a little research and things like that. Additionally, you should know how to work with the computer.”.*

But there is other type of competences highlighted by students: *“I think that you need only creativity and will to shared and update every time”, and “Inspiration, creativity”.* The engagement in ICT tools is necessary, as stated: *“It is really necessary to be able to engage in learning via digital tools”.*

Previous EEP research has shown that it is possible to create ePortfolios with the basic ICT knowledge and skills, and students usually rate themselves globally with a medium/intermediate level of expertise (Kunnari et al, 2017).

Competences developed during the process

All students recognize that they have developed digital skills, becoming more resourceful and confident: *“I became more resourceful, I wasn't afraid of sharing my thought with others”.* Besides that, the linguistic and narrative competences were also referred: *“I improved my English, I learned new tools and programs” and “I improved my skills of working with the internet and especially with the computers. And I improved also my ability to write essays and story's and now I also know how to create my own digital story.”* They also state that it boosted creativity: *“And of course, my creativity improved too.”*

Looking to the final results they feel proud of the work developed and can identify more clearly competences gained with the process: *“Seeing my blog now makes me realize that my semester was full of creation and creativity and I am proud to say, as a Brazilian student, that I improved a lot on my responsibility, my way of writing and telling stories, and just as a gift: my English.”*

Changes happened not only at the level of competences, but also as a transformative experience, as stated by a student: *“I felt like a new person afterwards and I was amazed how big changes happened inside of me. (...) So the new applications and programs to work with was only a tiny part of the whole process. Process included new learning, progress, growth and eventually empowerment.”.*



Engaging relationships

Students highlight positive relationships with colleagues and teacher, based on collaboration, sharing of information, resources, and open communication: *"We both collected and shared our works and resources. It increased communication opportunities between professors, our peers and us a good relationship"*.

The mutual support was felt very important during the process: *"asking help, relating, sharing information and prevent misunderstanding which can escalate to frustrating and giving up"*.

Working together and knowing themselves better contributed to positive feelings, like *"friendship"*, as stated. *"We worked together on different projects and it was so interesting to see how different every work is. We get to know each other better by working together on the blog."*

"We have to learn how to cooperate with each other. And this course was a great example of cooperating with each other. Accepting each other for who they are and where they come from. I loved it!"

The role of the teacher in supporting students' engagement was highly recognized: *"I believe our teacher was always very stimulating because of her engagement with everything we did. She is always willing to help us achieve what we want, understands us, and tries to keep us making conversation about the things we've done in our ePortfolios."*

They valued a teacher-student relationship based on advice, support, open-mind and by *"sharing information, telling tips how to make things and advising"*, and *"The teacher also showed us very helpful examples and supported us with our work."*

This perception is in line with previous findings, reinforcing the value of tutoring *"(...) where the teacher, rather than just transmitting knowledge, takes on the role of learning advisor. Here, the teacher is valued because he becomes closer the students and seeks to understand their problem and direct them toward a solution."* (Rodrigues, Pires & Pessoa, 2017-b, "Final Considerations", para. 6).

Use of ePortfolio as a learning and assessment tool

As a learning tool

The ePortfolio is highly valued as a learning tool, making processes easier and fun: *"It is a fun way of making assignments and it is also easy to evaluate."* and *"For someone process of working digital can be easier, more relaxing, allows you to be more open and do something different, modern and especially fun"*. But it is also hardworking: *"Creating our own storytelling E-portfolio was very enlightening and fun, as much as it was a bit hardworking: I personally felt tenser to create my*



projects - people will see it! It has to be perfect!”, and the fact that it is going to be shared with other brings more responsibility to students.

It’s an engaging process for students: *“It’s perfect for learning because we can go on our friends’ blogs and read what they’ve done, compare with us, and engage in a mutual learning process.”* but perhaps not so easy for everyone: *“I think it might be a little bit difficult because if the students aren’t motivated to use it, they won’t use it to learn.”*

Based on collaborative learning, the ePortfolio developments can be followed in a formative and continuing way: *“I think it is a good and easy way to work together and share your own work with the other students. It is also easier for the teacher to have the students under control and follow their learning process.”*

By sharing and discussing, the process becomes more transparent for students: *“I like a lot, is a big opportunity to share the works with others, and can see the works from other too.”* In this way, visibility brings new opportunities to learning.

Besides, it contributes to relevant personal learning, creating and reinforcing identities: *“I find highly useful both in educational and the other field. It can also be used as a personal. It helps to create an identity and discover tacit knowledge within ourselves”*, allowing individuality.

These ideas reinforce ePortfolios as processes of hetero and auto-identification, reinforcing the sense of authorship and responsibility (Sá-Chaves, 2005).

As an assessment tool

The ePortfolio is also positively accepted as an assessment tool — both teacher-assessment and peer-assessment, as stated: *“It is really good because also the other students can see all the blogs of their colleges and check what they can make better and take some ideas.”*

“It’s the best way of making an assignment. You can be as creative as you want to be and it allows you to be independent in a certain way.”

Students have acknowledged that it demands permanent feed-back from teachers: *“I think it’s great as well, because the teacher can keep checking our work and comment in it, and see if we’re doing things in time.”*

However, students are aware that it is a continuous work: *“I think this can be a good thing but also the same as before ... if the students don’t do their best or leave everything to the last week it won’t have any effect ...”* and *“E-portfolio is a continuous action so I support using the e-portfolio as an assessment tool”*.

Recommendations

At the level of recommendations, students have reinforced the importance and the role of the teacher: encouraging, supportive, engaging: *“Be more like teacher Z., engage with us! Be a friendly teacher and encourage us to keep doing our jobs cause*



by the end of the day, we'll see our work done and realize how important the present of a good tutor was for our improvement."

The transparency of the process and the visibility of the results was positively highlighted: *"I would totally recommend the work with the eportfolios because I think it is a good way of working with the students. And you can see really easy if the people like the work or not, you can just check the blog."*

The use of ePortfolio as a restrict or public tool was raised by one student, showing that the question of privacy is not equally accepted by all: *"A little tip can be not to use the E-portfolio public because there are students that work really hard and there are other students that are the opposite. And then it's easy to search for someone's work on the e-portfolio, copy paste it and then make some small adjustments. So give the students the chance to keep it personal and if it is important for you as a teacher to put it on line for everyone, give them the chance to do it at the end when everyone needs to be ready with their tasks."*

We are aware that this is a challenging issue. Some students do not feel comfortable with the idea of an open ePortfolio, leading us to accept that not all students want to see their ePortfolios public (Kunnari et al, 2017; Rodrigues, Pires & Pessoa, 2017-b).

CONCLUSION

The current field of practice-based research sustains that ePortfolio practices promote students' transformative capabilities and develop a culture of social learning, creating new pathways for learner empowerment (Ryan and Tilbury, 2013). The ideas that emerge from this study — based on the international students' perspectives of ESE-IPS on the use of ePortfolios — are congruent with this assumption. Students have considered that ePortfolio has contributed to their learning and development processes, from a multiple perspective — development of digital competences/technological skills and a range of transversal and transformative capabilities linked to the process, such as creativity, autonomy, reflection and logical thinking, capability to select and organize information, collaboration and sharing, between others.

The analysis of the students' perceptions on ePortfolios allow us to affirm that can offer several advantages: availability, transparency, portability, and sustainability. Students recognize that ePortfolios are relevant tools for learning and assessment in HE, giving transparency to their development processes and results.



They faced challenges and overcome them, feeling confident with the teacher and colleagues support, showing a positive engagement and commitment to ePortfolio process.

Students also acknowledge the benefits of ePortfolio in their future professional life, reinforcing the EEP previous studies that highlighted their benefits in terms of easy access and sharing with others, low cost use and sustainable process to support personal development and lifelong learning (Kunnari et al, 2017).

These ideas are relevant contribution to the reflection and discussion about pedagogy on HE, allowing to expand traditional perspectives and the exploration of new pathways.

REFERENCES

- Amado, J., Crusoé, N., & Vaz-Rebello, P. Quadros Analíticos da Investigação Qualitativa em Educação. In J. Amado, *Manual de Investigação Qualitativa em Educação*. (pp. 73-104). Coimbra: Imprensa da Universidade de Coimbra. (2014).
- Amado, J., Ferreira, S. A entrevista na Investigação em Educação. In J. Amado, *Manual de Investigação Qualitativa em Educação*. (pp. 207-290). Coimbra: Imprensa da Universidade de Coimbra. (2014).
- Azevedo, N., Alves, M., Gonçalves, T., Nascimento, A., Couceiro, M., Neves, C., Gomes, E., Vieira, R., Rosa, J. & Guerrero, A. *Investigar em educação: desafios da construção de conhecimento e da formação de investigadores num campo multi-referenciado*. Caparica: UIED - Coleção Educação e Desenvolvimento. (2010).
- Gonçalves, D. & Ramalho, R. O (e)Portfolio Reflexivo como estratégia de Formação. In Actas das Jornadas E-Portfolio - Jornadas Internacionales Docencia, investigación e innovación en la Universidad: Trabajar con (e) portfolio en la Universidad, Santiago de Compostela. (2009)
- Kunnari, I. & Laurikainen, M. *Collection on Engaging practices on ePortfolio Process*, Hameenlinna, Pub. HAMK. (2017)
- Kunnari, I., Laurikainen, M., Pires, A., Rodrigues, M.R. *Supporting students' ePortfolio process in Higher Education*. HAMK Unlimited Journal 12.12.2017. Retrieved [January, 2018] ISSN 2343-4708. (2017)
- Morgado, J., Pinto, A., Montes, C. & Vieira, P. "Portefolio: à procura... de um caminho...como tantos outros". In *Transformar a Pedagogia na*



- Universidade. Narrativas da prática.* Fátia Vieira (org). Santo Tirso, De Facto. (2009).
- Pires, A., Rodrigues, M. & Pessoa, A. *Transforming pedagogy in Higher Education. Contributions of the Empowering ePortfolio Process project.* HAMK Unlimited Journal. (2018).
- Rodrigues, M. R., Pires, A.L.O., & Pessoa, A. O papel da interação entre pares e da Tecnologia na aprendizagem: percepção de estudantes do Ensino Superior. In A. Osório, *Atas da XVIII Conferência Internacional de TIC na Educação - Challenges 2017*. Braga: Instituto de Educação da Universidade do Minho. (2017-a).
- Rodrigues, M. R., Pires, A.L.O., & Pessoa, A. *Higher education students' perspectives on the use of ePortfolios. An exploratory study in the context of the Degree in Basic Education.* Proceedings of the XIX International Symposium on Computers in Education XIX, Lisboa, Ed. CIED. (2017-b).
- Sá-Chaves, I. Os “Portfolios” Reflexivos (Também) Trazem Gente Dentro. Reflexões em torno do seu uso na humanização dos processos educativos. Porto: Porto Editora. (2005).
- Veiga Simão, M. O portfolio como instrumento na auto-regulação da aprendizagem: uma experiência no ensino superior pós-graduado. In Sá-Chaves (org). Os “Portfolios” Reflexivos (Também) Trazem Gente Dentro. Reflexões em torno do seu uso na humanização dos processos educativos. Porto: Porto Editora. (2005).



BUILDING A STRATEGIC NETWORK OF FINNISH UNIVERSITIES OF APPLIED SCIENCES - HOW THE EAMK PROJECT WAS ESTABLISHED

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ABSTRACT

The Ministry of Education and Culture opened a funding call to Higher Education Institutions (HEIs) in September 2016. The purpose of the call was to improve learning, education, and quality of guidance and counselling, while ensuring student-oriented development of these processes. The Finnish universities of applied sciences decided to prepare an application as a coalition. All the Finnish UASs participated in the collaborative development process. The work based on results of a survey conducted by Arene that collected views from the UAS sector on how to utilize extra funding for the development of digital learning environments and improving the prerequisites for year-round studies.

The main conclusion from the project to the students at UASs will be a common, year-round digital studies that are based on the profiles of the HEIs and open to all the UAS students in Finland. At the same time, the project improves working-life



cooperation in learning ecosystems and develops digital guidance and counselling. These conclusions and objectives benefit every UAS in Finland. To find such common and standing goals is necessary to create and successfully complete a collaborative development process in the UAS field. This case aims to describe how to build a good basis for large-scale collaboration process and involve the participants effectively in a short period of time.

DUAL SYSTEM OF HIGHER EDUCATION IN FINLAND

In Finland, there are 24 universities of applied sciences and 14 universities. With regard to the size of the country and its population, this is a high number. The dual system of higher education is relatively young, as the applied university system was established only 20 years ago. Both university sectors are highly autonomous as how to cooperate with each other and across borders.

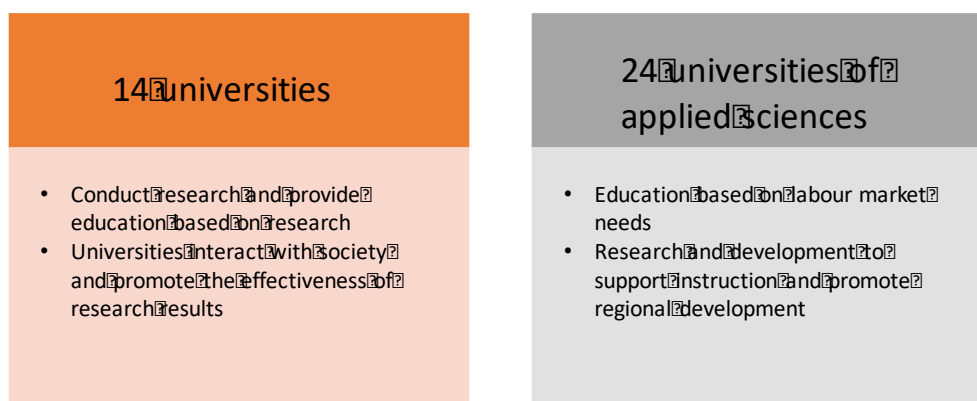


Figure 1. Dual model in higher education

The education system and all educational institutions in Finland are controlled by the Ministry of Education and Culture. The main objective of the education policy is to offer all citizens equal learning opportunities.

During the past years there have been several coalitions of universities of applied sciences in Finland. They cooperate on many levels, such as benchmarking, projects, development of studies and mutual study offerings. Also, a wider coalition of virtual studies, the Virtual AMK, was active during 2000-2016, in which all Finnish universities of applied sciences participated.

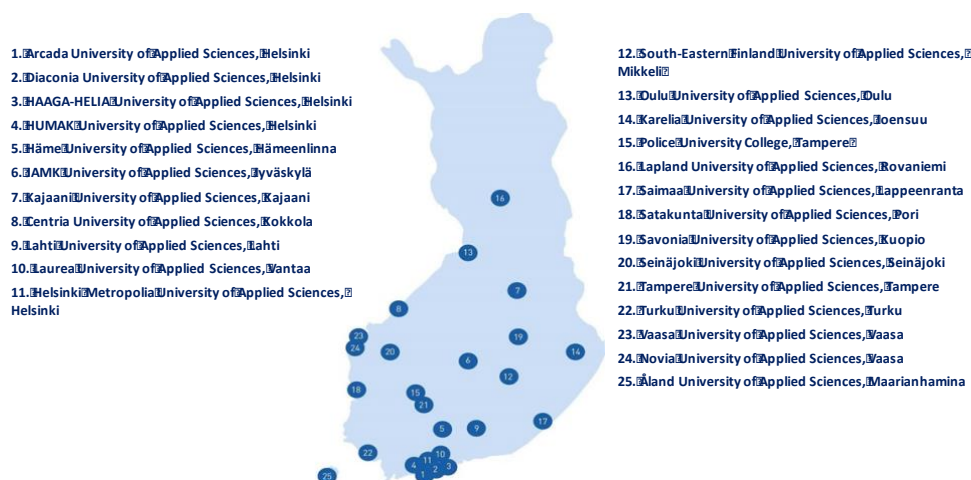


Figure 2. Universities of Applied Sciences in Finland

THE MINISTRY OF EDUCATION AND CULTURE: FUNDING CALL TO HIGHER EDUCATION INSTITUTIONS 2016

Digitalisation is a global trend that is transforming society, working life and competence needs. Research and competence needs are changing, which in turn is changing the operating models in education. All institutions of higher education must ensure that students are able to cope in a digitalised world – institutions of higher education must provide the competence that is required in working life. Institutions of higher education also provide society with competence that allows digitalisation to be utilised in all sectors. (European schoolnet 2016, OECD 2016). Digitalisation provides a variety of opportunities to learning and the operations of institutions of higher education, and it is widely recognised as a key factor in the educational operating environment and its transformation (for example, Strategy of Rectors' Conference of Finnish Universities of Applied Sciences 2016–2020, Huttula 2016).

The Finnish government also considered it to be important to utilise the modernisation of learning environments and the opportunities provided by digitalisation and new pedagogies in learning. In the General Government Fiscal Plan 2017–2019, the government decided to allocate a total of €105 million in funding to the development of higher education by strengthening the prerequisites for digital learning environments and year-round learning (€75 million) and supporting the scientific activities of young researchers (€30 million), among other things. On the first funding round in 2016, a total of €25 million was available for development projects, with the purpose of the special grant being to improve the quality of learning, teaching and instruction and student-centred approach, promote



the interaction of education and society, increase cooperation between institutions of higher education and renew operating methods and learning environments.

INTRODUCTION – THE PROCESS

When the government made its decision to allocate funding to the development of higher education, the Rectors' Conference of Finnish Universities of Applied Sciences (Arene) decided to collect opinions from rectors of universities of applied sciences regarding how the approximately €75 million of additional funding allocated by the government for the period 2017–2019 should be used and what common matters and concrete measures should be promoted with this funding. Approximately 20 universities of applied sciences answered the survey.

The results of the survey were discussed in a meeting of rectors at Arene on 17 June 2016. Two thoughts were raised regarding the joint projects of universities of applied sciences, the first focusing on the development of student selection and the second on the promotion of digital technology in higher education. During the meeting, a decision was made with the consensus of all of the rectors to start preparing a project focusing on digital technology.

The purpose of Arene's operations is to influence the development of the Finnish higher education system and promote closer cooperation between universities of applied sciences. It was therefore logical that the universities of applied sciences decided to prepare an application as a coalition. JAMK University of Applied Sciences agreed to take on the coordination of the preparations. The results of the survey provided the first outlines for joint development.

The actual planning process was launched on 16 August 2016. A chosen group of universities of applied sciences was invited to JAMK for the first round of discussions with the purpose of producing the first draft/synopsis of the goals, content areas, scope and duration of the possible project with a fast timetable and using this synopsis to plan the change in the operating models of the universities of applied sciences. The synopsis was reviewed at a meeting of Arene on 24 August 2016, where the project's key themes and goals were agreed upon. The project was named 'eAMK – the new ecosystem of learning – a digital leap in vocational higher education.' It is worth noting that the first synopsis was largely in line with the form which the project was ultimately shaped into by the end of October 2016.

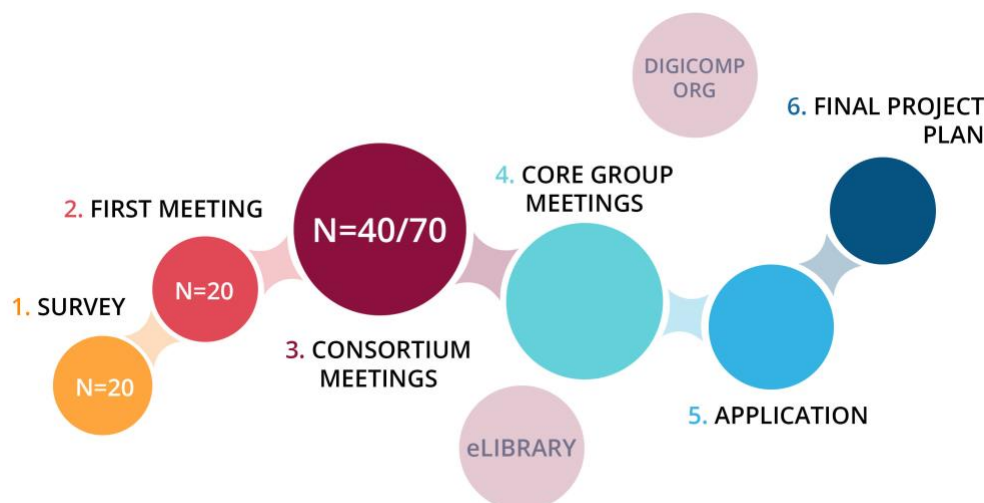


Figure 3. The process. N=the number of participants in the phase of the process.

The project preparations were scheduled immediately at the start of the planning in August 2016. A major choice of policy in the project's preparation was the engagement of all operators in the planning efforts and allowing each institution of higher education to influence matters and make choices regarding focus areas and their participation according to their own interests. Soon after the launch of the preparations in August, the project participants realised that a tightly packed planning timetable and an extensive operator network do not allow heavy, slow and expensive face-to-face rounds of conferences and planning meetings to be carried out across Finland. It was decided that online communication solutions would be created for the project's preparation to allow joint work to be carried out in online environments. These solutions are described more closely in the section 'Digital tools and transparent working environment'. It was decided that the preparation process would only include two contact workshops to which all operators were invited.

Held in Helsinki on 8 September 2016, the first workshop was attended by approximately 40 people. The participants specified theme-specific goals and results approved by Arene and prepared measures in small groups of people. The universities of applied sciences that would coordinate the project's content themes were chosen during and immediately after the workshop, and their representatives participated in the core planning group, which also included representatives from Arene and the coordinator, JAMK University of Applied Sciences. This core group convened regularly, coordinated the network and wrote and compiled the actual project application.



As the preparation process progressed, the hopes and expectations towards the project and its content grew and the project expanded into a larger entity than expected. This expansion demonstrates the dependencies that development activities often involve. The desired end result is rarely reached by developing one thing only. The second face-to-face workshop was held in Jyväskylä on 6 October 2016 and attended by approximately 70 people. The key purpose of this workshop was to make choices and cut back the project's content, as it had already become completely clear that the project could not be applied for and carried out as the extensive entity it had grown into during the process.

Between the face-to-face workshops, the core preparation group worked on and specified the plan and prepared a cost estimate for the project. The network was informed of the progress of the preparations via online meetings. The workshops served as places where decisions were made and thereby supported the work of those who prepared the project in particular. The workshops allowed various initiatives to be proposed, which stimulated discussion and the planning process.

The project application was submitted to the ministry on schedule at the end of October 2016. The funding decisions were obtained from the ministry at the beginning of February 2017. The ministry granted the project €3,000,000 in funding, which was less than half of the amount applied for. The plan had to be cut back, and the core project preparation group made a proposal on the content to be left out of the project. These proposals were reviewed with the network during a joint workshop in March 2017. Elements that were left out of the project included organisations' digital capabilities and preparing a joint e-library, which were found to be too broad subjects, even as separate projects.

eAMK – CHOOSE, LEARN, SPECIALISE

The eAMK project was launched on 1 May 2017. Its goal is to build a joint year-round offering of online courses between universities of applied sciences and simultaneously develop the pedagogies in higher education, as well as guidance and student administration services, to correspond to an operating environment that is undergoing a digital transformation.

Through a joint offering of courses, students will have the freedom to choose and pick studies from all universities of applied sciences in Finland. At best, the expanding offering of courses will open up increasingly flexible study paths that will allow students to specialise and build their skills by drawing from the wide range of courses offered by different universities of applied sciences. A joint digital offering of courses will also offer options for the continuing education needs of working life.

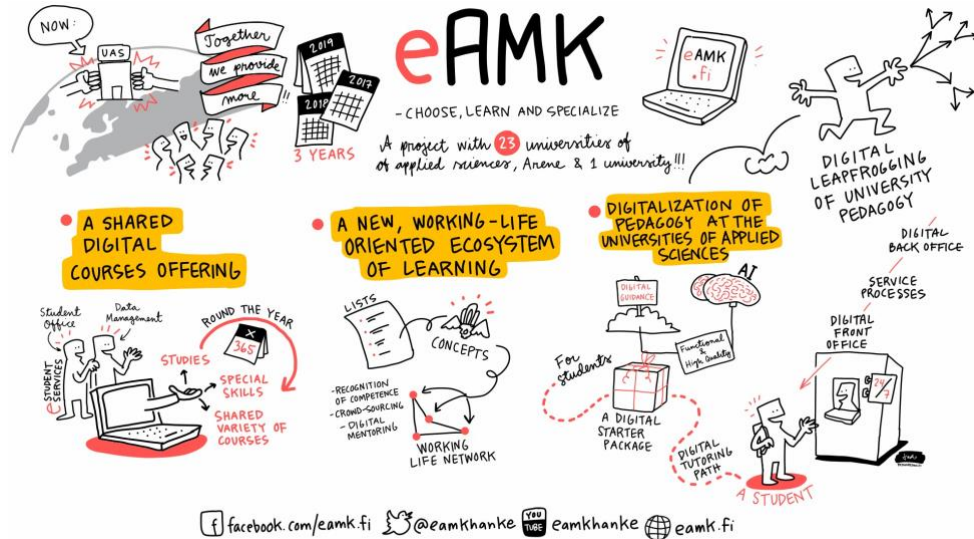


Figure 4. Themes and contents of the finalised eAMK project plan.

The project will develop pedagogies and guidance to support online learning. The digital proficiency starter package for students that is currently being developed will provide tools for studying and working online and ensure students' digital proficiency. Guidance provided during studies will be developed by utilising a culture of experimentation to provide a digital guidance path that will utilise learning analytics and be integrated into the entire study path. Switching to online studies will also require development of the skills of the staff of universities of applied sciences. The project will produce descriptions of the competence in digital pedagogy that will be suitable for a university environment, and a coaching programme for teachers will be planned and implemented.

Universities of applied sciences work in close interaction with working life, and taking working life into account is also important in the building of a joint offering of studies. A digital offering of studies will not only transfer teaching to an online environment, but also open up opportunities to produce expertise in cooperation between institutions of higher education and working life. With research and a culture of experimentation, universities of applied sciences will strengthen their connections with working life through the project.

PLANNING PROCESS – COMBINATION OF SYSTEMATICS AND CREATIVITY

Project preparation and procurement are typically phenomena in which creativity is needed but not clearly inherent in these processes. Those involved in the preparation



must often be able to anticipate in great detail the results which the project will reach within 3–4 years as well as the methods and measures for reaching them. Innovativeness may at times be at a modest level in such processes.

This risk was not realised in the preparation of the eAMK project, at least not in full. Granted, the project's goals, measures, results, resources and timetables were defined with a cooperative process, as is the proper method in projects. However, the preparation phases included creative or innovative elements which did not subject the project to uncontrollable risks, but which added considerable value to the project's preparation.

These elements included the megatrend cards (2016) which reduced a megatrend analysis by SITRA's experts to cards. A type of card game was developed based on the cards and utilised in the first meeting, in which the project's synopsis was worked on. In this game, the deck of cards is divided between a small group (3–4 people/group). Each member of the group placed one card on the table when it was their turn. A quick assessment was used to choose which of the trends mentioned could have the heaviest impact on the project's desired results in the future. After going through the deck a few times, the members of the group discussed and grouped the cards that were left over into key contributing factors.

The entire game took roughly 25 minutes, and the discussion that followed was open and lively. The discussion opened, in an important way, a communal method for considering the basis of the project's planning and created the first steps for developing a joint operating culture. The players were left with the image that universities of applied sciences are easily able to find creative, efficient and effective ways to develop joint operations by using new types of activities that strengthen interaction.

The project's preparation was also supported by experienced and distinguished project preparers who were familiar with systematic project preparation. The sprawling ideas were made more concrete by utilising a logical framework approach. The Logical Framework Approach (LFA) is a methodology mainly used for designing, monitoring, and evaluating international development projects. Its history dates back to 1969, when it was developed for the U.S. Agency for International Development (USAID). Nowadays, it is widely used by multilateral donor organisations, non-governmental organisations and private sector. A variation of this tool, Goal Oriented Project Planning (GOPP), is widely used for public sector projects in Finland.

In this case, we used it for designing the Activities, Outputs, Purpose and Goal of the project (Figure 7). The rows are read from bottom to top and each row represent the types of events that take place as a project is implemented: Activities, Outputs,

Purpose and Goal. The columns represent types of information about the events. Indicators and Assumptions were left out to be described in other documents.

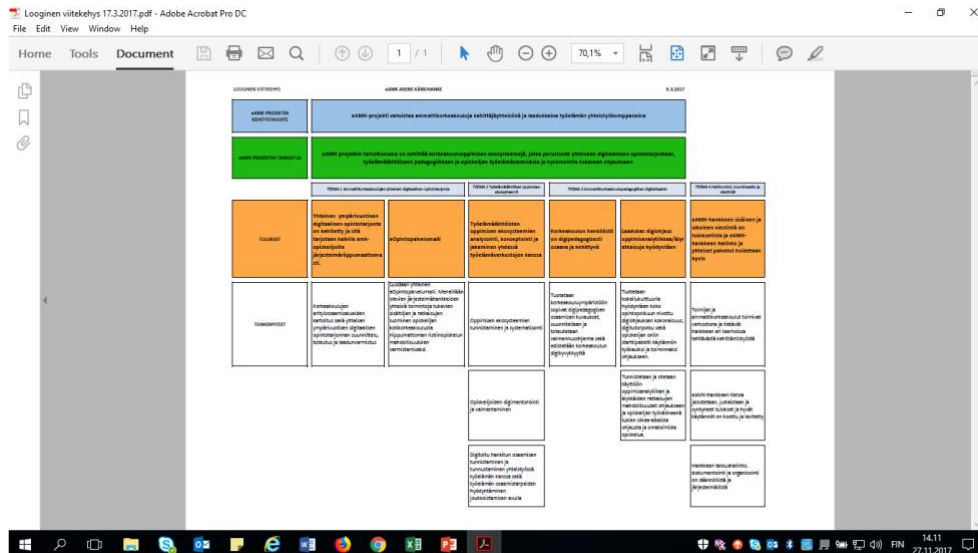


Figure 5. Logical Framework of the eAMK project.

Digital tools and transparent work environment

Tools that enable communal work online were decided to be used in the preparation and implementation of the project. This meant numerous Adobe Connect online meetings and the utilisation of an electronic discussion platform and material bank. The first steps were also taken towards creating a culture of open work taking place online for the project. Familiarisation with and development of this operating culture will continue as the project is implemented. The decision proved to be the right one. All information, questions and answers were provided to all operators at the same time and in the same format without the core project preparation group having to spend any working time on handling e-mails. Sulava Ltd., an expert in increasing the productivity of knowledge work, has studied bottlenecks in the efficient knowledge work of private and public organisations. The company found the greatest problem that weakens the productivity of knowledge work to be working methods and culture, too much time spent on searching for information and handling e-mails, which continue to be used inefficiently (Sulava, 2012).

The digital platforms chosen for the project were Yammer and OneDrive, which are based on Microsoft's O365 environment. Both programmes are in use at all universities of applied sciences, although there was great variation in their adoption and proficiency in their use at this stage. Yammer was chosen as the joint discussion



platform because the project participants wanted to avoid heavy, multi-level and vulnerable e-mail traffic between the parties. The management of mass e-mails was considered to be challenging in the complex process, in which as many participants as possible had to have the opportunity to have access to a maximum amount of information on all phases. For this purpose, e-mail is far too inflexible and vulnerable as a tool.

The OneDrive environment was adopted for use in documentation and storing documents. This provided all parties with access to all discussions and related documents. Version control is automatic, and there is no need to separately control them or collect them from e-mails. The management of Yammer and One Drive proved to be easy and registrations to use them expanded so quickly that by the final stage of the project's preparation, approximately 200 participants from universities of applied sciences were participating in these online environments. Despite the great number of participants, the number of e-mails pertaining to the project could be counted with one hand – a result we are very satisfied with.

The Innoduel online tool, which is based on swarm intelligence technology, was used to increase the engagement of staff of universities of applied sciences in order to limit and select the measures. This digital survey tool was used in the project preparation phase for the purpose of extensively determining the opinions of staff and students of universities of applied sciences. The working group prepared 20 seed ideas, and the survey invitation was conveyed via the intra systems of all the universities of applied sciences. All participants to the survey answered 10 pairs of ideas, always choosing the alternative that they considered to be most important. Participants were also encouraged to suggest their own new, concrete and positive ideas. Swarm intelligence helped in choosing the key goals that would serve the renewal of teaching and learning processes at universities of applied sciences the best. The Innoduel survey was open for a week, after which the answers were compiled for a joint project seminar.

After the Innoduel arena closed, participants numbered 483 in total, with 5,693 votes given and 87 new ideas submitted by the participants. Each idea was ranked according to the votes they had received, and the results were utilised in focusing and selecting measures. This gave the entire staff of universities of applied sciences the opportunity to influence the project's contents.

All the above-mentioned methods (both systematic and creative) and digital tools were selected to support the principles, drivers and values of the planning process:

1. Transparency
2. Openness
3. Interaction



These values are also used in the implementation phase to create trust that will strengthen universities of applied sciences as a development community. Communality and working together describe the significant desire of institutions of higher education to implement a cultural change, even though these institutions tend to prefer being conservative in the development of their operations rather than working together creatively and divergently. Rapidly progressing and blurry processes are often found to be risky and may have a high threshold for participation. The management teams of Arene and the universities of applied sciences worked quickly, purposefully and with a high preparedness to take risks in the preparation of the eAMK project in order for the extensive and significant project to be prepared within the short time frame.

A MODEL TO SUPPORT THE DEVELOPMENT OF A STRATEGIC NETWORK

At the beginning of the planning process there was no chosen model to help the team to guide the process of compiling a successful project plan. However, as the result was successful, it seemed to be valuable to pay attention to the critical supportive facts for the success. The supportive elements of the process were thus listed.

With attention to the criteria of the ministerial funding mechanism, it seems that the Ministry of Education and Culture drives the universities of applied sciences towards closer cooperation. Therefore, it was clear that suggesting the present project meant also that in the future the UASs are not only networking, but building strategic networks with deeper cooperation in chosen areas, in this case online studies.

How does the idea of a strategic network help in designing a successful project plan? Strategic networks have been studied with the help of the Balance Scorecard (BSC) model (Kantola et. al. 2011). This approach was tested as a model in the present case. The dimensions of the BSC are:

1. Region and customer
2. Finance
3. Process and structures
4. Learning and growth

In applying the BSC model the list of the success factors were placed into these four dimensions, resulting in the following map:



The Dimensions:	
Region and customer	• The understanding and the willingness to design a project where all TUASs are involved
Finance	• The ability to adapt to the reduced funding
Process and Structures	• Clear responsibility of the coordinating party • Ability to discuss the process with a vast amount of participants, seeing the mutual goal • The use of digital tools and project design methods in the process • The understanding of the benefit of cooperation instead of competition • The activating and supporting role of The Rectors' Conference of Finnish Universities of Applied Sciences (Arene) • Readiness for culture of experimentation • Keeping it simple
Learning and Growth	• Openness of the process, freedom of choice and equal opportunities to participate • Common need to develop e-Learning and digital pedagogy

Table 1. The dimensions in development of a strategic network.

The chart shows that all BSC dimension could be met with a success factor. We therefore suggest that the Balanced Scorecard can be a useful tool when preparing a project, which aims at a strategic network. In the design phase, this model could be implemented, making it visible that all dimensions of the BSC are taken into account as well as possible. This may help the designers to reach a positive result.

Challenges of the planning process

Even before the start of the actual planning process, the scope of the network and a packed preparation timetable were identified as challenges in the preparation of the eAMK project, with a little over two months assigned to the practical preparation of the project. It was clear from the start that the process would become demanding and intensive in terms of the timetable and the complexity of the process. It was also clear that the preparation process must be as open, transparent and engaging as possible in order for all parties to feel that their voices are heard in the project's preparation and that they will be able to commit to the decisions made together in the final phase. The working methods and tools chosen for the preparation process



supported participation and the universities of applied sciences were committed to the process, ensuring that the challenges identified in advance did not become an obstacle to the preparation.

One of the starting points for the preparation was focus on the student and customer. The aim was to involve students and external interest groups in the preparation process and provide them with the opportunity to influence the project's content. In this context, external interest groups refer in particular to business and working life organisations with which universities of applied sciences cooperate a great deal. However, engaging students and interest groups in particular in the entire fast-paced preparation process proved to be a challenge and was only partly realised. Student unions from different universities of applied sciences and the Finnish Association of Student Unions participated in the two workshop days, in addition to which students answered the Innoduel survey. In contrast, there was no concrete participation from interest groups, working life organisations or labour market organisations in the preparation.

Does This Kind of Network Lead to Co-Operation, Alliance or Merger?

Finally, it is valuable to pay attention to the vision of future networks of the universities of applied sciences and how they develop further. As mentioned above, the ministerial funding mechanism supports the idea of the strategic networking of the UASs. On the European level, there are also examples of the next steps. Simplifying the OECD (2017) model, the steps move from networking towards collaboration (which is here paralleled with strategic networking), alliance and merger.

Network	Collaboration	Alliance	Merger
Generally no change to organisational autonomy	Arrangement between institutions (rather than individuals) embedded in formal agreements or partnership	Partners share a wide scope of capacities, but retain separate identities and legal statuses, and the agreements are revocable	At least one institution ceases to exist as a legal entity through incorporation within an existing or new institution

Table 2. Future possibilities for the eAMK strategic network.

The funding mechanism may draw the roadmap for the future of the universities of applied sciences. What will be in intensity of the cooperation between the institutions? How does the intensity of the cooperation best offer learning environments for our future students? After all, the structures should in the best



possible way ensure that the future work skills of the students will meet the expectations of the working life.

REFERENCES

- Ammattikorkeakoulujen rehtorineuvosto Arene ry. (2016, February 10). *Kohti maailman parasta korkeakoululaitosta*(Rep.). Retrieved December 22, 2017, from Arene website:
<http://www.arene.fi/fi/ammattikorkeakoulut/vaikuttavuus/rake-selvitys>
- Arene. (2017). Retrieved September 21, 2017, from <http://arene.fi/en>
- ARENE Strategia 2016-2020.
http://www.arene.fi/sites/default/files/PDF/2016/Arenen%20strategia%202016%20-%202020_08_2016.pdf
- Castells, M. (2011). Network Theory| A Network Theory of Power. *International Journal Of Communication*, 5, 15. Retrieved from <http://ijoc.org/index.php/ijoc/article/view/1136>
- European Schoolnet (2016), The e-Skills Manifesto - With contributions from leading figures in government, education, policy, research and industry;
http://www.pedz.uni-mannheim.de/daten/edz-h/gdb/10/e-skills_manifesto_en.pdf
- Grönroos, R., Kaitovaara, P., Arbab, S., Korelin, J., Tuomisto, A., Grönroos, R., Omaheimo, R. (2012). *Uskasvun anatomia: Opas parempaan tuottavuuteen*. Helsinki: TeliaSonera Finland.
- Huttula, T. (2016) Digitalisaatio ja uusi korkeakoulu in Määttä, J., Pohjanmäki, T. & Timonen P. (eds.) *Kohti digikampusta*. Humanistinen ammattikorkeakoulu, julkaisu 22 (12-23)
- Kantola, M., Kettunen, J., & Helmi, S. (2011). Strategic Regional Networks in Higher Education. In P. Ordóñez de Pablos, W. Lee, & J. Zhao (Eds.), *Regional Innovation Systems and Sustainable Development: Emerging Technologies* (pp. 177-186). Hershey, PA: IGI Global.
doi:10.4018/978-1-61692-846-9.ch013
- OECD (2016) *Getting skills right: Assessing and anticipating changing skill needs*, OECD Publishing: Paris; http://www.oecd-ilibrary.org/employment/getting-skills-right-assessing-and-anticipating-changing-skill-needs_9789264252073-en
- Sitra. (2017). Megatrend cards. Retrieved December 22, 2017, from <https://www.sitra.fi/en/publications/megatrend-cards/>



- Sulava. (2012). Tehokkaan tietotyön pullonkaulat -kyselytutkimus [PowerPoint slides]. Retrieved December 22, 2017, from <http://www.slideshare.net/Sulava/tehokkaan-tietotyn-pullonkaulat-kyselytutkimus>
- Wenger, E., McDermott, R. A., & Snyder, W. (2010). *Cultivating communities of practice: a guide to managing knowledge*. Boston, MA: Harvard Business School Press.
- Williams, J. (2017) Public Policies for Collaboration, Alliance, and Merger among higher Education Institutions, OECD Working Paper Nro 160 - forthcoming; <http://minedu.fi/documents/1410845/4177242/EDU-WKP-2017-9.pdf/e3d72fd4-fcae-41d4-b8eb-87760435fa4d>



THE MATHEMATICAL KNOWLEDGE BASE AND THE QUALITY OF MATHEMATICS INSTRUCTION IN PRIMARY EDUCATION

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ABSTRACT

In the Netherlands standards for mathematics in primary teacher education are defined in a nationwide knowledge base. This study investigates the relation between prospective teachers' subject matter knowledge, as measured by the knowledge base test, and the quality of mathematics instruction they deliver to their pupils. Six prospective teachers with different levels of mathematical abilities were observed in their mathematics instruction in primary school and were interviewed afterwards. Their mathematics instruction was analysed using a variant of the Mathematical Quality of Instruction instrument. Results showed that prospective teachers with strong mathematical abilities tend to provide mathematics instruction of higher quality than prospective teachers with weak mathematical abilities. Yet, strong as well as weak mathematical ability may hinder prospective teachers in their mathematics instruction. Prospective teachers with high mathematical ability showed difficulty to descend to pupils' levels, whereas prospective teachers with weak mathematical ability showed difficulty to interpret pupils' strategies or errors.



INTRODUCTION

During several years the quality of teacher education institutes from Universities of Applied Sciences in the Netherlands has been subject of debate. The educational results of mathematics in primary education tended to be lower than expected (KNAW, 2009; NVAO, 2004). Teacher educators emphasized the need for sufficient attention for mathematics for teaching in teacher education (Keijzer & Van Os, 2002). Disappointing results for mathematics led to the development, introduction and testing of a mathematical knowledge base (Van Zanten, Barth, Faarts, Van Gool, & Keijzer, 2009). The content of this mathematical knowledge base is based on subject matter knowledge and pedagogical content knowledge (Ball, Thames, & Phelps, 2008). The introduction of the knowledge base is intended to increase prospective teachers' level of mathematics (OCW, 2008).

Since 2013, in the Netherlands, prospective teachers need to pass a mandatory knowledge base test at national level before they graduate. Only the subject matter knowledge is tested (HBO-raad, 2012); the assesement of mathematical pedagogical content knowledge is left to the teacher education institutes. A majority of the prospective teachers pass this mandatory test, but some of them fail. Those prospective teachers who fail do not believe their weak mathematical abilities will disturb them in teaching adequate mathematics education at primary school (Boersma & Keijzer, 2017). Research by Hill et al. (2008) shows, however, that teachers' mathematical subject matter knowledge indeed influences their quality of mathematical instruction.

The aim of this study is to provide insight into the relationship between the mathematical ability of prospective teachers and the quality of their mathematics instruction by a qualitative exploratory research. The question is whether differences in subject matter knowledge influence prospective teachers' actions in their mathematics instruction. Therefore the main question of this study is:

How do prospective teachers with strong and weak mathematical abilities provide mathematical instruction?

This question has been further elaborated in the following sub-questions:

1. What characterizes prospective teachers' subject matter knowledge for those with strong and weak mathematical abilities?
2. What characterizes prospective teachers' pedagogical content knowledge for those with strong and weak mathematical abilities?



THEORETICAL BACKGROUND

Professional knowledge for teaching includes knowledge of the subject and the way this knowledge is organized (Ball et al., 2008; Shulman, 1986). Within this knowledge Shulman (1986) distinguishes, among other things, subject matter knowledge and pedagogical content knowledge. Ball et al. (2008) further broadened these two domains of knowledge for the mathematical domain, using the mathematical knowledge for teaching (MKT) model (Figure 1).

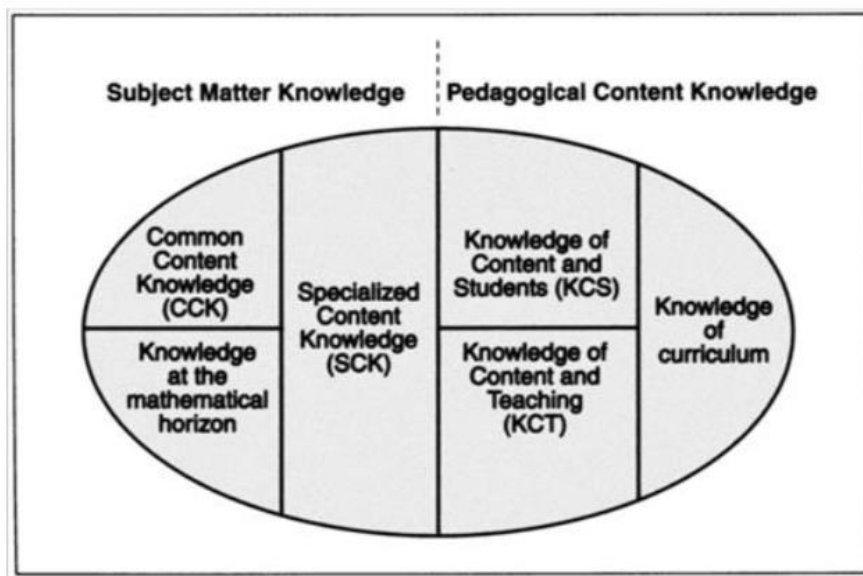


Figure 1. Mathematical knowledge for teaching model (Ball et al., 2008, p.40p. 403).

Subject matter knowledge is the teachers' mathematical content knowledge (Ball et al., 2008). Within this subject matter knowledge, *common content knowledge* is about solving mathematical problems. Teachers need to know the subject matter they teach, but they should also be able to recognize wrong answers. *Specialized content knowledge* is the mathematical knowledge and skills unique to teaching. It requires recognizing different interpretations or mathematical operations that pupils have or use (Ball et al., 2008; Kool 2013). This is similar to pedagogical content knowledge, but is distinctive. A teacher with pedagogical content knowledge knows which mistakes pupils make, while *specialized content knowledge* is needed to unravel these mistakes. *Knowledge at the mathematical horizon* is about social relevance and entanglement. This is the teacher's ability to interpret and explain situations from everyday life (Kool, 2013).



Pedagogical content knowledge is about knowledge that teachers use in classroom, it is about ways of representing and formulating to make a subject comprehensible to pupils. When a teacher is familiar with a common mistake of pupils and recognize them in the class context, it is called *knowledge of content and students*. This knowledge can be used by a teacher to shape his instruction (Hill, Ball, & Schilling, 2008). *Knowledge of content and teaching* combines knowing about teaching and knowing about mathematics. It for example focuses on which examples to start with and which examples to use to take pupils deeper into the content. *Knowledge of the curriculum* is about the curriculum. What content is already covered, what pupils learn during other lessons and which instruction materials are available.

The dashed line in figure 1 between subject matter knowledge and pedagogical content knowledge indicates that just knowing a subject well may not be sufficient for teaching (Ball et al., 2008). A teacher might have strong knowledge of the content itself but weak knowledge of the way students learn the content, or vice versa (Hill et al., 2008). Because subject matter knowledge and pedagogical content knowledge are both important, the composition of the mathematical knowledge base in the Netherlands is an integral approach to both areas of knowledge (Van Zanten et al., 2009).

Various researchers studied the impact of MKT. A study at multiple schools in Texas indicates no clear relationship between MKT and pupil achievements (Shechtman, Roschelle, Haertel, & Knudsen, 2010). Hill et al. (2008) found a significant, and positive correlation between levels of MKT and the mathematical quality of instruction. There is a strong relation between what a teacher knows, how she knows it, and what she can do with this knowledge in the context of instruction. There are also factors that mediate this relationship, for example teacher's beliefs on learning mathematics or attractiveness of activities. Swars, Hart, Smith, Smith and Tolar (2007) found a positive correlation between specialized content knowledge and teachers' pedagogical beliefs.

In an exploratory case study, Hill et al. (2008) designed the Mathematical Quality of Instruction (MQI) instrument. This instrument expresses interactions between teacher, student and content (Cohen, Raudenbush, & Ball, 2003) during mathematical instruction. The MKT model lays the foundation for the MQI instrument in which the teacher-content interaction is associated with subject matter knowledge and the teacher-student interaction with pedagogical content knowledge (Figure 2). Within the teacher-content interaction, the dimension *richness of the mathematics* captures the depth of the mathematics offered to students. There are two categories in this dimension; focus on meaning of facts and procedures and focus on key mathematical practices. The dimension *errors and imprecision* is about errors and imprecision in language and notation, or the lack of clarity/precision in the teacher's presentation of the content. *Working with students and mathematics*



captures whether teachers can understand and respond to students' mathematical contributions or mathematical errors. Coherence between MKT and MQI seems most likely for errors, while richness of the mathematics seems to be more influenced by mediating variables (Hill et al., 2008).

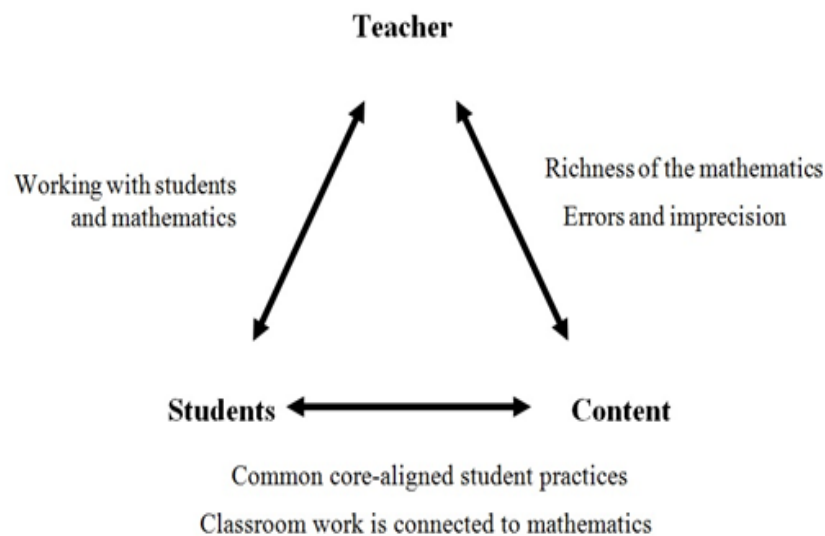


Figure 2. Instructional dimensions measured by MQI (National Center for Teacher Effectiveness, 2009).

METHOD

Instructions of six prospective teachers with high and low mathematical abilities were explored in depth in this study. To explicate the relation between teachers' knowledge and their teaching a multiple case study was used. According to Yin (2009) this is an appropriate methodological design in a setting, such as instruction, where there is little or no control over many factors. The participants in this study were third-year students from the Christian University of Applied Sciences Ede, a teacher education institute in the middle of the Netherlands. The six prospective teachers were tested for the first time on their subject matter knowledge in October 2016 with the National Knowledge Base Test of Mathematics. The result of this test is expressed as a mark on a scale of 1 to 10. Prospective teachers with a score 8 or above in this research were considered as high performers, prospective teachers with a score 5 or below as low performers. Three participants scored a mark 8, and three participants scored a mark 4. All participants followed an internship in grade 6 or 7 (10-11 year) and in their teaching used the same mathematics textbook.



The prospective teachers were asked to provide an instruction in mathematics, for about 15 to 20 minutes, like they normally did during their internship at a primary school. They could choose the activity for the instruction themselves, e.g. a self-chosen activity or task from the textbook. Each prospective teacher was observed three times during their instruction, followed by a focus interview between researcher and participant. In the interview prospective teachers explained and motivated the choices they made in their instruction. The first author wrote scripts of the observations and interviews. The scripts were coded using the ‘observation-instrument mathematical quality of instruction’ (Table 1). This observation-instrument is a variant of the original MQI instrument, without the use of the underlying 4-point scale. Namely, as this case study focuses on many aspects of low and high performing prospective teachers, the instrument is used only as guide for analysing their behaviour. As such the instrument use is in line with the nature of this research, being not about the prospective teachers’ level of mathematical quality of instruction, but about what a prospective teacher shows in practice and why he performs in a certain way in a mathematical instruction. The observation-instrument was discussed with researchers who participate in the ELWIER research group², a group of teacher educators from various Universities of Applied Sciences, departments of primary education, in the Netherlands.

Table 1. Observation-instrument mathematical quality of instruction

Dimension <i>richness of the mathematics</i>	Code
Relationships between different mathematical representations are visually displayed and explicitly pointed out.	r1
Mathematical explanations on why a solution method or answer is true/false or why a procedure works.	r2
Multiple solution methods or procedures are presented or discussed.	r3
Develops or works on patterns, generalizations or definitions, based on at least two examples.	r4
Fluent use of mathematical language and supports students’ use of mathematical language.	r5
Dimension <i>errors and imprecision</i>	
Mathematically incorrect events. Solving problems or defining terms incorrectly, forgetting a key condition in a definition, equating two non-identical mathematical terms.	f1
Problematic use of mathematical language or notation; errors in notation, in mathematical language or in general language.	f2
Lack of clarity in mathematics teacher’s utterances.	f3

² See for details: <https://elwier.nl/2017/04/10/elwier-onderzoeksgroep/> (in Dutch)



Dimension *working with students and mathematics*

Instances of remediation in which student misconceptions and difficulties with the content are addressed. w1

Use of student mathematical contributions to move instruction forward. w2
Contributions can include student answers, comments, mathematical ideas, explanations, representations, generalizations, questions to the teacher and student work.

The scripts were coded by the first author. To increase reliability, for each prospective teacher one instruction was also scored by another ELWIER researcher who also watched the ensuing interview. Subsequently, coding was discussed by both observers in order to improve coherence. The first participant case was used as a pilot.

RESULTS

Overview

This section provides the key findings from the observed instructions and the interviews with six prospective teachers. The dimensions *richness of the mathematics* and *errors and imprecision* characterize the subject matter knowledge of prospective teachers (sub-question 1). The dimension *working with students and mathematics* characterizes the pedagogical content knowledge of this prospective teachers (sub-question 2). The observation-instrument codes as defined in table 1 are given in parentheses. Lineke, Nienke and Aron were high performers, Roos Esther and Peter were low performers³.

General

All low performing prospective teachers used the textbook manual for their instruction, which was not observed with high performers. In addition, low performers shared their beliefs and experiences with their pupils about which subject matter is hard or difficult. For example: in her instruction about the metric system Esther told her pupils: *‘That is a complicated story I can tell you, since I also have questions about this topic of which I think, oh no....’* During the interview, Roos explained about tasks in a given context: *‘That’s a rather tough topic, some pupils are not good at that, which makes it very difficult.’* From the interviews it appeared that all prospective teachers provided an instruction adapted to the average pupil.

³ Prospective teachers’ names and pupils’ names are fictitious.



Dimension richness of the mathematics, high performers

Lineke and Nienke connected different representations in their instructions, such as concrete materials, models and formal level (r1). Lineke taught the subject fractions and discovered with her pupils what fractions are, while she was using a fraction model: a paper strip. Two pupils were allowed to describe how to divide the paper strip into 24 equal pieces. In addition, Lineke showed on the blackboard how 1 , $\frac{1}{2}$ and $\frac{1}{4}$ relate to each other by moving rectangles of different sizes on top of each other. Nienke taught spatial figures by letting pupils searching examples in their classroom. Nienke explained why a pouch and a toilet roll were good examples. In another instruction, Nienke showed that she argues at mental level, without making the issue concrete for pupils (r1). *'If you roll that rectangle you get a cylinder, try to imagine it.'* In the interview she explained: *'I can imagine what rolling a sheet looks like, but you have to be aware to go back to the level of those children.'* It seems her mathematical ability got in her way to descend to pupils' level.

Teachers' subject matter knowledge also became visible when a prospective teacher interprets how a pupil thinks about a given answer or strategy (r2,r3). Aron showed that he could do this, but also ignored a learner's smart strategy. In his class, he discussed a multiple choice question about the product 76×6 . There were four possible answers, one of them ended at a six. A pupil said: *' 6×6 is 36, so it could be more than the 3, but it ends at a 6, so you can already know the answer.'* Aron did not respond to this, but instead explained the task as he had prepared. In the interview Aron said: *'If I think about it now, I know exactly what he means, but not at that moment, I did not notice. I think I was more thinking about the step 70×6 , which I wanted to make clear to everyone.'* Aron seemed too much tied to his prepared instruction, leaving no room for pupils' strategies. At another point, Aron showed that he could interpret how a pupil thought. *'Look, Victor says I divide by 10 twice. If you prefer, that is possible. Esmée says it can be done a little faster, she just divides by 100 at once.'*

Dimension richness of the mathematics, low performers

In the lessons conducted by Peter and Roos the use of manipulatives, namely measuring glasses and money, seemed not to be very well considered (r1). Roos: *'I thought I need to have some materials because of your visit, but during class I forgot that part a bit, and then it did not make much sense anymore.'* Peter: *'I took some measuring glasses that I had once seen on the attic, but when I looked at those cups, I had to think about how to use them because they are not standard sizes.'* In addition, another low performer, Esther, showed that she could use a model well in her lesson. Using a stripe, she explained how the fractions $\frac{1}{4}$ and $\frac{3}{4}$ belong to 25 and 75 percent. During one of Esther's lessons she frequently experienced difficulty in interpreting a pupil's explanation (r2,r3). In one case, when a pupil proposed a good



strategy, Esther responded: *'It may be clear to you, but I do not get it completely.'* Later she saw in the manual that a pupil's answer was incorrect, but she could not trace the pupil's wrong line of thinking: *'I'm also doubting, because the manual states 40. Karin, can you explain why 40 is right?'* Esther needed help from another pupil to get the correct answer. In the interview Esther explained about this fragment: *'I think I just found this situation very difficult. In such situations I start doubting, then I think: is it right or wrong? You want to serve as a role model, so you want to show that you understand, but I'm just making it even more confusing for them. However, I do not consider this being a failure, as children may see that teachers also make mistakes.'*

The low performing prospective teachers also showed examples where they correctly interpret pupil's reasoning. In one of Roos' lessons the problem $98 + 99 + 96$ was discussed. A pupil said: *'98 will be 100 and 99 too, and then you need to subtract 3 of 96.'* Roos: *'Ah, he realised that 98 and 99 together are 3 short of [two time] hundred, and then he subtracted them from 96.'* To summarize, within the dimension *richness of the mathematics*, prospective teachers show examples that seem to be explained by strong or weak mathematical ability, but this relation does not always hold.

Dimension errors and imprecision, high performers

In his instructions, Aron made one-time errors such as turning numbers, 67×6 instead of 76×6 , and in a task about internet providers he called MB microbyte instead of megabyte (f1). When Aron discussed a task in which the pupils had to subtract, his explanation was wrong and his use of the blackboard unclear (f3). By subtracting the tens, Aron said *'Five minus zero is not possible'*, he meant zero minus five is not possible (figure 3). He repeated this error several times. After changing he putted a dash through the tens he received at the changing and wrote a five above.

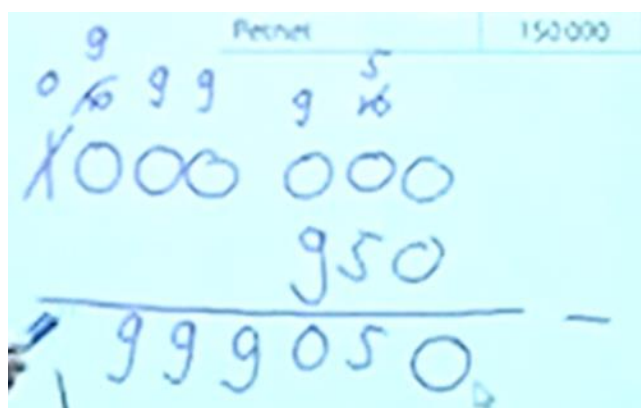


Figure 3. Elaboration of a task in Aron's lesson



This was not necessary and made it unclear for pupils. In the interview Aron said: *'I did not notice that I switched, when I watched the video.'*

Nienke demonstrated an error in her use of mathematical language. She used the word number where digit was meant (f2). *'Sometimes there are no three numbers behind the decimal point.'* She also spoke about 'sticking' of zeros, which can be considered a meaningless manipulation with zeros (f3). Lineke was inaccurate in using two different time notations (f2). *'Anja goes to the shop a quarter to 9 and returns at 21.15. How long has she been away?'*

Dimension errors and imprecision, low performers

In Esther's lesson it occurred that she did not notice or correct errors (f1). Written on the blackboard was $5:10=1.00$ and $4:100=0.25$. For the first division, Esther wrote an incorrect answer, for the second division she wrote refers to the answer a pupil suggested. She commented: *'There I go again, I just miss the step in which he makes a mistake, I do not recognize it.'* Roos demonstrated in her lessons similar substantive errors, the high performer Nienke used. Roos also used the word number where digit was meant (f2) and spoke about 'sticking' of zeros (f3). Roos expressed the conversion of meter to centimetre as follows: *'Two steps, the two zeros must be added, just add two zeros and then it's all right.'* A pupil later asked: *'Can you also remove two zeros when dealing with 200 meters?'* Roos: *'Why would you do that, then it is not correct, it becomes 2 meters.'* Peter was sometimes inaccurate in his wording (f2): *'I bought a whole cake and there are four people. I will give each one piece. That is a lot, with four people all one piece.'*

These examples show that both high and low performing prospective teachers do make mistakes in their instruction. Prospective teachers from both groups use ambiguities and inaccuracies. A clear relationship between mathematical abilities and action does not appear in this dimension.

Dimension working with students and mathematics, high performers

In one of Nienke's lessons, pupils could review their errors (w1). Nienke did not give examples of the common errors she noticed. In the interview, she was sometimes amazed about pupils' mistakes. *'Then you really get that 2.5 all of a sudden becomes 1, I thought how do you come up with that.'* Lineke sometimes found it difficult to respond to pupils' mistakes (w1). Her reaction to a pupil who accidentally came to 24 when folding the paper stripe: *'Maybe, I could have asked, how did you actually fold that? I did not.'* Lineke instructed her pupils to draw a bar chart about the group. With this example, she intertwined pupils' work with her instruction (w2). During the instruction, she said: *'I inspected your sheets, and then Reinier said, look miss, I have made something different.'* Lineke then discussed the meaning of a legend. In her interview, she said: *'What I have prepared is leading, what pupils contribute I include in my lesson.'* In Nienke's lesson there was also



room for input from pupils, but she did not always adequately address this (w2). When a pupil mentioned a mnemonic for remembering the metric system, Nienke said: *'That is a good one, you have a sheet where it is on.'* She did not explain this rule. Another example was the task $\text{€}9.95 \times 3$. This was solved by a pupil using a non-standard strategy, but this was not the strategy Nienke had in mind: *'That is possible, if you were ciphering, because that is actually what we are doing now.'* Although the pupil's solution was quite well, she did not indicate that this task was not a very good example of ciphering. In the interview Nienke said: *'No, I did not expect this solution, because I was referring to multiply by ciphering. I think, in my preparation, I have to think more of what children themselves come up with, in terms of questions and solutions.'*

Dimension working with students and mathematics, low performers

Peter walked around in the classroom with the manual in his hand. If he saw from the manual that a pupil's answer was wrong, he asked that pupil to look at the task again (w1). In the interview he explained: *'I have never taken much effort to automate things myself, such as the eight-times table, so I am looking for some safety when pupils make tasks.'* Peter gave two after-the-test lessons, where pupils worked on what went wrong in the test from the textbook. About these lessons he said: *'No, I can be honest about it, I did not look what pupils failed at in the test, I could have prepared it better. Maybe, I thought a bit too easy about it.'* In Roos' lesson a pupil suggested to read the number of days of the different months on the knuckles of your hands. Roos did not elaborate on this (w2). In the interview she said she could not remember that this was said, but she knew how this principle works. The intertwining of pupil's work in the instruction has not been observed with low performers.

The scores on this dimension show that prospective teachers with strong mathematical abilities have a keen eye for pupil work and interweave it with their instruction. He or she also use, in contrast to prospective teachers with weak mathematical abilities, the mistakes pupils make to adapt their instruction. However, the way they actually adapt this mistakes, is not always adequate.

CONCLUSIONS

The central research question in this study is how prospective teachers with strong and weak mathematical abilities provide mathematics instruction. The conclusion is that there are differences between both little groups, strong performers are not troubled by the mathematical content leaving more space for dealing with pupils' input while low performers have trouble instantly interpreting pupils' reasoning due to their weak mathematical abilities. Because there are also differences within the prospective teachers, conclusions are not generally valid for low or high performers,



but better suited to an individual prospective teacher. Figure 4 summarizes the conclusions.

Within the dimension *richness of the mathematics*, it seems that subject matter knowledge is important (bold and thin arrow). Prospective teachers with strong mathematical abilities can provide rich lessons. They make connections between different representations and interpret pupils' explanations correctly. Richness is sometimes absent in low performers' teaching. They get stuck with pupil's explanations or try to connect between representations, but have not properly thought through the use of materials. Prospective teachers with weak mathematical abilities attribute this to insufficient preparation. The actual cause seems to be a shortage of *specialized content knowledge* (Ball et al., 2008). However, there is no unambiguous causal link between subject matter knowledge and quality of instruction, because differences in mathematical ability do not always matter. Prospective teachers with

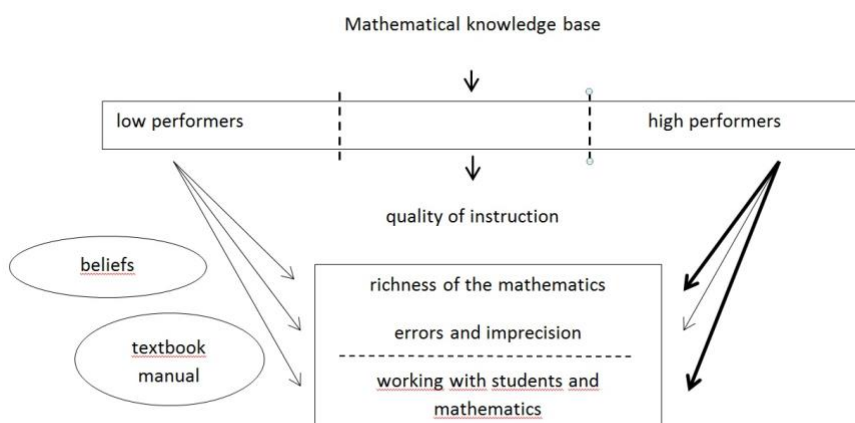


Figure 4. Conclusions schematised. Thick line symbolizes that mathematical ability contributes convincingly.

weak mathematical abilities sometimes interpret pupils' contributions correctly while high performers sometimes ignore pupils' efficient strategies. Mathematical ability sometimes even seems to prevent prospective teachers from descending to a pupil's level. Pupil's thinking processes or questions are insufficiently thought through or lead to amazement. Here too, insufficient preparation is given as an argument.

Both little groups of prospective teachers make substantive errors during their instructions and in both groups there are inaccuracies or ambiguities (thin arrows).



The coherence between subject matter knowledge and quality of instruction, found by Hill et al. (2008) for the dimension *errors and imprecision* is not confirmed. This research also does not show that high performers recognize their own wrong answers as suggested by Ball et al. (2008).

The National Knowledge Base Test does not measure pedagogical content knowledge, but differences in mathematical abilities do seem to have an effect on the way prospective teachers work with pupils (bold and thin arrow). High performers use pupils' input and errors in their instruction, which are examples of pedagogical content knowledge (Hill et al., 2008). This does not happen with low performers. For their instruction they depend on the teacher's textbook manual. Finally, low performers share their own difficulty with mathematics with their pupils. The reason for them to discuss their own difficulties does not seem to be pedagogical (Swars et al., 2007), but empathetic. Pupils are allowed to know that a prospective teacher also makes mistakes.

DISCUSSION

This research provides descriptions of what a prospective teacher knows, what he does in class and why he does it that way. Based on this study recommendations for teacher education institutes are given. Because of different mathematical abilities, prospective teachers need a different approach in teacher education. High performing prospective teachers can be challenged to discuss smart strategies, prospective teachers with weak mathematical abilities need more time and attention in teacher education. Another recommendation is also to test pedagogical content knowledge on a national level. Currently it seems that subject matter knowledge is more important because of the knowledge base test. A national test for both aspects in teaching mathematics will strengthen the mathematics knowledge base as an integral approach for both domains (Van Zanten et al., 2009).

These results also raise additional questions. Both a high and a low performer blame choices made during instruction to insufficient preparation. Perhaps the distance between the prospective teacher's subject matter knowledge and pupil's learning is the underlying cause. In addition, it has not been found that prospective teachers with strong mathematical abilities make less errors in their instruction than prospective teachers with weak mathematical abilities. Possibly lack of experience plays a role here but this would require further research. Another additional question is about the coding. During the discussion with both observers about each participant case, it appeared that the observation-instrument did not provide enough information for unambiguous coding. The original MQI instrument, with extensive descriptions might provide for that better (NCTE, 2009). This research does not provide a direct answer to questions about development in quality of education due to the



introduction of the knowledge base and whether the knowledge base increases teachers' level (OCW, 2008). There are no baseline measurements available before the introduction of the knowledge base. Moreover, the number of cases examined is small. The participants in this study enjoyed education at the same University of Applied Sciences and could be influenced by the presence of the researcher. In order to get a more general picture, it is advisable to widen the scope of this study to a larger group of respondents from various institutes.

The prospective teachers in this research were motivated to participate. Doubt about own mathematical abilities did not prevent them from participation. One prospective teacher expressed this to his pupils: *'I can learn a lot myself from these film recordings.'* In order to continuously increase quality, this is a good principle for students, but also for teacher educators and for teachers in primary education. Intensive cooperation between teacher education institutes and primary education can contribute to this.

REFERENCES

- Ball, D.L., Thames, M.H., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? *Journal of Teacher Education*, 59(5), 389-407.
- Boersma, G., & Keijzer, R. (2017). Worstelen met rekenen-wiskunde in het vierde jaar van de lerarenopleiding basisonderwijs [Struggling with mathematics in the fourth year in teacher education]. *Tijdschrift voor lerarenopleiders*, 38(1), 17-28.
- Cohen, D. K., Raudenbush, S., & Ball, D.L. (2003). Resources, instruction and research. *Educational Evaluation & Policy Analysis*, 25(2), 119-142.
- HBO-raad (2012). *Toetsgids pabo Rekenen-wiskunde [Test syllabus mathematic primary teacher education]*. Den Haag: HBO-raad.
- Hill, H.C., Ball, D.L., & Schilling, S.G. (2008). Unpacking pedagogical content knowledge: Conceptualizing and measuring teachers' topic-specific knowledge of students. *Journal for Research in Mathematics Education* 39(4), 372-400.
- Hill, H.C., Blunk, M.L., Charalambous, C.Y., Lewis, J.M., Phelps, G.C., Sleep, L., & Ball, D.L. (2008). Mathematical knowledge for teaching and the mathematical quality of instruction: An exploratory study. *Cognition and Instruction* 26(4), 430-511.
- Keijzer, R., & Van Os, S. (2002). Rekenen-wiskunde & didactiek anno 2002 [Mathematics and pedagogy anno 2002]. *Tijdschrift voor nascholing en*



- onderzoek van het reken-wiskundeonderwijs* 20(3), 17-20.
- Kool, M. (2013). Ontwikkeling van beroepsspecifieke wiskundekennis op de pabo [Development of specialized mathematical content knowledge in primary teacher education]. *Reken-wiskundeonderwijs: onderzoek, ontwikkeling, praktijk*, 32, 22-32.
- KNAW (2009). *Rekenonderwijs op de basisschool. Analyse en sleutels tot verbetering [Mathematics teaching in primary education. Analysis and keys for improvement]*. Amsterdam: Koninklijke Nederlandse Akademie van Wetenschappen.
- NCTE (2016, November 2), National Center for Teacher Effectiveness. Retrieved from <http://cepr.harvard.edu/ncte>.
- NVAO (2004). *Notitie: meta-evaluatie pabo's [Note: meta evaluation primary teacher education]*, d.d. 3 maart 2004. Den Haag: NVAO.
- OCW (2008). *Krachtig meesterschap. Kwaliteitsagenda voor het opleiden van leraren 2008-2011 [Powerful mastership. Quality agenda for educating teachers 2008-2011]*. Den Haag: Ministerie van Onderwijs, Cultuur en Wetenschap.
- Shechtman, N., Roschelle, J., Haertel, G., & Knudsen, J. (2010). Investigating links from teacher knowledge, to classroom practice, to student learning in the instructional system of the middle-school mathematics classroom. *Cognition and Instruction*, 28(3), 317-359.
- Shulman, L. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(2), 4-14.
- Swars, S., Hart, L.C., Smith, S.Z., Smith, M.E., & Tolar, T. (2007). A longitudinal study of elementary pre-service teachers' mathematics beliefs and content knowledge. *School science and mathematics*, 107(8), 325-335.
- Yin, R. K. (2009). *Case study research: Design and methods, Fourth edition*. Thousand Oaks, CA: Sage.
- Van Zanten, M., Barth, F., Faarts, J., Van Gool, A., & Keijzer, R. (2009). *Kennisbasis Rekenen-Wiskunde voor de lerarenopleiding basisonderwijs [Knowledge base mathematics for primary education]*. Den Haag: HBO-raad.



PATTERNS OF COLLABORATION IN VET TEACHER FOR THE FUTURE PROGRAMME, COHORT III

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ABSTRACT

As members of a society which is in constant changes caused by the development of information technologies, we feel it is about time we reframed our beliefs and conceptions. Nowadays, it is not enough to live as if we are in an island and try to solve real life problems by ourselves, we need to establish networks in order to overcome challenges that frequently come up in different ways,. We believe that living in the network and strengthening collaborative groups are essential efforts for innovation in different social and cultural contexts. Not only network but also collaboration is based on sharing ideas, tasks, readings, criticism and other issues. Thus, it is necessary to learn how to act according to this perspective. Having that in mind, this paper aims to bring up some reflection about the stages of group development based on Tuckman (1965,2001) and patterns of collaboration discussed by John-Steiner and Mahn (1996), besides analyzing how groups perform and collaborate, accepting critic and promoting individual and team development. The research participants are composed by a group of twenty (20) Brazilian teachers immersed in an Applied University of Sciences in Finland during three months, in 2016. We have requested the participants to answer a questionnaire with open-ended and closed-ended questions, the data were analysed according to the perspective of qualitative research and the result of the investigation reveals that most of those participants experienced the stages of “norming” and “performing” in their respective groups.

Keywords: Collaboration, VET Teacher for the Future, Teacher Training.



INTRODUCTION

It is almost a common sense that we currently lived in the information-age driven by the internet advance. This phenomenon has brought some challenges for humanity, since it is required from human being, some skills never thought before, as lifelong learning skills.

Current learning theories emphasize learning as a construction of one's own knowledge (Bereiter & Scardamalia, 1996) and learning as knowledge creation (Paavola, Lipponen & Hakkarainen, 2004). Learning has been defended as a very social process and needs excellent collaboration skills. However, authentic collaboration is, sometimes, difficult to achieve. Usually, it is easier to cooperate with partners than to collaborate effectively.

Considering the educational context as a rich environment permeated by interaction and responsible for the citizens' development in a lifelong learning dynamic, this paper focuses on an important learning skill, which is a collaboration.

The first part of this article presents a theoretical discussion about cooperation and collaboration in order to make clear our conceptual approach about working together. In sequence, we bring the conceptual definition concerning the stages of team development and patterns of interaction and collaboration. Therefore, considering that collaboration takes place through interaction, we show cooperation and collaboration as complementary working methods, upon which each one is part of a process from plain to a deeper level integration work. Hence, we discuss team development stages, patterns of collaboration and reflect upon the interactive dynamics in team work in order to achieve innovation.

CONTEXT

The studies about the stages of group development (Tuckman, 1965, 2001) and patterns of interaction and collaboration (John-Steiner & Mahn, 1996) support us to reflect on our experience as teamwork developed during VET Teacher for the Future Programme, Cohort III. This program has been developed under the coordination of the Brazilian Vocational and Technological Education Secretary for the Education Ministry (SETEC-MEC), in association with Universities of Applied Sciences of Finland, and aims at professional training for teachers from the Federal Vocational Education Network.

The program consisted of three months of immersion in the Finnish educational system, experiencing the guiding principles of its education and culture, which stands out in the world panorama for its successful results. According to the Finns,



education is based on trust, learning by doing, collaborative work, curricular flexibilization and individualization, considering the student as the center of the learning process. It was expected that the Brazilian teachers could become multipliers of teaching best practices in the vocational education context in Brazil.

Based on this, the program was designed in such a way that Brazilian teachers could experience the Finnish educational principal, which is learning by doing. At the beginning of the training, the first challenge faced by the participants was the working group constitution, organized by the Finn Educators according to the analysis of preliminary questionnaires and an individual interview held in the first week of the VET Teacher for the Future Programme, Cohort III (VET III). The groups, called “Family Group”, were challenged to work collaboratively during the first two months of the Program, something far from the participants’ reality in Brazil, so, it caught our attention during our reflection process on the stages and patterns of collaboration the VET III group passed through.

Each “Family Group” was organized with six teachers who had very different academic backgrounds, professional experiences and years of teaching. Because of these characteristics we tend to think that maybe that was the reason they demonstrated difficulty to engage in collaborative works. The groups were able to discuss the proposed themes in depth, but the synthesis and textual productions were constructed individually by each participant and then put together to make sense.

RESEARCH GOALS AND QUESTIONS

Collaboration and cooperation are very important in the learning process. According to this perspective, this article is guided by the following question: what level of collaboration was achieved by the VET Teacher for the Future Programme, Cohort III participants? This research question will be answered in light of three other questions: what development stages the teams achieved? What were the patterns of collaboration adopted by the group? Which digital tools were used by the group to facilitate collaboration?

THEORETICAL FRAMEWORK

The stages of group development between the participants of the VET Teacher for the Future Programme, Cohort III is analyzed according to Tuckman (1965; 2001) model: Forming, Storming, Norming, Performing and Adjusting. And the patterns of interaction that occurred during the first phase of the Program, which took place during three months of 2016 in Finland, was based on the role of collaboration standards proposed by John-Steiner and Mahn (1996).



Cooperation and Collaboration

Some researchers suggest a setback of meaning when comparing the words cooperation and collaboration. For Roschelle & Teasley (1995) "Collaboration is a coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem", what involves a "(...) mutual engagement of participants in a coordinated effort to solve the problem together" (p.70). Already the "Cooperative work is accomplished by the division of labor among participants, as an activity where each person is responsible for a portion of the problem solving" (p. 70).

Kayser (1994) says collaboration "is a joint effort between two or more people, free from hidden agendas, to produce an output in response to a common goal or shared priority. Often this output is greater than what any of the individuals could have produced working alone" (p.21).

Dillenbourg et al (1995) does agree with Roschelle & Teasley, and define "cooperation and collaboration do not differ in terms of whether or not the task is distributed, but by virtue of the way in which it is divided: in cooperation, the task is split (hierarchically) into independent subtasks; in collaboration, cognitive processes may be (heterarchically) divided into intertwined layers" (p. 190).

In this paper, we adopt the conception that collaboration takes place according to the stage of each small-group development (TUCKMAN, 1965) and that the interaction in the group work defines patterns of collaboration (JOHN-STEINER & MAHN, 1996).

Team development stages

The organizational psychologist Bruce Tuckman, in 1965, developed a model of team development that has been used extensively to assess the progress of work teams (HOPE, 2005). This model brings four stages to describe the developmental sequence in small-groups development: forming, storming, norming, and performing. Later, he added a fifth stage, adjourning (RICKARDS; MOGER, 2000; TUCKMAN 2001).

The first one, forming, is usually the initial moment that a group interaction experiences, when the group members get to know each other, working in a closer way. Sequentially, according to Tuckman (1965), there is a storming stage. That occurs after an initial contact among the group members, when they begin to know and understand everyone's individual position, through presenting their opinions but still working and thinking in a particular way. At this stage several conflicts among



group members may usually occur when they cannot be open to share and listen to opinions and contributions from one another. The third stage is called norming. In the norming stage the group starts to know each other deeper and respect individual opinions and beliefs, respecting more those contributions that grant the group's growth. In this stage, it is possible to note openness to the ideas of other group members (RICKARDS; MOGER, 2000; TUCKMAN 2001; HOPE, 2005).

Despite some conceptual conflicts, comparing collaboration and cooperation with the team development stages brought by Tuckman (1965), it is possible to consider that in the forming, storming and norming stages the group members cooperate to develop some task. In these phases, members can work together to achieve a goal, but in a more individualized way, such as in cases which they develop separated activities that each member must perform individually, each one "does their own share of a whole" (RICKARDS; MOGER, 2000; TUCKMAN 2001; HOPE, 2005) and at the end they put all pieces together to form a whole.

In the performing stage, members are proactive and autonomous, they trust and support each other, working as a team. It does not mean ideologies are uniform, but the diversity of ideas is discussed in order to increase innovation, and then collaboration starts to take place in the group work (RICKARDS; MOGER, 2000; TUCKMAN 2001; HOPE, 2005).

On the other hand, in the adjourning stage, the last one established by Tuckman, there is anxiety concerning group separation and work completion. There is a general feeling of sadness and feelings toward the leader and group members (TUCKMAN, 2001). With the objective of summarizing Tuckman's model of group development, figure 1 shows a parallel between the development stages of the group and the collaboration process.

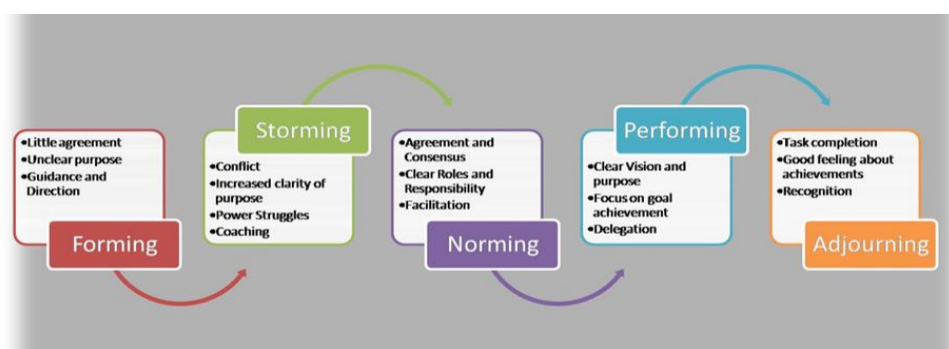


Figure 1. Team development stage of collaboration (Modified: TUCKMAN, 1965).



Patterns of interaction and the role of collaboration

According to John-Steiner and Mahn (1996, p. 199), there are patterns of interaction and collaboration with groups of students where teachers emphasize coparticipation and cooperative learning. The authors reveal four patterns of the collaboration process according to collaborator's values, roles and working methods. The patterns created by the authors are: distributed, complementary, family and integrative, as shown in the Figure 2.

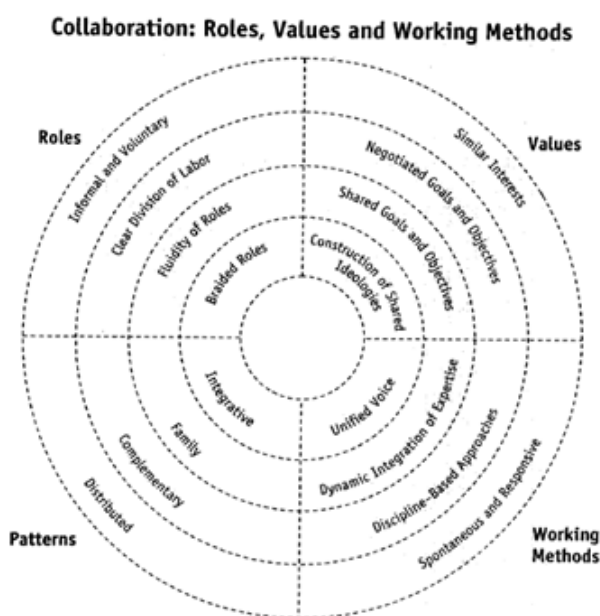


Figure 2. Phases of the development research cycle (JOHN-STEINER & MAHN, 1996, p. 200)

John-Steiner and Mahn (1996, p. 199) explain that in development groups engaged in collaborative learning, conflict-resolution strategies are dynamic and “the collaboration can be initiated at any level and be transformed over time”.

Following the author's ideas, the distributed collaborations occur in an informal and voluntary way, learners share similar interests and collaborative work is spontaneous. There are exchanges of information in the collaborative dynamic, but the main feature is sharing ideologies, never conflict them.

Complementary collaboration is based on a clear division of labor, where collaborators negotiate goals and objectives to be achieved in a period of time. This



pattern is common in discipline-based approaches, in the organization, school work teams in several classrooms in Brazil.

Opposing to it, “family collaboration” is characterized by frequent changes of roles, in which learners change roles repeatedly and unexpectedly during collaborative work. Collaborators share goals and objectives, taking to a dynamic integration of expertise.

Finally, integrative collaboration is a critical and deep way to work in groups. The diversity of voices is unified; roles are braided, leading to the construction of shared ideologies. Group members trust each other and they are able to innovate through a diversity of ideas.

METHOD

This research is characterized as an exploratory study which aims to provide an overview of a fact. This type of research is performed especially when the chosen topic is little explored and it becomes difficult to formulate precisely and operable hypotheses about it. This particular research targets to explore and describe the stages of development and collaboration patterns achieved by the Brazilian teachers who took part of the VET Teacher for the Future Programme, Cohort III, during three months in Finland, in 2016. It comprises quantitative and qualitative mixed methods. According to Sampieri and Collado (2006) one method does not neutralize the other in the attempt to answer different questions in the field of investigation of a certain problem, since it collects, evaluates and links qualitative and quantitative data in the same research.

Participants

Participants of this study were from a group of 40 Brazilian teachers who took part of the VET Teacher for the Future Programme, Cohort III, during the first phase of the course that took place in April, May and June 2016 in Finland at Häme University of Applied Sciences (HAMK) and TAMK University of Applied Sciences (TAMK).

Of the teachers surveyed, 20 accepted to respond to the questionnaire. The group that answered the questionnaire consists of 40% female teachers and 60% male teachers. 40% of them studied at HAMK University and 60% at TAMK University.



Instruments

In this survey for collecting data, we have used an online questionnaire built through the use of Google Forms. The questionnaire was composed by open-ended and closed-ended questions and shared by e-mail and WhatsApp with the teachers.

The questionnaire was organized into four parts. The first part collected general information about the research participants; the second one had as objective to verify the stage of development achieved by the groups; the third part obtained information about behavior patterns of the groups and the fourth part collected information about the digital tools used by the group to facilitate collaboration.

The second and fourth part of the questionnaire was composed of open-ended questions. The third part was composed of 9 closed-ended questions that ranged from 1 "never" to 4 "always". According to Field (2009) Chronbach's alpha (α) between 0.7 and 0.8 indicates the good reliability of the instrument. The reliability of the questionnaire used in this study is $\alpha = 0.78$, implying the questionnaire to be reliable.

RESULTS

Research Question 1: What developmental stages the teams achieved?

Based on Tuckman's theory (1965, 2001), the questions from the second part of the questionnaire were used to analyse the teachers' perceptions, participants from VET Teacher for the Future Programme, Cohort III, regarding the stage reached by them during the period they spent in Finland. The data was analysed in NVivo © 10 software, figure 3.

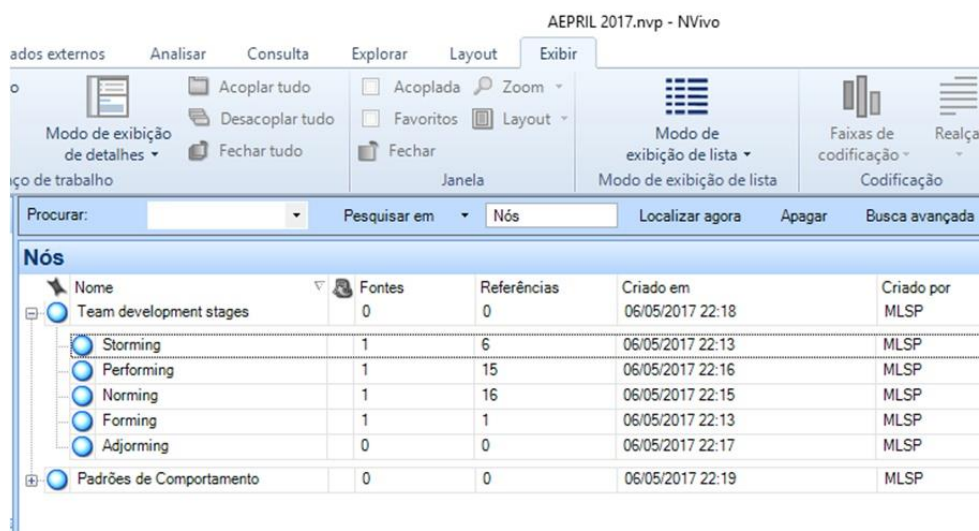


Figure 3 - Codification proposed by the research - registration and data processing in the NVivo © 10 Software.

The methodological choice for analyzing data was not limited to its quantification, although this resource has been used. It sought to privilege mainly data interpretation, based on the theoretical framework approached in this research. Likewise, the composition of the final report combined the research participants' statements and theoretical propositions so that reflections and conclusions could be better elucidated.

In this analysis, it can be seen in table 1, that most teachers' statements (81%) report that the actions performed by the group are related to the characteristics of the Norming and Performing levels.

Category	Registry Unit	Occurrences	%
Developmental Stage	Forming	1	3%
	Storming	6	16%
	Norming	16	42%
	Performing	15	39%



	Adjourning	0	0%
Total		38	100%

Table 1 - Perceptions on the Traineeships achieved by teachers during the VET III

From the teachers' statements it can be seen that 42% report attitudes regarding the Norming phase, which, according to Tuckman (1965, 2001) is the phase in which groups begin to know each other more deeply and begin to accept contributions of all in a growth process. This is clear in the following statements:

We usually discussed the proposal, generated some common understandings and gave some referrals (Teacher 3)

Initial discussion to understand different points of view and to align the way of working (Teacher 10); Always listening to group members (Teacher 16).

Additionally, 39% report attitudes related to the Performing stage in which group members are proactive, autonomous, confident, supporting, and working as a team. These characteristics can be seen in the following teachers' statements:

There was the collaborative construction of documents, considering the abilities of each group member (Teacher 18);

Each one performed the action he felt most comfortable with (Teacher 2);

The work was done according to the initiative and abilities of each group member (Teacher 20).

Finally, it became clear that the groups exceeded the Forming and Storming stages, which refer to the initial phases of groups' adaptation, when participants begin to know each other and define their position within the group. It is possible to perceive that they did not reach the stage of Adjourning at that moment, since group work was not over by then. That occurred only in Brazil, four months after this research. After the end of the Teacher Training Program, in Brazil, teachers who had some affinities organized themselves in new groups and began to work cooperatively on new projects.



Research Question 2: What were the patterns of collaboration adopted by the group?

In order to analyze this research question, the third stage of the questionnaire was used, in which teachers had to read nine statements, three of them were associated to the Roles, three associated to the Values and three associated with the Working Methods adopted by the group during the phase in which teachers were in Finland. These statements referred to situations that could occur during the activities carried out in their groups, and then teachers should select if they: did not occur, almost never occurred, frequently occurred or always occurred. Based on these answers, we obtained the frequency of responses associated with the patterns of collaboration adopted by the group, which can be seen in figure 4.

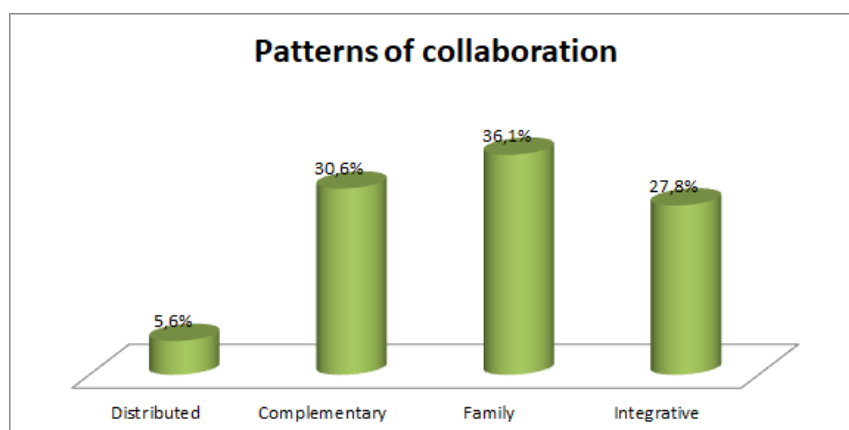


Figure 4. Frequency of responses associated with patterns of collaboration adopted by the group.

The graph shows that the group's statements demonstrate there was a more or less equal division between Complementary, Family and Integrative standards, since Family standard had a slightly higher percentage of occurrence than the others. This pattern is characterized by frequent changes of roles and sharing goals and objectives leading to dynamic group integration. These characteristics can also be perceived in some answers of the second part of the questionnaire:

Each activity had its own organization, but in general, the organization was based on joint group discussions (Teacher 3);

Essentially, each member of the group chose the activities that were most interesting to himself/herself (Teacher 7).



Research Question 3: Which digital tools were used by the group to facilitate collaboration?

A number of digital tools were introduced by some Finnish teacher's trainers from HAMK and TAMK to facilitate collaboration among VET III teachers. In addition to the tools presented by Finnish trainers, some Brazilian teachers also brought their contributions by presenting other tools. The process of collaboration as quoted by Kayser (1994) aims to produce a result, in response to a common goal generating far greater results than any of the individuals could have produced working alone. So we can see that the use of collaborative tools has helped the groups' work. All the research participants stated they used some kind of collaborative digital tool. Figure 5 shows the main tools used by VET III teachers.

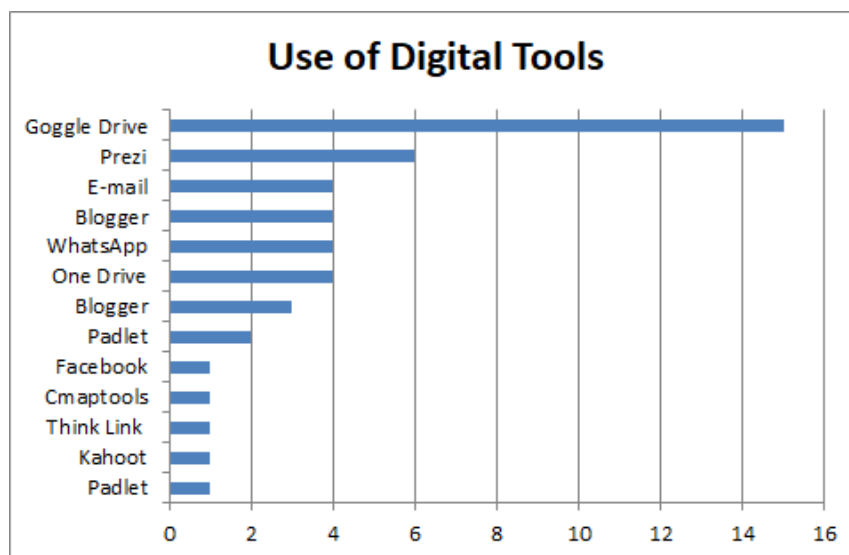


Figure 5. The main tools used by VET III teachers.

The importance of using these tools is expressed in the following teachers' statements:

I believe that the tools that help us manage online documents allow greater collaboration by allowing the joint construction of work (Professor 6);
Using Google Drive, documents were filed at anytime from anywhere (Professor 8);



All of them have potential for collaboration, since we use them together (Professor 16)

The tools were used so that everyone in the group could work simultaneously (Professor 6).

It's important to mention that many of the collaborative tools listed above continued to be used by teachers during the program phase that occurred in Brazil, from July to November, 2016, since teachers participating in VET III were in different regions in Brazil.

CONCLUSION AND DISCUSSION

After data analysis, it is noticed that most of those involved in this research managed to reach "norming" and "performing" stages in their respective groups. In other words, they got to know each other more deeply and began to respect individual opinions and beliefs, respecting each one's contribution. Some participants managed to go further by becoming proactive, autonomous and confident by working as a team and expanding network.

Considering patterns of interaction, it was observed that participants could reach the "family standard". It means that in the dynamic of group work there were fluidity of roles, shared goals and objectives, dynamic integration of expertise.

Some teachers have achieved the "integrative standard", in which the diversity of voices is unified and group members trust each other and they are able to innovate through the diversity of ideas.

It was also possible to verify that the digital tools facilitated collaboration mainly when participants were developing their work in Brazil.

How does this research, improve (future) educational practice?

As we began the discussion in this paper, citizens' development in a lifelong learning dynamic depends on authentic collaboration, that is, sometimes, difficult to achieve. We agree that collaboration is a learning skill that must be improved in all educational contexts. Hence, researches that focus on patterns of interaction and roles of collaboration enrich this field of investigation.

It's important, but not enough to identify stages of collaboration or patterns of interaction in scholar group work, so based on this research, it is possible to extend the study by creating innovative strategies for promoting integrative patterns of interaction and collaboration in group development with performing and adjourning



characteristics. Besides, this work can support the achievement of a more in-depth analysis concerning the process of social interaction, internalization and social construction of knowledge; showing how stages of collaboration and patterns of interaction can facilitate the students' learning process.

REFERENCES

- Bardin, L. (2011). *Análise de conteúdo*. Lisbon: Edições, 70.
- Bereiter, C., & Scardamalia, M. (1996). *Rethinking learning. The handbook of education and human development: New models of learning, teaching and schooling*, 1, 485-513.
- Dillenbourg, P., Baker, M. J., Blaye, A., & O'Malley, C. (1995). *The evolution of research on collaborative learning*.
- Hope, J. M., Lugassy, D., Meyer, R., Jeanty, F., Myers, S., Jones, S., ... & Cramer, E. (2005). Bringing interdisciplinary and multicultural team building to health care education: The downstate team-building initiative. *Academic Medicine*, 80(1), 74-83.
- John-Steiner, V., & Mahn, H. (1996). Sociocultural approaches to learning and development: A Vygotskian framework. *Educational psychologist*, 31(3-4), 191-206.
- Kayser, T. A. (1994). Building team power: *How to unleash the collaborative genius of work teams*. Crm Films.
- Paavola, S., Lipponen, L., & Hakkarainen, K. (2004). Models of innovative knowledge communities and three metaphors of learning. *Review of Educational Research*, 74(4), 557-576.
- Rickards, T., & Moger, S. (2000). Creative leadership processes in project team development: an alternative to Tuckman's stage model. *British journal of Management*, 11(4), 273-283.
- Roschelle, J., & Teasley, S. D. (1995, August). The construction of shared knowledge in collaborative problem solving. In *Computer-supported collaborative learning* (Vol. 128, pp. 69-197).
- Sampieri, R. H., Collado, C. H., & Lucio, P. B. (2006). *Metodologia de pesquisa*. (FC Murad, M. Kassner & SCD Ladeira, Trad.).
- Tuckman, B. W. (1965). Developmental sequence in small groups. *Psychological bulletin*, 63(6), 384.
- Tuckman, B. W. (2001). *Theories and applications of educational psychology*. New York: McGraw Hill.



DEVELOPING PORTFOLIO PRACTICES AT LAUREA UNIVERSITY OF APPLIED SCIENCES

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ABSTRACT

This paper describes the process of developing ePortfolio practices in Laurea University of Applied Sciences. Integrating ePortfolio practices to studies and curriculum has been our objective since 2014. During these years there has been a lot of challenges but we have also been able to create some functioning practices.

In this paper, the history, current state and the next steps to be taken are discussed. The emphasis is on understanding the challenges and difficulties of the process. The findings are based on Sometaduuniin (Social Media and its Equipments as a Way to Working Life) project. During the project we have worked with five pilot groups to be able to understand the challenges. The analysis is based on data gathered from a small group of lecturers and the managers responsible for the development of education. A small survey was also conducted for the pilot group students.

The participants of eApril conference were invited to share their ideas on what should be done in the near future for the challenges. These ideas are used and developed further in this article.

BACKGROUND FOR THE PROJECT

“I can not understand why this is taking so long and not progressing” commented one manager when a workshop was held for the education managers concerning the ePortfolio practices in November 2017. The comment refers to the fact that the development work of taking ePortfolios into use has progressed rather slowly. The same question was the starting point in ESF funded Sometaduuniin project in autumn 2016.

To be able to understand the current state we have to look back in time and reflect on what we have done so far to develop ePortfolio practices. The main steps of the



actions at Laurea UAS have been summarized in figure 1 and elaborated in the following chapters.

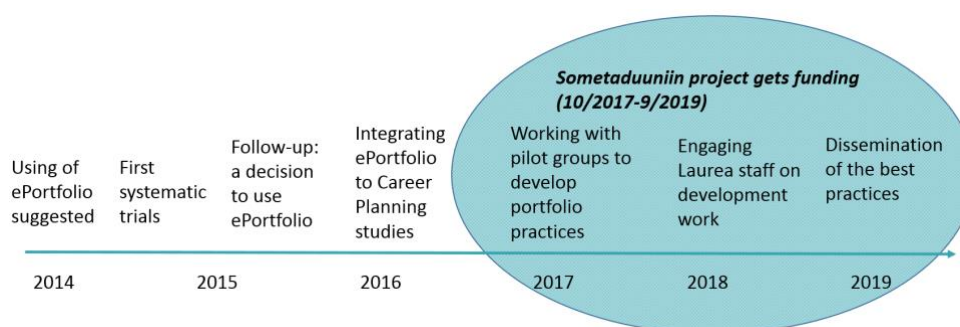


Figure 1. Timeline of the portfolio development work at Laurea.

A Decision Was Not Enough

The case organisation Laurea University of Applied Sciences is a multidisciplinary institution located in Helsinki Metropolitan Area in Finland. The university operates in six campuses and has around 7800 students and 500 staff members. (Laurea 2018.) The current curricula consist of modules in which there are several study units or projects. The modules are coordinated by nominated lecturers and each study unit or project has also a nominated lecturer in charge even if often implemented by a lecturer team. The degree programmes are led by development managers and the education development work at the university level by a vice president in charge of education. The vice president is supported by managers responsible for certain functions such as education processes or e-learning. These managers and the vice president work together in the meetings of Education Development Group.

The Education Development Group had suggested that all students should curate their portfolios during their bachelor degree studies already in March 2014 (memo, 3.3.2014). The follow up had been held in May 2015. At that point the concern had been expressed that not many students were using the ePortfolio platform (Kyvyt.fi) and that using it had not been integrated with the study units. After discussing the issue the workgroup made a decision that integration needs to be enhanced the aim being that ePortfolio is used in every study unit (memo, 28.5.2015).

You might think that the timeline between these two meetings was long, but it's something that has to do with the organisational culture. At Laurea staff are empowered to take the responsibility for the development work at hand. Laurea staff seems to have the reputation in the Finnish higher education field that we are always



eager to develop new practices. Thus, the task was thought to be rather easy: It would just mean that the staff and students should learn how to compile ePortfolios and then to integrate the studies and the portfolio process.

Consequently the staff was given freedom to proceed with the given task. The decision on how and when to proceed with introducing the idea of an ePortfolio to the students was left in their hands. Of course to support this process, training sessions for both students and lecturers were provided on how to use the chosen Mahara-based ePortfolio platform. Soon enough it was realised however that the lecturers need to attend the training session at the same time as their student group so that the lecturers would also learn how to use the platform. The solution that there are only few experts who are able to train the students doesn't work in a university that has six campuses.

As a consequence the efforts of taking the platform into use varied a lot. Some neglected the decision and some tutor lecturers tried to use portfolios with their own groups.

Besides of these individual trials, one campus made a joint decision for all degree programmes that portfolios are taken into use during the career planning studies already in autumn 2014. But the result was a total failure. Already during the first term many tutor lecturers swore that they would never use the ePortfolio platform again. The main reason behind the failure was that they had not taken into account in the process of returning the assignments to be evaluated that the ePortfolio platform is a personal learning environment (PLE). This means that the staff members do not have any access to the student portfolios unless the students share their portfolios with the staff by e.g. creating a secret URL. Thus the lecturers had used a lot of time for trying to find the content from the platform and not been able to access it. Consequently they got naturally extremely frustrated. All sort of comments could be heard when walking the campus isle from both the staff members and students (see Figure 1). When we think back in time the reason behind this misunderstanding might be that the logic of the PLE platform had not been emphasized enough in the training sessions.

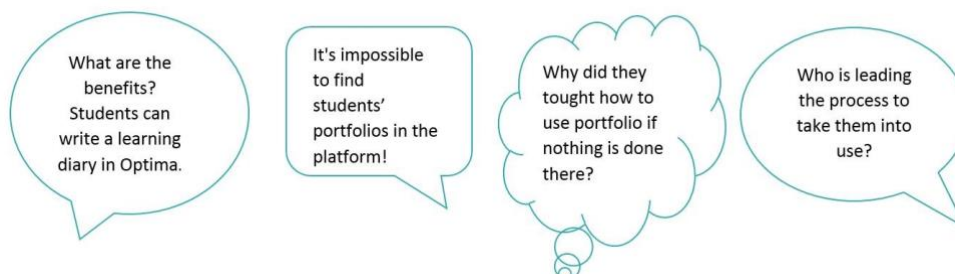


Figure 9. Staff members and students wondering the portfolio practices during the academic year 2014-2015.

First Attempt to Integrate ePortfolio in Bachelor Studies at Organisational Level

As this kind of attitudes are difficult to pass, it was no sooner than in spring 2016 when first organizational wide steps could be taken to ensure the integration of the ePortfolio practices into the studies. As the main reason for the failure in autumn 2014 was clearly a matter of better instructions, the issue could be brought back to discussions. What need to be solved was to plan the process for how to return the ePortfolio links for assessment.

As a result a common learning platform was created for the career planning studies in spring 2016. The use of a portfolio was integrated in three assignments:

- In the first semester the idea is that the students describe their background and prior competences as well as goals for their studies in their portfolio. This will help with recognition of prior learning.
- In the end of the first academic year they are expected to describe and assess their learning and to set new goals and to reflect on their possibilities for internationalisation during their studies.
- In the third study year a showcase is made to demonstrate that the student has acquired the generic competences that have been set as a target for the UAS graduates nationally. It worth noticing, that this could also provide information on the quality of the education if only used.

(Career Planning workspace 2016.)

The idea is, of course, that the students will build their portfolios also during their other studies and projects so that the showcase is easy to compile during the third year studies (see Figure 2).

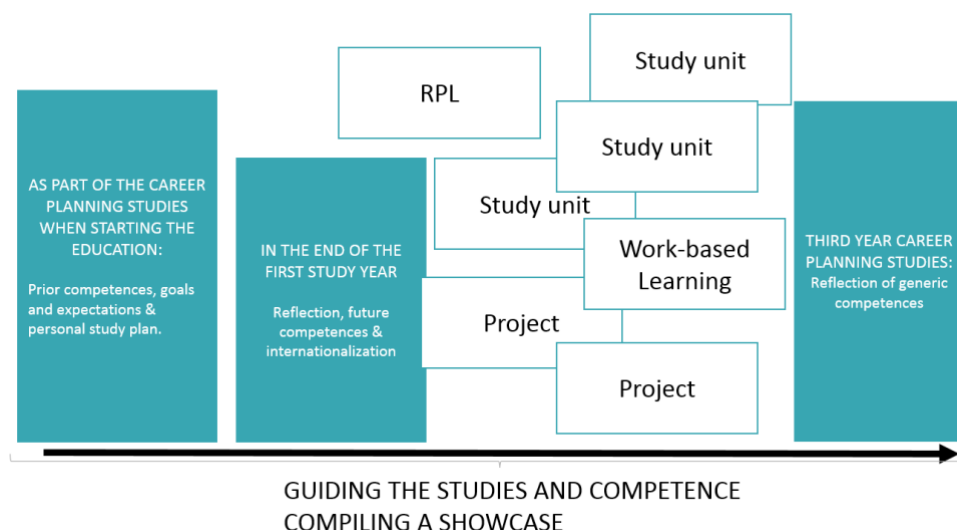


Figure 2. A vision of how portfolio is upgraded gradually during the studies.

As the learning platform for career planning studies was commonly taken into use, the ePortfolios were too. To make the lecturers feel more comfortable with the idea, it was emphasized that the main thing is that the students – not the lecturers – need to learn how to use their personal learning environment. This aim has been supported by providing the students on-line training as this was regarded as an efficient way of guaranteeing similar support services for all campuses.

PROJECT FUNDING ACQUIRED TO SUPPORT THE DEVELOPMENT WORK

As described above, a good start has been made at Laurea to utilize ePortfolios pedagogically but the fact seems to be that not much is being curated in the portfolios from other studies. Therefore it is important to understand what the challenges from the lecturers' and students' perspectives are.

Luckily, as a portfolio is a good tool for describing the competences when applying for a job, the development work of portfolio practices could be included in the Sometaduuniin project plan. The ESF funded the project for three years starting in autumn 2016. In general the project aims to a permanent change in the guidance processes in higher education in Finland by increasing the use of virtual tools and social media to support students' employment. Development process has started by approaching the phenomenon from different perspectives: higher education students,



HE teaching and guidance staff and employers. Various training packages will be produced during the project in co-operation with our partners.

To develop the use of ePortfolio the idea is to work with pilot groups and develop the practices based on the experiences. Finally, the good practices developed during the Sometaduuniin project will be shared nationally in Finland.

METHODS USED TO EXPLORE THE CHALLENGES

The challenges were examined from the points of view of lecturers, education managers and students. It must be emphasized that the data used in this paper was not gathered for scientific use but for development purposes. Thus the aim has not been to acquire data that provides information on how common these challenges are but to give insights into the situation.

Actually when the data from the lecturers was gathered the idea was not to use the material for practitioner research. The data was gathered from a group of lecturers (N=8) teaching in the bachelor degree programme in Hospitality Management in their development meeting before introducing them the idea of an ePortfolio. Thus it is not known how many of them had any prior experience on the matter. What we wanted to achieve originally was to put the skeptical insights aside by writing down *the challenges and threats that the lecturers felt when they thought about using portfolios as a pedagogical tool*. That way we could concentrate better on the topic without being constantly interrupted with some negative comments as these lecturers work in the campus in which they had failed with the ePortfolio practices in 2014. The lecturers were asked to write their thoughts on a white paper and then the papers were gathered and put in an envelope and the envelope was closed. Their supervisor also filled in one paper.

The same method was used with the managers responsible for developing the education at Laurea (N=13). The group included the vice president responsible for education, managers responsible for education and virtual learning and development managers responsible for degree programmes, who work also as supervisors for the lecturers. The data was gathered in the beginning of a workshop in which the idea of a portfolio was introduced to them.

The data from the lecturers was analyzed by categorizing the content by identifying common themes. As there was not that much material the comments were not counted. The materials received from the managers were used to check if some new issues were mentioned by comparing the answers to the previously identified categories.



The student experiences were examined by implementing a feedback survey for the pilot groups. The way how the students of the five pilot groups had been instructed to use the ePortfolio platform varied. 65 students (40 %) answered to the survey. We received most answers from the business information technology and business management students, but also from the field of social services and hospitality management. The content of the survey was not planned to reveal challenges but to reveal what kind of support the students would like to have for compiling their portfolios. Thus it might be that not all the challenges are identified with this data. The questionnaire included both multiple choice questions and offered an opportunity for open feedback. The data was analyzed by counting percentages from the multiple choice questions and categorizing the written feedback.

OBSTACLES FOR LECTURERS TO TAKE THE EPORTFOLIOS INTO USE

The challenges, worries and threats recognized by the lecturers can be categorized under three titles: 1) "New technology is scary", 2) "Do I know what to do as a pedagogue" and 3) "Do we need changes in the education". These categories are described with quotations.

New Technology is Scary

It seems that digitalisation brings challenges and questions that need to be addressed. In relation to an ePortfolio these include the following challenges mentioned by the lecturers:

- *Who guides the students and where do they get help to learn to use the ePortfolio platform, make videos, publish pictures etc.?*
- *Do I need to know how to use the ePortfolio platform myself? How do I guide the students?*
- *Where do I find the ePortfolio sites? Do the students remember to give a permission to view their portfolio or do I need to remind?*
- *Is the content in safe?*
- *Are there too many learning environments?*
- *What options there are for curating the portfolio? (platforms etc.)*

To summarize, the lecturers seem to be concerned whether they have the technical ability, knowledge and resources to support the students. As one lecturer put it: *"The portfolios seem to be messy and difficult to use and thus they create a lot of job for the lecturers."* In the era of digitalisation, the amount of platforms and systems is



already huge and thus it is a good question if something else can be left unused when a new tool is taken into use.

A study conducted by Kunnari, Laurikainen, Pires and Rodrigues (2017) highlights also technical challenges.

Do I Know What to Do as a Pedagogue

How to utilize a portfolio as a pedagogical tool is something that not all the lecturers are familiar with according to the comments. Several questions were raised. It's only natural that lecturers tend to choose teaching methods that they are already familiar with. Thus, these challenges need to be considered while planning staff training and teacher education in general. These themes consisted of three abilities: 1) ability to understand the purpose, 2) ability to plan the demonstrations and 3) ability to guide and evaluate.

1) Ability to understand the purpose

The lecturers' comments included evidence of that the idea behind the portfolio needs to be discussed in depth. The lecturers asked:

- *Is a portfolio compiled just because it needs to be?*
- *How do I affect the attitudes and explain the value of constructing a portfolio?*
- *How do I motivate everyone to curate one?*

If the lecturers can't explain to the students the benefits of compiling a portfolio, the task remains as one compulsory assignment among others. That will easily lead to a situation where students will not be motivated to update their portfolio as their learning proceeds and they will miss the opportunity to reflect on their learning, find connections with their earlier experiences and what they have just learned and to build a toolbox for the future. Thus, even if the lecturers were only to support the idea of a continuously upgrading portfolios by integrating the portfolios in their study unit implementations, they need to be able to understand what the benefits are for the students. Only that way they will be able to encourage the students to curate materials.

It's also likely that understanding the purpose has to do with the lecturer's motivation to learn new practices. It's just so much easier to ask the students to return their essays and reports in a return box in the lecturer managed learning space, isn't it? In fact it doesn't acquire a lot more to ask the students to return a link to their portfolio site instead.



2) Ability to plan the demonstrations

The next comments surprised the most. These comments indicate that at least some lecturers lack the pedagogical skill to use portfolios or at least they feel unsecure:

- *Do I know how to utilize a portfolio in my study units? In which studies should I use it?*
- *While planning the assignments how do I take into account that the output is suitable for a portfolio?*
- *What is the amount of instructions needed to allow the student to be creative but still to understand the idea?*
- *What competences are described and presented in the portfolio? How to instruct?*
- *Is portfolio always made alone?*

The studies in a university of applied science should be closely related to the industry and world of work. These comments reveal that not all the assignments that lecturers give to the students correspond the real work tasks. It's worth asking if we could require the students to produce more realistic outputs as an evidence of the gained competences. On the other hand, the challenges in this pedagogical area might be the reason behind the fact that recognition of prior learning seems to be a challenge still.

3) Ability to guide and evaluate

Assessment has also earlier been recognized as an area in which lecturers need new tools in Laurea UAS and in general in many universities (e.g. Kunnari et al., 2017). The challenges related to assessment as well as guiding the portfolio content were mentioned also in this context:

- *How do I guide the content?*
- *How do I ensure that also other type of evidence is added in the portfolio than just descriptive reflection?*
- *How do I evaluate a portfolio? With which competence?*
- *Is it going to be a tool to recognize competence that doesn't exist? An easy path to graduate?*

These questions are important as the evaluation criteria should work as a hint for the content and the scope of the portfolio. The learning outcomes set for the studies and the degree programme in the curriculum should also work as a tool for guiding the portfolio content. Discussion is needed to build a common understanding of what is expected from the students.



Do we Need Changes in the Education

The final theme was formed by gathering those comments together which indicated that the current curricula, pedagogical practices and the student services might not support the portfolio process enough. To embed the portfolio in the student process might mean that the role of the tool needs to be described in the curriculum. After that it is likely that the need to develop the pedagogy and support services will be taken into account accordingly.

The lecturer comments included:

- *Is it compulsory? Who is controlling that it is being curated?*
- *When does the student get guidance for the portfolio and by whom?*
- *Is the final portfolio evaluated? If so, when? Do we have the time required for the task?*
- *Could all the studies be completed by upgrading one's portfolio? This would suit well for a thesis!*
- *Will there be extra work? It sounds like that!*
- *Should we rethink the whole idea of a digital portfolio?*

In the current curriculum the student portfolios can be discussed during the personal study plan (PSP) discussions which are held once a term. Unfortunately the resources seem not to be sufficient for an in-depth discussion and thus some other solutions should be considered. This is important as what would be more important than guiding the students in their path of professional development?

Kunnari et al. (2017) also write about the lack of sufficient organisational and structural support and resources. We are not alone with this challenge.

STUDENTS NEEDS TO BE MOTIVATED AND SUPPORTED

As described earlier, the survey conducted for the students did not specifically aim to identify the challenges that the students had confronted but rather their wishes on how to support the process. Thus to maintain the focus, in this article the data has been utilized only partially.

There are Challenges to Use the Platform

The lecturers have reported that the students have quite a lot of challenges with the platform. The survey verified this information as one third of the students reported that it had been difficult to take the platform into use. On the other hand one third reported that it had been easy. Yet only 25 % thought that the platform is easy and



clear to use. The system seems to be easier for the business information technology students, which is only natural. Based on these answers and other studies (see e.g. Devaere, Matrens and Van den Bergh 2018) a conclusion can be made that support is needed.

When we asked in what areas they need help, the most popular answer was with the visual aspects (57 %). With describing the competences was the second wish on the list (46 %). Only a few needed help with videos (18 %) even if it is known that not all the students are familiar with making videos. Perhaps they do not understand how videos could be utilized in this context.

These findings are in line with Kunnari et al. (2017) who state that both technical support as well support for creating content is needed.

Benefits Need to Be Told

According to the open feedback, it seems that many students did not see any point in compiling an ePortfolio and they were doing it only because it was compulsory. On the other hand, some students had realized that it is a good tool for to reflect and rehearse what has been learned. Some students appreciated that the instructions left space for creativity.

A conclusion can be made that the idea of a portfolio and how it can be utilized need to be clarified for all students (see also Kunnari et al. 2017). The ePortfolio training at Laurea needs to be harmonized and offered in the campuses, not just on-line.

MANAGEMENT LEVEL SEEMS TO HAVE SOME DOUBTS TOO

In general, the managers responsible for the education felt similar challenges and threats than the lecturers. Besides, the following perspectives were given:

- *The lecturers will not be committed to develop portfolio practices if they do not understand the value for the students and for themselves. It doesn't work if it's seen as something "extra".*
- *The threat exists that the lecturers have no time to get acquainted with the idea or have prejudices.*
- *Is it suitable for all fields of studies?*
- *Can the benefits be demonstrated?*

To summarize, in their opinion all starts with committed lecturers.



SUGGESTIONS AS THE NEXT STEPS

Thinking about all the challenges identified above, the next steps on the road of developing the ePortfolio practices need to be carefully planned at Laurea UAS. Now in early 2018 one measure in the road to proceed with digitalisation has been identified to be that every student will compile a portfolio during their studies (vice president Katri Ojasalo's presentation 22.11.2017).

To support the students training must to be offered in the campus premises. At the time of eApril conference (29.11.-1.2.2017) the plan was to ensure that in the near future there will be trainers available in each campus who can motivate and coach new student groups to start curating their portfolios.

There was also a plan that teaching staff needs to be trained: first the module coordinators, who would then take the responsibility to coordinate the development work in their module to integrate the studies and portfolio process.

One idea had been to develop a peer coaching model to support the students in the ICT skills needed while making the portfolio content. Thus one student project was already implemented in autumn 2017 to verify that students are able to coach other students on how to use the ePortfolio platform. This model needs to be further considered. Peer guidance is also suggested by Kunnari et al. (2017).

In eApril we also asked the participants, who were listening to the challenges, to give their suggestions on what should be done. The eApril conference programme also provided some new ideas. These ideas are shared in the next chapters.

Tips for Planning a Training Programme for the Lecturers

First of all the training programme needs to provide a very clear answer to the question why portfolio will be used. In fact, it would be beneficial to start with combining the idea with the pedagogical model used in the university. In the case of Laurea UAS that would mean to analyse how portfolio is utilized in the context of Learning by Developing action model (see Learning by Developing Action Model 2014). That way we could hopefully form our own interpretation what we mean by an ePortfolio as it serves many purposes. These could be acknowledged as a result of creating of a common conceptual model as done elsewhere (see Buyuarski et al. 2015).

The starting point would be also to emphasize that portfolio is already successfully used in the career planning studies. To expand the usage, the audience advised us to start with one subject. In our case that could mean to start by analysing the studies



in one core competence module. Based on the analysis it needs to be then decided in which study units portfolio could be used so that students can create meaningful content in their portfolios. These plans should to be shared in a common platform. That way in the lecturers could form an ePortfolio community of practice which would be for their competence development in this area (Carson, Mcclam, Frank, Hannum & Greenhill 2014).

The Importance of Assessment and Feedback Must be Emphasized

We were reminded that the assessment criteria should guide the students while they are creating and curating the content. It would be advisable to provide guidance for the students during their first assignments and coach them to produce high-quality content. That way we could increase the students' motivation to continue to work on their portfolios. The output should be used for assessment and providing feedback. This means that the focus must be in the process not in the tools as Kunnari, Laurikainen and Ruhalahti (2017, p. 50) emphasize.

The conference audience also noted that portfolio content can be created also in pairs or in a group. That way the barriers could be reduced to start curating one's own ePortfolio.

Student Support Needs to be Further Developed

According to our audience, it would be ideal if the students were instructed on how to compile portfolios already during the introduction week. The session in which the portfolio platform is introduced should be compulsory. During the first semester there should be several follow-up sessions in small groups to discuss the portfolios and to provide feedback. Easily accessible helpdesk service could be available for technical questions or possibly a platform for the students to share their work and build confidence that they are curating an appropriate ePortfolio. As Davaere, Martens & Van den Bergh (2018) noted in their study, the teacher's need to be actively involved.

Even if the basic training materials have been created that can be used when introducing the idea of a portfolio for the students, the support materials need to be further considered. There could always be better examples and, as suggested by our audience, storytelling could be used to convince the students that a portfolio can be utilized in various situations, not only when applying for a placement or a job. These kinds of stories could be gathered from the graduates who have utilized their portfolios during their career path.



The Development Process Needs to Monitored

Thinking back we could not have got a better advice from our audience even if it is self-evident: this kind of pedagogical transformation needs to be planned and monitored. Project management tools and methods needs to be used to ensure that change is actually taking place.

The eApril conference also inspired us to think about the possibility to try to commit the lecturers to develop the practices by asking them to provide information that will be used for a practice-based research in the future. That would show them that this development challenge is taken seriously and that the value of the practices is critically analysed, not taken for granted. Perhaps the research should focus on authentic learning and portfolio outcomes. That kind of research should be done more according to an analysis made by Bryant and Chittum (2013) of prior research reports. That could also lead to a situation that this article was just the first one of many in which the story told by Laurea UAS continues.

Many thanks for our audience for your valuable tips received during our case study session.

REFERENCES

- Bryant, L.H. & Chittum J. 2013. ePortfolio Effectiveness: A(n Ill-Fated) Search of Empirical Support. *International Journal of ePortfolio*, Vol.3(2), p. 189-198.
- Buyarski, C. A., Aaron R.W., Hansen, M.J., Hollingsworth, C.D., Johnson, C. A., Kahn, S., Landis C.M., Pedersen, J.S & Powell, A.A. 2015. Purpose and Pedagogy: A Conceptual Model for an ePortfolio. *Theory Into Practice*, Vol 54 (4), p.283-291.
- Carson, A.S., Mcclam, S., Frank J. & Hannum G.G. 2014. ePortfolio as a Catalyst for Change in Teaching: An Autoethnographic Examination of Transformation. *International Journal of ePortfolio*, Vol. 4(1), p.73-83.
- Davaere, K., Martens E. & Van den Bergh K. (2018). Analysis on Students' ePortfolio Expectations. *HAMK Unlimited Journal* 1.5.2018. HAMK University of Applied Sciences. Retrieved 29 January 2018 from <https://unlimited.hamk.fi/ammatillinen-osaaminen-ja-opetus/analysis-on-students-eportfolio-expectations/#.WmLqCNHkuf1>
- Kunnari, I., Laurikainen M., Pires A.L. & Rodrigues M.R. (2017). Supporting Students's ePortfolio Process in Higher Education. *HAMK Unlimited Journal* 12.12.2017. HAMK University of Applied Sciences. Retrieved 24 January 2018 from <https://unlimited.hamk.fi/ammatillinen-osaaminen-ja-opetus/supporting-students-eportfolio-process-in-higher-education/#.WmLqCNHkuf1>



opetus/supporting-students-eportfolio-process-in-higher-education/#.WmSqSdHkuf2

Kunnari, I., Laurikainen M. & Ruhaalahti S. 2017. Conclusions. In Kunnari, I. & Laurikainen M. (eds) Collection of Engaging Practices in ePortfolio Process – Publication of the Empowering Eportfolio Process project. Häme University of Applied Sciences: Hämeenlinna. Retrieved 25 January 2018 from <https://drive.google.com/file/d/0BxEfFq7yUumMUGV2V2VxVmNaNFU/view>

Laurea. (2018). Laurea in a nutshell. Retrieved 28 January 2018 from <https://www.laurea.fi/en/about-laurea/laurea-as-an-organisation/laurea-in-a-nutshell> (2018).

Learning by Developing Action Model. (2014). Ed. K. Raij. Laurea Publications 36. Grano: Espoo. Retrieved 29 January 2018 from <https://www.laurea.fi/dokumentit/Documents/36%20%20Raij%20LbD%20Action%20Model.pdf>



WHAT DOES A SUCCESSFUL DIVERSITY POLICY LOOK LIKE? DIVERSITY AS THE MOST VALUABLE TOOL TO MAKE LEARNING POTENTIAL FLOURISH

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ABSTRACT

Most universities and university colleges are located in different major cities, and it is in these metropolitan areas that we speak more and more of 'super diversity'. Most institutions of higher education are therefore working on the development of a diversity plan to deal with this diversity. Diversity policy then means recognise and accept the unique qualities, talents of all students (and staff) to enable opportunities to fully develop the potential of students.

Figures show that students with diverse characteristics still run into a number of barriers, causing them to leave school faster or not to obtain a diploma. And this while higher education should strive for equal educational opportunities for every student. To grow towards inclusion, we need to align our educational environment and education practice to the learning needs and talents of each student in the diverse student population and this should all be captured in a decent, well-structured diversity policy.

This publication tries to clarify the barriers that students encounter with various characteristics and how we can then tackle these barriers in an integral diversity policy showing two different examples out of the educational practice. Only structural and inclusive changes in education and curricula are the solution to create an inclusive environment. In other words: creating a welcoming community that engages all of its diversity in the services of student and organizational learning by installing three important pillars: (1) inclusive culture, (2) implementing inclusive practices and (3) anchoring inclusive policy.



BACKGROUND

The student population in higher education should be **a reflection of all the people in the society** (Pliner & Johnson, 2004). It is a social necessity to deal constructively with the so-called super diversity of our modern society. Most universities and university colleges are located in different major cities, and it is in these metropolitan areas that we speak more and more of '**super diversity**'. There are several minority groups, which bring more social, economic, cultural and ethnic differences into our society. Over time, these minority groups are more and more becoming a majority. We identify this as majority - minority cities.

Up until the recent past, we lived in a society where one group constituted a clear majority. Minority groups had to adapt themselves to the values and tradition of majority groups. Now we are evolving towards an urban society where diversity is the new norm. We need to address this issue to overcome the challenges and to establish a connection with each other and the society at large. We have to take care of these challenges in new diversity needs (Geldof, 2016)

Super diversity characterises as follows: (1) As a result of worldwide contact, people, knowledge and information are more mobile. This at the expense of contact in the own neighbourhood. (2) The inconsistency and fragmentation of the own identity, social stability and societies demand an adaptability of everyone.

Diversity policy then means for a university or university college to recognise and accept the unique qualities, talents of all students (and staff) to enable opportunities to fully develop the potential of students to successfully enter the work field.

Students entering higher education take upon themselves a new role in life next to the different roles they already hold in other contexts such as brother, son, scout leader, friend, ...etc.. They are not just students in our courses, they are much more (Bourdieu, 1973).

Higher education should start looking more at the student in a more **holistic** way, and see a much wider learning environment that unfolds itself and which is characterised by the student's unique learning needs, talents and personal qualities (Leung & Chiu, 2010). This unique composition of learning needs, talents and personal qualities for each student is translated educationally as his or her individual learning style and learning potential but often shows in student differences (Felder & Brent, 2005).



Differences between students often cause difficulties in class management, group composition and sometimes create unwanted cultural barriers. Barriers such as having a negative image of students with a migration background, as well as lower estimates of academic performance for some students and doubting the study ethics of students with a diverse background (Fuligni, 1997). Lack of understanding can sometimes makes teaching more difficult or challenging.

Figures show that students with diverse characteristics still run into a number of **barriers**, causing them to leave school faster or not to obtain a diploma (Goddard, 2003). And this while higher education should strive for equal educational opportunities for every student.

If we strive for equal educational opportunities, we should not only take a look at students who obtain a diploma, but we must also focus on inflow, throughflow and outflow of students in higher education. Each of these phases must be taken into account when trying to develop a diversity policy. Currently there is a tendency to try and democratize higher education, but socially economically weak groups systematically remain on the lower-educated end of the scale (OECD, z.d.). Next to that, research indicates that education is an important lever to guarantee social participation.

But still, every day, we allow opportunities to be missed due to differences between students and forget how to deploy diversity as the most valuable tool to make learning potential flourish. To grow towards **inclusion**, we need to align our educational environment and education practice to the learning needs and talents of each student in the diverse student population and this should all be captured in a decent, well-structured diversity policy (Wild & Esdar, 2014).

HISTORY

All countries have an obligation to commit to equal educational opportunities at all levels, including higher education. Education is in fact a fundamental right to which all human beings are entitled (UN Assembly, 1948). But we see a **growing inequality** everywhere and when we talk about education, where educational institutions could be the solution, they often maintain certain inequalities (OECD, z.d.). You can find data about unequal educational opportunities and the consequences that go with them.

Much is also written about arguments on the ‘why’ of creating a diversity policy. Nevertheless, summary articles on this topic are scarce and nowhere are these insights brought together where it is precisely outlined what the success factors or those barriers are.



This publication tries to clarify the barriers that students encounter with various characteristics and how we can then tackle these barriers in an integral diversity policy showing two different examples out of the educational practice.

BARRIERS

The first barrier that easily comes to mind is the barrier of **financial resources**. Higher education institutions often have a **competitive position** with other institutions nationally and internationally. In a competitive model, (economic) efficiency is the motive to increase market share and it is just there that students who need more support are less profitable in an economic education model, and that is why they are more likely to quickly fall outside the system.

Secondly, in the same line, financing is also a very difficult point. **High enrollment costs** and study costs have an important effect on school accessibility and it is therefore normal that the students with various characteristics are again to be the first to face educational exclusion (Zusman, 2005).

Thirdly, in our society nowadays, we also have a **competition fetish** where everything should be better (e.g. better technology, better marketing, ...), but also better students. When priority is given to prestige, unique talents get snowed under and support is threatened. A consequence of this competition fetish is that we start to see students in different groups and that "something is done for each group" (Mumper, 2003). It lacks an integral approach for all students, so that certain groups are stigmatized if they do not belong to the elite-end of this model.

But the fourth and most important barrier is the **project-based approach**. An important number of diversity projects sprout up and after a period of about two years they just come to an end. The results are read and classified after the end of the project. Personnel with expertise goes on to the next or new projects and thus we lose sustainability and awareness to develop a spot-on diversity policy (Mumper, 2003).

Barriers enough to break. In the next section we will discuss a **successful approach** with examples from Odisee⁴ and UCLL⁵.

4 The University College Odisee offers bachelor study programmes at different campuses in Aalst, Brussels, Ghent and Sint-Niklaas. Our focus is on 'people', their talents and development. The student is our central focus point.

5 University colleges Leuven – Limburg is a quality-minded institution which offers higher education, research and community service. UC Leuven-Limburg has been inspired by European Christian heritage in dialogue with and at the service of an open, pluralistic and intercultural society.



A SUCCESSFUL DIVERSITY POLICY

Before being able to develop a diversity policy, the concept of diversity must be supported by all educational staff. There must be a certain **sense of urgency at all levels** with a goal to grow towards an inclusive educational environment where diversity is the norm. Important is that a diversity policy is more than a policy written by the educational staff. It is necessary that this policy leads to structural adaption. Practice what you preach.

Creating an inclusive culture

First of all, universities of university colleges should create an inclusive culture with inclusive values and standards, and an open climate where all students are welcome (Booth, Ainscow, Black-Hawkins, Vaughan, & Shaw, 2002). A place and context where all teachers, students and other personnel can find fellowship in the concept of diversity.

At university colleges Odisee and UCLL, diversity is defined as a broad spectrum: going from the mother with five children who wants to obtain a bachelor's degree, to the student with dyslexia or the student who is multilingual because of another social cultural background.

When creating an inclusive culture, Odisee focuses on sensitizing the entire staff and organising educational days on the theme of diversity. During these educational days, we inspire the lecturers with success stories about student diversity and reflect on our own attitudes and students' attitudes towards students with a diverse background. In order follow up on the educational days, tailor-made trajectories are made to continue working on shared values and standards concerning student diversity.

UCLL organises a focus day on diversity every year. Students and staff get inspired by lectures and workshops on different diversity themes. Afterwards, students reflect on these themes and try to name challenges for their future jobs.

Both UCLL and Odisee offer study programmes in different faculties: Teacher Education, Health and Welfare and Management and Technology.



Inclusion as a policy priority

If we take diversity seriously and we really want to work towards a solid diversity policy, the approach must go beyond working project-based and we have to opt for a sustainable, qualitative policy. This means that resources are made available and that expertise is built up in a durable, long-lasting way.

At Odisee, diversity is one of the five policy priorities and is seen as an important transversal link between education, research and social community service. This transversal link is monitored by the diversity coordinator who has a line up (to the management committee) but also many lines to the educational programs via anchorage personnel.

The policy preparation work is done by a steering committee, managed by the coordinator, with several expertise cells underneath that support substantively. In order to shape policy plans, Odisee created different expert cells, each of which explores and elaborates a theme. For example, there is a team of experts around the influx of minority groups in higher education, there is a cell that focuses on developing talent profiles for students and there is a cell to create a powerful learning environment based on UDL.

The managers of these cells come together in the steering group that then makes further translation into implementation strategy for practice by anchoring these themes into the policy plan. Conversely, the steering committee also determines which themes are on the agenda and will be elaborated.

The philosophy of UCLL can be summarized in two words: Moving Minds. One of the Moving Minds scoops is Bachelor-Proof@UCLL. Students have to get the opportunity to graduate based on their own authentic personality. UCLL is creating digital and physical learning environments in which learners of all ages and levels of education collaborate to shape tomorrow's society. UCLL thus uses as its starting point the talents of the learners so that they can develop personal portfolios of competences.

At this moment, UCLL works on an education-innovation program. The scoop here is to increase social and academic integration of minority groups. In one of the cases, they are working on a frame to help staff and students to communicate on different diversity issues.



Intercultural communication and diverse sensitive work are the baselines.

Implementing an inclusive educational concept

In addition, diversity is not a single priority. This must certainly be geared towards the educational concept. An education concept aimed at creating a powerful learning environment for every student, and where the diversity policy is fully embedded in all educational programs and in all courses. There must be an infusion of diversity practices throughout the educational institution.

At Odisee, we are building an inclusive education community by using inclusive strategies in practice following the principles of universal design for learning (UDL). Keeping in mind the unique strengths, talents and learning needs of each student, we create a very powerful learning environment. Odisee also focuses on professionalizing teachers to recognize and valorize their talents.

For example, Odisee uses more and more broad evaluation, a system that allows students to become more and more owner of their learning process. The student then chooses, based on his or her talent, for a particular evaluation form (e.g. presentation, written, oral, ...). This led to empowerment of students but also gave some stress about making the “right choice”. Using differences between students as a tool to increase engagement in classes is a strong leverage for academic success.

At UCLL, the Teacher Education department has implemented a very unique program where all students from their first till third year work together on their education program. Through experience-based learning and peer-assistant learning, an established team of three teachers coaches the students through their learning program. Every student works on his or her own portfolio. Together they share a special working space and take up responsibility for their evaluation and reflection.

Be prepared summer program and secondary education

The most vulnerable students who enter higher education are the so-called pioneer students (Zyl, 2014). These students are the first to enrol in higher education in their family and they often experience less support from their environment to integrate academically and to find their place in higher education. It has been shown that a



good preparation program can help to give these students a sense of belonging. In such a preparatory program, both academic and social integration should be addressed.

This often takes the form of a summer school where, for example, students work on: getting acclimatised to campus life, participating in peer-led sessions with experienced students, build new relationships with instructors and fellow students, learn to plan and summarize, enjoy meals at one of the campus dining halls, access to various recreational facilities. In addition to a preparatory program, good cooperation with secondary schools is also very important to provide students with the correct information about the possibility of further study.

For example, Odisee works together with secondary schools to facilitate this transition and we also work with a role model approach to inspire students.

Moreover, at UCLL, there has already been a staff member for 8 years who takes the responsibility for the pioneer students. She has a migrant background herself and was also a pioneer student. She coaches students on their specific needs and works on their wellbeing. Culture and religion are seen as an important part of the identity of these students. This person also is the contact point for parents of pioneers students and helps to improve the dialogue between parents, students and teachers.

Partnerships with policy makers

The first two barriers on financial issues are difficult to eliminate as a higher education institution and require an approach through cooperation with policy partners. Which of course does not mean that we have to wait and do nothing. It is important to consult on a regular basis and to shape the policy for the future in cooperation with key partners.

Both Odisee and UCLL are represented in a working group of the VLOR where one tries to write an advice on the diversity in higher education.

In addition, Odisee and UCLL are also associated with network organizations such as beweging.net. But it is equally important to work from the bottom up and to exchange between practitioners. To this end Odisee and UCLL set up the network "teachers for diversity" and exchanged between different institutions.



CONCLUSION

Students have the right to study in an environment where they can combine their different identities, roles and positions. That means that higher education has to have a dynamic view on culture. The fundamental idea of a powerful learning environment is to have respect for being different and to show a sincere recognition.

A powerful learning environment is not an educational practice where a different approach is used for each target group (students with disabilities, bi-lingual students, students with lower socio economic status, ...). It is an inclusive learning environment that supports a universal design approach, whereby a one-size-fits-all approach benefits everyone. Only structural and inclusive changes in education and curricula are the solution to create an inclusive environment. All students will enjoy the full benefits of these structural and durable changes.

Important is not to start from a deficit thinking or targeting different groups but to approach each student with a growth mind-set. In short: creating a welcoming community that engages all of its diversity in the services of student and organizational learning (Nüthen & Pantelmann, 2014) by installing three important pillars: (1) inclusive culture, (2) implementing inclusive practices and (3) anchoring inclusive policy (Booth e.a., 2002).

REFERENCE

- Assembly, U. G. (1948). Universal declaration of human rights. *UN General Assembly*.
- Booth, T., Ainscow, M., Black-Hawkins, K., Vaughan, M., & Shaw, L. (2002). Index for inclusion. *Bristol: Centre for Studies on Inclusive Education*.
Geraadpleegd van <http://csie.org.uk/resources/translations/IndexEnglish.pdf>
- Bourdieu, P. (1973). Cultural reproduction and social reproduction. *London: Tavistock*, 178.
- Felder, R. M., & Brent, R. (2005). Understanding student differences. *Journal of engineering education*, 94(1), 57–72.
- Fuligni, A. J. (1997). The academic achievement of adolescents from immigrant families: The role of family background, attitudes, and behavior. *Child development*, 68(2), 351–363.
- Geldof, D. (2016). *Superdiversiteit. Hoe migratie onze samenleving verandert*. Acco.



- Goddard, R. D. (2003). Relational networks, social trust, and norms: A social capital perspective on students' chances of academic success. *Educational evaluation and policy analysis*, 25(1), 59–74.
- In It Together: Why Less Inequality Benefits All - en - OECD. (z.d.). Geraadpleegd 30 januari 2018, van <http://www.oecd.org/social/in-it-together-why-less-inequality-benefits-all-9789264235120-en.htm>
- Leung, A. K., & Chiu, C. (2010). Multicultural Experience, Idea Receptiveness, and Creativity. *Journal of Cross-Cultural Psychology*, 41(5–6), 723–741. <https://doi.org/10.1177/0022022110361707>
- Mumper, M. (2003). Does Policy Design Matter? Comparing Universal and Targeted Approaches to Encouraging College Participation. *Educational Policy*, 17(1), 38–59. <https://doi.org/10.1177/0895904802239285>
- Nüthen, I., & Pantelmann, H. (2014). Rezension zu: Saskia-Fee Bender, Marianne Schmidbaur, Anja Wolde (Hg.): Diversity ent-decken. Reichweiten und Grenzen von Diversity Policies an Hochschulen. Weinheim: Beltz Juventa Verlag 2013. *querelles-net*, 15(2). Geraadpleegd van <https://www.querelles-net.de/index.php/qn/article/view/1119>
- Zusman, A. (2005). Challenges facing higher education in the twenty-first century. *American higher education in the twenty-first century: Social, political, and economic challenges*, 2, 115–160.
- Zyl, G. M. V. (2014). The “nervous conditions” of neo-liberated higher education students. *South African Journal of Higher Education*, 28(5), 1663–1679.
- Pliner, S. M., & Johnson, J. R. (2004). Historical, theoretical, and foundational principles of universal instructional design in higher education. *Equity & Excellence in Education*, 37(2), 105–113.
- Jeffrey F. Milem, Mitchell J. Chang (2005). Making diversity work on campus. A research-based perspective.
- Geldof D. (2014). Nood aan een nieuwe democratiseringsgolf. De transitie naar superdiversiteit voor hoger onderwijs.



EDUCATIONAL RESEARCH LABS IN THE NETHERLANDS: A JOINT VENTURE IN CONNECTING THE WORLDS OF EDUCATIONAL PRACTICE AND RESEARCH

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ABSTRACT

In this paper, we describe an ongoing project in which three Educational Research Labs were created in the Netherlands. The overarching aim of the project is to advance collaboration between educational practice and educational research in a sustainable way. The project consists of three parts, which will each be explained in the current proceedings paper: a) a literature review, resulting in a conceptual model of successful collaborative configurations of partners from different educational fields (i.e. practice and research); b) three educational research labs taking place in three Dutch cities, each of them choosing their own particular focus of attention and their own operating procedure aligned with their research aim; c) a study on a metalevel, in which the educational research labs are evaluated. The paper will close with a comparison of what was stated in the initial model, and what has been found in the metalevel study that evaluates the three Educational Research Labs so far.

⁶The authors stated above contributed to this particular proceedings paper. In addition to the authors stated above, Gea Spaans (po raad) and Maartje van den Brand (Plein013) were also presenters during the EAPRIL 2017 symposium. Claudy Oomen (Utrecht University) and Ditte Lockhorst (Oberon) were involved in the literature study



INTRODUCTION

For many years Dutch higher education institutes and schools have been trying to strengthen the connection between educational practice and educational research. Despite many initiatives, educational professionals in both the scientific domain and the educational practice domain feel that a gap remains between research and practice (Schenke, Geijssel, Volman, & Van Driel, 2017; Vanderlinde & van Braak, 2010). One of the methods to address this has been teacher-led research, an approach has gained popularity in the past decades. Besides the expectation that joint research ventures advance school development, teacher-led research has also been proposed as an effective means for professional development of teachers (Van der Linden, Bakx, Ros, Beijgaard, & Keuvelaar, 2015; Zeichner & Noffke, 2001). However, this type of research is often short-term and more oriented to practice than to theory. Some researchers therefore doubt the impact of teacher-led research on educational quality (Lather, 2004). It seems that the gap that is referred to is mainly caused by a lack of exchange of knowledge, a lack of equal relationships while conducting joint research and a lack of a common language.

In this paper we will elaborate on an ongoing project in which we intend to bridge the aforementioned gap in a sustainable way: a collaborative educational research lab (ERL).

What is an Educational Research Lab?

In an ERL, schools and researchers from higher education institutes work together with many others, such as municipalities, the business community or centres of expertise. They work together intensively towards one goal: to solve a problem which occurs in the educational practice. By combining educational research and practice, the research lab helps to further enhance school development. Furthermore, by producing research output in a variety of modalities (written reports, journal articles, video blogs) the results of each collaboration are made accessible to other schools. This helps to generate insights that can be translated to a new setting, such as another school with its own, unique characteristics.

Outline of the Educational Research Lab project

The ERL project takes place in the Netherlands. The project is funded by the Netherlands Initiative for Education Research⁷ and monitored by the sector organization for primary education (*'PO-Raad'*). It is considered a pilot, aiming to advance collaboration between schools for primary education and higher education

⁷ File number 405-16-626, www.nro.nl



institutes and ultimately contributing to the knowledge base of all stakeholders within the realm of education (NRO 2016).

The project consists of three parts: a) a literature review, resulting in a conceptual model of successful collaborative configurations of partners from different educational fields (i.e. practice and research); b) three educational research labs taking place in three Dutch cities, each of them choosing their own particular focus of attention and their own operating procedures aligned with their research aim; c) a metalevel study, evaluating the factors that underlie successful educational research labs and factors that may hamper success.

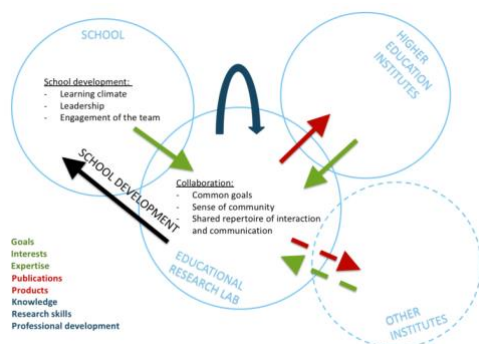
Literature review and conceptual model

At the start of the ERL project, we carried out a literature review⁸ to investigate what is known about the relationship between practice-based research and school development, and about effective means of collaboration between schools and higher education institutes (Zuiker, Schot, Oomen, DeJong, Lockhorst & Klein, 2017). The literature we reviewed described collaborations that seemed to be structured as shown in the working model we developed (see Figure 1): people from different institutes with complementary expertise come together to collaboratively conduct practice-based research with the aim to further school development (cf. Zwart et al., 2015, NRO 2016). In addition, all participants build knowledge and research skills, and develop professionally (the blue arrow). In this paragraph we will focus on two aspects of the literature review: first we will describe the conditions that are necessary for a fruitful collaboration and second we will describe what the literature tells us about what is necessary to translate the results of practice-based research to school development.

⁸ For reasons of space, not all literature that has been reviewed in the literature study is stated in the current proceedings contribution. For a complete list of references, we refer to the complete literature study (Zuiker et al. 2017).



Figure 10: The working model that resulted from the literature review (Zuiker et al. 2017)



Nature of the collaboration

As outlined above, in an ERL, people from different institutes (schools, higher education institutes, and sometimes other parties such as research firms or centers of expertise) come together to collaboratively research an issue in educational practice. The literature identifies several components for a successful collaboration. First, common goals are essential for a successful collaboration (cf. Admiraal et al., 2016). These goals should result in research questions that are within the area of interest and expertise of all the parties to ensure ownership of the project (Baumfield & Butterworth, 2007). Besides the common goals, there can also be conflicting goals which could complicate the collaboration. For instance, researchers strive to collect knowledge which can be generalized, while teachers are mainly interested in improving their teaching practice, which asks for knowledge that is highly contextualized (Kwakman & van den Berg, 2004). In such cases, it is important to communicate about these conflicting goals and to come to an agreement on how these goals will be met (Schenke et al., 2017).

Second, successful collaboration benefits from a sense of community. Because the ERL is made up of people from different domains, people may have different perspectives on the collaboration (as was outlined above for the case of conflicting goals). Within the ERL, all parties therefore have to cross over from their own domain to a new shared domain to form a new community. This is known as boundary crossing (Akkerman & Bakker, 2011). Through boundary crossing, social and cultural discontinuity between different systems can be eliminated. In crossing borders, boundary objects can be helpful: the social artifacts that are meaningful in the different systems and encourage and facilitate interactions between the systems in boundary activities (Akkerman & Bakker, 2011). Forming a new community takes time because the parties need to agree on the nature of the collaboration (cf. Avgitidou 2009). Also, all parties need to feel part of the group and they need to feel



responsible for the collaboration (Admiraal et al., 2016). To achieve this, the parties need to invest in a relationship in which they recognize and appreciate each other's expertise and that is characterized by mutual trust and equality (cf. Bronkhorst et al., 2013; Meijer et al., 2013).

Third, as the project evolves, the parties in the ERL need to build a shared repertoire of interaction and communication. Mutual understanding grows through frequent contact with one another. Frequently discussing responsibilities, expectations and insecurities contributes to collaboration where parties are open to giving and receiving constructive feedback. Explicitly addressing and evaluating communication within the ERL aids a long-lasting collaboration (Admiraal et al., 2016). This is especially important when there are changes within the team, which can lead to changes in the perceived goals of the project.

How can the collaboration lead to school development?

One of the goals of the ERLs research is furthering school development. However, research in an ERL does not automatically lead to school development. Several factors within the ERL and within the participating schools have been identified that contribute to school development.

Factors within the ERL

When teachers and researchers work together, complementary expertise about educational practice and educational research leads to a strong knowledge-base for an 'evidence-informed' educational practice that builds on earlier research. Practice-oriented research has a higher impact when the teachers involved have a lot of input. The research question should originate from educational practice and be aimed at school development (cf. Zwart et al., 2015) in line with the teaching philosophy and policy of the school (Schenke et al., 2017). When research is aimed at improving their own educational practice, it enables teachers to systematically and critically investigate their practice and to develop a research-oriented attitude (cf. Meijer et al., 2013). This contributes to the professional development of teachers in the ERL, which can in turn lead to improvements in their educational practice (Zwart, Van Veen, Meirink, 2012). In addition, when several teachers of a school are involved, this can facilitate professional development throughout the school because the knowledge can be shared and clustered. Shared ownership helps in translating practice-based research to school development (Sleegers & van Dael, 2012).



Factors within the schools

Even when the research in the ERL is relevant to the school and supported by several teachers from the school, school development is not a given. An innovative climate is necessary to expand the school development beyond the teachers participating in the ERLs (Dodgson, 1993). School development requires development at several levels in the organization: the school board, the team, and individual teachers. First, the school board needs to openly support the intended development and facilitate the teacher-researchers (Miner & Mezias, 1990). For instance by giving them recognition and allocate time for them to work on the research and/or by sharing the results of the research in team meetings to discuss the possibilities for implementation in the school at large (Schenke et al., 2017; Zwart et al., 2015). In addition, the other teachers should also be open to professional development and to applying the knowledge that the teacher-researchers gain in the ERLs. That is to say, the learning community needs to extend beyond the ERL into the rest of the school to reach school development.

Contributing to the knowledge base

As argued above, ERLs have a strong potential to contribute to professional development of the teacher-researchers in the ERL and to the school development of the schools involved. A secondary aim of the ERLs is to contribute to the educational knowledge base. Such contribution is achieved by making the contextual knowledge gained in the ERL useful for other contexts, for instance for schools interested in a similar educational innovation. ERLs should strive to not only describe the effects of their intervention but also the context in which these effects were achieved and the accompanying implementation plan. This way, others can adapt the implementation plan to their own unique context (Mol, 1999). When multiple schools have done research focusing on a central theme, and the contexts are adequately described, the crucial contextual factors contributing become clearer, leading to stronger contributions to the scientific knowledge base (Zuiker et al. 2017).

Educational Research Lab Tilburg⁹

The ERL Tilburg focuses on research concerning education for gifted pupils in primary schools. In the Netherlands, schools are transitioning towards inclusive education, which also concerns gifted pupils. The topic is therefore highly relevant

⁹ In this section, the project leaders of each ERL describe their focus, methods and intermediate results. 'We' therefore refers to all participants in the ERL that is described.



for all participants in this ERL. Teachers wonder in what way they can meet the educational needs of gifted pupils, while teacher educators are interested in educating future teachers for working with gifted pupils. In addition, it is known that gifted pupils are not optimally motivated, and Dutch gifted pupils achieve significantly below their potential (PISA, 2012).

In addition to the thematic focus of the Tilburg research lab, we were also interested in studying the aspects of collaboration that help labs be successful. We wanted to gain insight into the expectations of the participants of our ERL and we were interested in the school culture of the participating school teams.

Organisation of the ERL Tilburg

In our educational lab three types of organizations are represented and collaborate: 11 primary schools (1 teacher per school) and the local consortium of primary and special schools entrusted with inclusive education (two teachers and three internal educational advisors), two universities and one university of applied sciences (one researcher of each university and four students) and the institute for teacher education (one teacher educator and one researcher)¹⁰

Phase 1 of the ERL Tilburg: Insight in expectations and school culture

In the first phase of the research collaboration between teachers, researchers and teacher educators, we addressed two research questions:

- (1) What are the expectations of the collaboration between researchers, teacher educators and teachers in this research cooperation?
- (2) What characteristics of school culture do teachers describe when starting the ERL?

Method

This first study, upon which we report in this proceedings manuscript, was an exploratory study. 34 participants of the ERL participated in the expectancy-measure. The sample for this particular study consisted of 11 teachers, 14 school administrators, four researchers and five teacher educators. An open qualitative question card was used (in the form of a postcard), that stated the following question: When would you call this research collaboration a success? The 34 question cards

¹⁰ For more information, see www.point013.nl. Note that this website is in Dutch only



were collected, the responses were entered into an excel sheet and two researchers analyzed the data, using a grounded theory approach (Glaser & Strauss, 2009). As a second measure, we administered a standardized questionnaire with 40 items concerning 'school culture'. Respondents used a 4-point-scale from (1) totally disagree to (4) totally agree; the fifth option was 'I don't know'. A sample of 135 teachers completed this questionnaire. These teachers all worked in the 11 schools participating in the ERL. SPSS was used for data analysis. We calculated the descriptives in order to obtain a first impression of the data.

Results

Results regarding the expectations concerning success of the research cooperation of the 34 participants showed a different focus, dependent on the group of respondents. The teachers mentioned *applicable results* concerning working with gifted pupils. They hoped to learn more on the theme 'giftedness' and were looking for practical, usable advice and tools for these pupils in their classrooms. On the other hand, the school leaders/administrators were especially interested in *collaboration between school teams and researchers*, aiming to reduce the perceived research practice gap. Additionally, they hoped to find *evidence-informed practices*, which could help improve the daily school practice for gifted pupils. Two school leaders emphasized the need of knowledge on giftedness. Finally, the researchers and teacher educators also stated that the *connection between the primary school practice and the scientific environment* was most important for them. They hoped to be able to work together on an evidence-based education program for gifted pupils.

Findings regarding the research-oriented culture in school, showed an open and safe working climate in the schools of the 135 teachers. 95% of the teachers reported feeling safe to share work-related problems with their colleagues and in line with this finding, almost all teachers stated that they share problems with their colleagues (97%). All teachers stated that they were open to feedback from others and 93% stated that they actually gave their colleague-teachers feedback on what went well and on what could be improved (72%). 76% of the teachers reported that their colleagues supported them in doing research with regard to their teaching practices, and 64% stated that they actually conducted research together. 40% of the teachers reported that they invited colleagues to observe their lessons in order to provide them with feedback. Finally, the survey showed variety with regard to school leaders use of pupils' input (from evaluations or tests) or feedback to improve educational practice: 33% of the teachers stated that their school leaders do use pupils' feedback in order to identify educational problems, whereas 39% of the teachers stated that their school leaders do not and 28% of the teachers stated that they did not know about this.



Educational Research Lab Amsterdam

The Education Research Lab Amsterdam consists of a collaboration between three Amsterdam school boards and three Amsterdam-based higher level educational institutions. The aims of the Amsterdam ERL are threefold: 1) build a structure for sustainable cooperation in research that contributes to school development and quality of research, 2) develop, through joint research, relevant knowledge about an issue that binds education professionals, trainers and researchers in an urban environment, 3) share new insights and outcomes online¹¹.

From the start, the Amsterdam ERL is organized so that there is an equal position between all partners at all levels of cooperation: all partners and their interests are represented in the steering committee, the project management group and, at the heart of the Amsterdam ERL, the research group. At this moment one pilot research group is active in the Amsterdam ERL. The thematic focus of this group is diversity. Hence, the specific aim of the pilot project is to, through joint research, develop relevant knowledge regarding diversity issues in education.

Research question and method

Based on the analysis of the process within the Amsterdam ERL in year one, for this contribution we share insights on successes and pitfalls in the creation of shared ownership, meaningfulness and dialogue around practice-based research. Therefore we address the following question: What are the conditions for shaping collaboration in an ERL as a space in which shared ownership, meaningfulness and dialogue exists?

For this study different qualitative data were used, all collected in the period between September 2016 and July 2017. First, based on an activity theory framework (Engeström, 2001), data were collected with Professional Learning Community (PLC) coordinators, research coordinators and researchers during four research group meetings through surveys and focus group discussions. Additionally, data were collected during five focus group discussions with coordinators of the school boards and the researchers from the educational institutes. Last, departing from theory on network analysis (Butts, 2008) and value creation (Wenger, Trayner & de Laat, 2011) data were collected through interviews with participants representing different systems within the Amsterdam ERL organization.

¹¹ See: www.lameducation.nl. Note that this website is in Dutch only



Results

Analysis of the data shows that in the end of the first year of the Amsterdam ERL, shared ownership, meaningfulness and dialogue were present, though confined to defined moments and linked to specific activities.

Where it concerns dialogue, data provided through the network analysis highlighted that all participants had contacts with participants from the different systems, hence boundary crossing took place. However, the frequency and level of the dialogue depended on the role of the participants. Participants with a double (or triple) role, the so called *boundary crossers* (for example the research coordinators from the school boards who have a role within the research group, within the project management group and within the school board) experienced more ownership. Where it concerns the meaningfulness of the dialogue, based on the value creation analysis it was found that all participants experience *potential value*. *Immediate value* was experienced mostly by teachers, while *redefining value* was mostly experienced by the research coordinators. The analysis also showed us that most value was attributed to dialogue around the collaboration structure itself, and less to dialogue around (doing) practice-based research or the specific theme of this ERL: diversity.

It was found that for creating meaningful collaboration, dialogue between different perspectives was essential. Boundary activities and objects were created to facilitate dialogue. The most successful boundary activities identified in the first year were the joint readings and the elaboration of the shared vision on diversity and practice-based research. Most successful objects were the digital lectures, literature and the research formats.

Regarding pitfalls, findings of the first year indicate that activities that *cannot* be qualified as boundary activities (in the sense that they do not have meaning and do not stimulate dialogue in the different systems) interfere with the process of creating space for shared ownership, meaningfulness and dialogue. An example of such activities is parallel research that focuses on meta questions regarding the process and output of the Amsterdam ERL.

The data also highlighted that objects and activities should be well organized, proactively planned, and aligned to already existing plans and agenda's (for example at the school level). At the same time, they should be embedded within an existing organizational structure in which roles are well defined and participants facilitated. The analysis shows that organizational aspects (composition of the teams, role definitions, planning, facilitation) play an essential role in shaping conditions for collaboration in the ERL. Moreover, *time* was identified as a central element in the



outcome of this study. Building an ERL takes time: time to organize the structure and collaboration forms, but also time to develop real ownership, meaningfulness and dialogue amongst all partners around both the process of doing research together as well as around the specific theme that is being investigated.

Educational Research Lab Utrecht

The aim of the Educational Research Lab Utrecht is to create a sustainable infrastructure between schools and higher education institutes within the city of Utrecht, which allows schools for primary education to develop a scholarly or 'research-minded' attitude to tackle issues that teachers experience in their daily work.

To achieve this goal, the Utrecht ERL takes a bottom-up approach: research questions were rooted in actual issues or problems, experienced by the participating schools themselves. As a result, 15 'sub labs' work independently, within the overarching Educational Research Lab Utrecht (see below, 'organization'). As can be expected when choosing a bottom-up approach, the themes the 15 labs delve into show great variety. A couple of examples are studies concerning the support of 21st century skills; parental involvement; supporting socio-emotional development; attitudes towards inclusive education; self-regulatory learning; and inquiry-based learning. Departing from their own areas of interest, all labs work towards the above mentioned shared goal of developing a scholarly attitude.

Organization of the Utrecht ERL

The ERL Utrecht¹² consists of 15 schools (approximately 45 teachers), belonging to 3 school boards, and five higher education institutions in Utrecht (2 universities, 1 teacher training institution, 2 universities of applied sciences). Representatives of each of these institutions govern and monitor the research process in both a steering committee and a project management group.

Closely collaborating in roles within each sub ERL

The fact that the 15 sub-labs work independently does not mean they work in isolation from each other. All 15 sub-labs exchange intermediate results. This is

¹² For more information, see <http://www.kijkoponderwijs.nl/professionals/werkplaatsonderwijsonderzoek>. Note that this website is in Dutch only.



achieved by assigning clear roles within the project. Each of the sub-labs is composed of individuals with specific roles, who collaborate closely and equally.

We distinguish between four roles within each sub ERL. First, the key position within the lab is what we labeled the ‘broker’. The broker is a typical ‘boundary crosser’ (Akkerman & Bakker 2011). This is a teacher, working in the school, but equipped with *designated time* to take leadership in conducting the study. The broker typically has a Masters degree, and has some experience within the world of academia. This experience allows the broker to act as the ‘missing link’ between science and practice. The second role is that of a researcher from one of the five research institutions, who supports the broker in designing and conducting the research. They are matched to a particular ERL sub-lab depending on their area of expertise. Thirdly, approximately three teachers within the school are also committed to the study (the number of teachers varies greatly between sub-labs). They support their broker in data-collection, and they are involved as constructive research partners. The final role is that of an advisor from the school board. This advisor acts as a facilitator and has a close connection with the school administrator.

Knowledge exchange between sub-labs

Three times a year, all participants in the 15 sub-labs participate in a joint meeting. During these meetings, the brokers present their intermediate results. Participants engage in elaborate group discussions, in which they exchange experiences, knowledge and challenges. This applies to both teachers and researchers. These meetings are of great value for the ultimate goal of the Utrecht ERL: creating an infrastructure that facilitates a scholarly attitude of schools for primary education.

Intermediate insights of the ERL Utrecht

A process evaluation showed a couple of interesting patterns. First, the brokers are very enthusiastic about the project and about conducting research in their own school. They report that they learn quite a lot, and that they perceive the guidance by ‘their’ researcher as very helpful and accessible. However, they also experience their research work as demanding and labor intensive. They emphasize how important the role of the school administrator is, who needs to be committed both concerning content and the facilitation of designated research time. Furthermore, brokers stress that commitment of the team of teachers is also very important and motivating. Teams in which not only brokers but also teachers are provided with designated research time, flourish especially. Teachers who need to be involved in the research in their own time feel more hesitant about participating. Finally, brokers state that they feel strong ownership of their projects.



One sub-lab in the spotlight: *Developing a scaffolding tool for inquiry learning*

We will briefly describe the progress of just one of the sub-labs, to give the reader some idea of how an ERL sub-lab might work. One of the schools experienced that teachers encountered difficulties when guiding their students through inquiry-based learning assignments. Teachers struggled asking questions that would help the students ask good research questions themselves, without the lesson becoming strongly teacher-directed. Therefore, the ERL initiated design-based research, working towards a scaffolding tool that would enable teachers to support children during inquiry-based learning.

The broker designed an elaborate tool, stating many sample questions. The researcher advised and co-designed by consulting literature on inquiry-based learning. The tool was implemented by teachers during a 6-week project. Each week, the teachers provided the broker with a detailed journal, in which they described their experiences with the tool. The broker re-designed the tool based on these data. Intermediate results show that for this school, doing research is highly helpful in advancing school development. The revised tool will now be implemented in a new school-wide project. Whether the adapted version of the tool meets the needs of all teachers needs to be ascertained in the upcoming round of data analysis.

METALEVEL STUDY

On a metalevel, we evaluate the three ERLs in the light of research that has identified factors underlying successful collaborations and factors that may hamper success. Based on the initial model derived from the literature study (see the previous section and Zuiker et al., 2017) and the evaluation of the labs we present the first insights (after one year) (De Jong et al., 2017). We will compare what was stated in the initial model with what has been found in the metalevel study so far.

The following questions will be answered in this metalevel study:

- 1) Which factors enhance or hamper the cooperation between schools and higher education institutes aimed at a better connection between educational research and school development?
- 2) How do schools and higher education institutes collaborate in the three Educational Research Labs and how do schools benefit in terms of school development?



Method

In order to answer the research questions, data are gathered in the following manner: (1) Interviews with coordinators of the ERL, school board, school leaders, teachers and researchers involved in the ERL. The questions asked during the interviews were based on the initial model derived from the literature study, conversations with persons involved, and information from documents and meetings. For an impression see the textbox below. (2) Attending meetings of the ERLs (3) Gathering relevant documents of the ERLs.

Summary of interview questions:

1. What are the key elements of a successful collaboration in the collaborative educational research lab?
2. How do different groups in the collaborative educational research lab relate to one another in terms of roles, responsibilities and equivalence?
3. How would you describe the cooperation between schools and researchers?
4. Is the collaborative educational research lab in its current form sufficient as a foundation for a structural collaboration? If not, what should happen to achieve a structural collaboration?
5. In what ways is knowledge shared within the collaborative educational research lab and with people outside the collaborative educational research lab? Who uses the knowledge that is gathered in the collaborative educational research lab?
6. What expectations do you have regarding the outcomes of the collaborative educational research lab? Are you satisfied with the expected outcomes?
7. Will the collaborative educational research lab when the pilot study ends, provide sufficient insight in and answers for practice?

When interpreting the results of this study, it is important to keep in mind that during the foregone first year, the ERLs have mainly focused on the organization, structure and alignment of their content. Setting up each ERL was a lengthy, intensive process. Because of this, the scope of this article will be limited to the first research question. The second question will be answered in the summer of 2018.

Results: factors that underlie successful ERLs

Despite the differences between the three ERLs, some common factors seem to be essential for a successful ERL. First, the ERLs did not start from scratch: they built on existing networks between the participating school boards, schools and institutes for higher education. Most of the key elements for a successful cooperation between education and research that were raised in the aforementioned literature study (see above and Zuiker et al., 2017) were also found in our evaluation study. This included for example the role of the school leader with respect to educational leadership, the role of so called ‘brokers’ and the importance of developing a sense of community between teachers and researchers. In addition, we found three aspects that were not mentioned in the literature study but seem to have played a crucial role in the success of the ERL: the coordinator role, the role of the school board and school leader at different levels, development of participants at higher education institutes



The coordinator role

The role of the coordinator is an essential one for a successful ERL. Our metalevel study shows that, at least in the first year, it is a requirement to have an ERL coordinator. When the ERLs started, the coordinators played an important role in setting up and clarifying the organizational structure and bringing together different groups of people. All the members of the ERLs see the coordinator as the first person to come to with their questions. Especially in the beginning, when there were a lot of questions and the organizational structure was not completely worked out, this role was very useful. But also afterwards, the coordinator remained important in monitoring the process, organizing meetings and addressing issues to the right persons. As a result of these activities, the individual members stay highly committed to a successful ERL. However, it is a risk that the success of an ERL becomes dependent on one person: this makes the entire process vulnerable. One of the ERLs has taken this into account: they have two coordinators.

The role of the school board and school leader at different levels

The funding by the Netherlands Initiative for Education Research provides school boards and schools with money and therefore time to participate in the ERL. Both members of the school board and school leaders feel committed to the ERL and give priority to the research activities. When needed, some school leaders took over teaching in order to give the teacher time to do their research activities. With the given money and time, teachers were able to attend meetings and spend time on doing research. Some of the teachers used to do this in their spare time, but now it is a part of their regular job and time schedule. The school boards play an important role in facilitating the school leaders to engage in the ERL. When other priorities threaten to prevail above participating in the ERL, the school board can facilitate and support school leaders in making the right choices. With respect to the sustainability of ERLs in the future, members of the school board play an important role, for instance in setting relevant strategic goals in which ERLs could be embedded. This year we will further investigate the role of the school boards with respect to the ERLs.

Development of participants at higher education institutes

Another factor that was not mentioned in the literature study is that the researchers from the higher education institutes also develop professionally by participating in an ERL. Participating teachers, researchers, students and coordinators mention this. Outcomes of the ERL for involved persons from a higher education institute are underexposed but will be researched in the second year of the metalevel study.



How to proceed?

In September 2016, the ERLs started and accomplished a lot in the first year. In the summer of 2018 the funding for the ERLs will end and therefore we will pay attention to how the promising developments can become secured for the future. This is one of the aspects on which the meta-evaluation study will focus in the first half of 2018. Other relevant topics are:

- The benefits for the participants in the ERLs at the higher education institutes
- The role of school boards
- The role of school leaders and school boards with respect to further stimulating a research culture within their schools
- The role of having a central research theme within the ERL with respect to school development, the contribution to practice-oriented research and the sustainability of an ERL.
- The most essential characteristics of ERLs

REFERENCES

- Admiraal, W., Kruiter, J., Lockhorst, D., Schenke, W., Sligte, H., Smit, B., & de Wit, W. (2016). Affordances of teacher professional learning in secondary schools. *Studies in Continuing Education*, 38 (3), 281-298.
- Akkerman, S., and A. Bakker. (2011). Boundary Crossing and Boundary Objects. *Review of Educational Research* 81 (2): 132–169.
- Avgitidou, S. (2009). Participation, roles and processes in a collaborative action research project: A reflexive account of the facilitator. *Educational Action Research*, 17, 585-600.
- Baumfield, V., & Butterworth, M. (2007). Creating and translating knowledge about teaching and learning in collaborative school–university research partnerships: An analysis of what is exchanged across the partnerships, by whom and how. *Teachers and Teaching: Theory and practice*, 13, 411-427.
- Bronkhorst, L. H., Meijer, P. C., Koster, B., Akkerman, S. F., & Vermunt, J. D. (2013). Consequential research designs in research on teacher education. *Teaching and Teacher Education*, 33, 90-99.
- Butts, C. T. (2008). Social network analysis: A methodological introduction. *Asian Journal of Social Psychology*, 11(1), 13-41.
- De Jong, A., Exalto, R., De Geus, W., Kieft, M., Klein, T., & Lockhorst, D. (2017). *Werkplaatsen onderwijsonderzoek PO. Tussenrapportage onderzoek jaar 1*. Utrecht: Oberon.



- Dodgson, M. (1993). Organizational learning: A review of some literatures. *Organizational Studies*, 14, 375-394.
- Kwakman, K. & Van den Berg, E. (2004). Professionele ontwikkeling als kennisontwikkeling door leraren: Naar een betere interactie tussen praktijk en theorie. *Tijdschrift voor Lerarenopleiders*, 25(3), 6-12.
- Lather, P. (2004). Scientific research use in education: a critical perspective. *British Educational Research Journal*, 30, 759-772.
- Meijer, P. C., Oolbekkink, H. W., Meirink, J. A., & Lockhorst, D. (2013). Teacher research in secondary education: Effects on teachers' professional and school development, and issues of quality. *International Journal of Educational Research*, 57, 39-50.
- Miner, A. S., & Mezias, S. J. (1990) Ugly duckling no more: Past and futures of organizational learning research. *Organization Science*, 7, 88-99.
- Mol, A. (1999). 'Mooie woorden en verplaatsbare praktijken'. [transferrable practices] In K. Vos & V. Timmerhuis (red.), *Gedragswetenschappen in context: Essays over beleidsrelevantie en wetenschappelijke uitdagingen* (p. 21-34). Den Haag: SDU.
- NRO (2016). Call for Proposals. Pilot Werkplaatsen Onderwijsonderzoek Primair Onderwijs.
- Schenke, W., Geijssel, F., Volman, M. L. L., & Van Driel, J. (2017). Boundary Crossing in R&D Projects in Schools: Learning Through Cross-Professional Collaboration. *Teachers College Record*, 119 (4), 1-42.
- Sleegers, P. & Van Dael, H. (2012). Over effectieve schoolverbetering en de weerbarstigheid van de praktijk. In: A.B. Dijkstra & F.J.G. Janssens (Eds.), *Om de kwaliteit van het onderwijs: Kwaliteitsbepaling en kwaliteitsbevordering* (pp.112-139). Den Haag, Nederland: Boom Lemma uitgevers.
- Van der Linden, W., Bakx, A., Ros, A., Beijaard, D., & Keuvelaar (2015). The development of student teachers' research knowledge, beliefs and attitude. *Journal of Education for Teaching*, 41(1), 4-18.
- Vanderlinde, R., & van Braak, J. (2010). The gap between educational research and practice: Views of teachers, school leaders, intermediaries and researchers. *British Educational Research Journal*, 36(2), 299-316.
- Wenger, E., Trayner, B., & de Laat, M. (2011). *Promoting and assessing value creation in communities and networks: A conceptual framework*. Heerlen: Ruud de Moor Centrum.



- Zeichner, K.M., & Noffke, S.E. (2001). Practitioner research. In V. Richardson (Ed.), *Handbook of Research on Teaching*, (pp. 298-330). Washington, C: American Educational Research Association.
- Zuiker, I., Schot, W.D., Oomen, C., De Jong, A., Lockhorst, D., Klein, T. *Succesvolle werkplaatsen: Wat is er nodig voor een vruchtbare onderzoekssamenwerking tussen onderwijspraktijk, hogescholen en universiteiten?* Universiteit Utrecht / Oberon Onderzoek en advies. <https://dspace.library.uu.nl/handle/1874/359183>
- Zwart, R. C., Smit, B., & Admiraal, W. F. (2015). Docentonderzoek nader bekeken: Een reviewstudie naar de aard en betekenis van onderzoek door leraren. *Pedagogische Studiën*, 92, 131-148.
- Zwart, R., Van Veen, K., & Meirink, J. (Eds.). (2012). *Onderzoek in de school ter discussie: Doelen, criteria en dilemma's*. Leiden, Nederland: Universiteit Leiden.



DEVICES TO COUNTER THE LACK OF PRACTICE IN MATHEMATICS IN A FIRST YEAR ARCHITECTURE PROGRAMME

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ABSTRACT

The present study focuses on the whys and wherefores of the online-oriented pedagogical redesign of a course in mathematics in the context of the Feedback First-Year Project (FFYP) implemented in an architecture programme at the University of Liège (Belgium). Lead in order to support the experience and learning of freshmen within the institution, FFYP aimed to involve a group of professors from the same Faculty in a reflection about their current teaching and assessment practice and possible improvements. The teachers were especially acquainted with feedback-related issues through structured moments of personal coaching and collegial meetings, fed by the provision of theoretical resources, among which Nicol's "12 Principles of good formative assessment and feedback" (2009). This paper reports and analyses four significant devices set up in mathematics by one of the teachers in collaboration with the FFYP team; an online prerequisite test implemented on our academic online platform, a true/false quiz intermediate test, a peer-grading mock exam and an online graphic syllabus. According to Nicol's recommendations, each of these features is completed with specific feedbacks to the students. At the end of the process, students were asked about their perceptions about the implemented devices. The paper concludes with a discussion of several facilitating and challenging factors.



INTRODUCTION

Whereas some predictors of student's success directly depend on themselves (e.g. in-depth study instead of superficial study; work and study on a regular basis), quality teaching and pedagogic support play a major role in dropout prevention (Bécharde & Bédard, 2009). According to Lizio's model (Lizio, Wilson, & Simons, 2002), quality teaching is positively and significantly correlated with current level of academic achievement ($r = .31$), reported satisfaction with course ($r = .54$) and self-reported development of generic skills ($r = .32$).

An important part of teaching lies within the assessment of learning. Whereas assessment has long been considered as a mere operation occurring at the end of a complete learning process (William, 2011), a growing community of researcher focuses on the *why* and the *how* of the evaluative process. Assessment *of* learning therefore becomes assessment *for* learning, with evaluation as a means to promote learning, through formative assessment and feedback practices. High quality feedback practices are therefore essential. According to Nicol (2009), in order for a feedback to be of quality, 12 principles should be followed. The 12 principles aim at enhancing students' engagement in the academic life and, more importantly, students' self-regulation. For instance, the first principle urges the teachers to clarify what a good performance is, to let students clearly know and understand what is expected from them. Another principle invites teacher to encourage their student in spending great deal of time and effort in challenging task, to favour regular work. In order to improve teaching and feedback practices within the University, a project has been developed in partnership with the Institute of Training and Research in Higher Education (IFRES), the Centre of Higher Education Didactic (CDS) and the Student Guidance Service (SGE), and implemented in five faculties. This ambitious project is entitled "Feedback First-Year Project".

FEEDBACK FIRST YEAR PROJECT

The Feedback First-Year Project (FFYP) is an action research project oriented towards First-Year students' learning support. It aims at engaging First-Year teachers in a reflection on concrete ways to develop or optimise opportunities of formative feedbacks for freshmen in order to both improve students' academic and social experience, and enhance their ability to self-regulate their learning. The teachers are assisted in their pedagogical reflection by a pluri-disciplinary team of two advisors working within the faculty premises, one psycho-pedagogical advisor and one architect

Following its implementation in three faculties (Law and Criminology; Applied Sciences; and Sciences), the FFYP was put into practice within the Faculty of Architecture. Amongst all the initiatives introduced within the faculty, the present paper focuses on the Math course's pedagogical redesign.



FFYP AND MATHEMATICS COURSE

The pedagogical redesign focuses on both didactic and pedagogical reflections in teaching mathematics in architecture programme in order to support the experience and learning of first year students. The reflective process leading to the chosen redesign formula was performed in the FFYP in three steps. With the collaboration of a student completing a Master in Didactics of Mathematics at the University of Liège, who was in charge of supporting freshmen facing problems in learning these course contents, we first managed to investigate and collect what appeared to be the main mathematical difficulties encountered by Architecture students in all the other courses taught in first year. Thanks to this inventory - which included many basic prerequisites in the first place - a list of examples was sorted according to mathematics' skills and demonstrated the lack of transfer between the disciplines.

After having analysed and cross-checked this list of purely disciplinary difficulties with her own systematic observations of the students' behaviours during the term, the professor in charge of the course worked with the FFYP team, trying to derive the more generic corresponding needs of freshmen in this course, thus determining the priority objectives of its pedagogical redesign:

- making students aware of their levels of knowledge in the mathematic prerequisites necessary for the course;
- clarifying the levels of performance required to pass the course;
- regulating the actual workload spread over the semester and supporting the engagement of students toward the course on a regular basis;
- giving students multiple and formal opportunities to confront themselves to the evaluation criteria and self-regulate throughout the semester.

Aligned with those objectives, the pedagogical redesign of the course was carefully achieved in accordance with the theoretical foundations of the FFYP. It has been made up of four different yet complementary devices which, taken separately, notably match with various "practical recommendations for improving assessment and feedback in the first year of higher education" set by Nicol (2009). Moreover, as discussed later on in our paper in the light of the formative feedback/assessment and AfL theories applied to the First-Year context, this pedagogical redesign offers the inspiring example of an integrated framework which, taken as a whole, also appears likely to support the engagement, self-regulation and learning of freshmen. Developed in order to investigate how those four devices were perceived by the students and to support the teacher in her decision to replicate the initiative or not, a questionnaire was submitted to the public concerned.

These four significant devices set up in mathematics consist in: an online prerequisite test implemented on our academic online platform, a true/false quiz intermediate



test, a peer-grading mock exam and an online graphic syllabus. They are described in the following section.

FOUR DEVICES IMPLEMENTED IN MATHEMATICS

The four devices were added to complete the course framework, the weekly two-hour exercises session directly following the theoretical transmission of knowledge. During these practise sessions given in auditorium, the teacher receives the assistance of 4 math master students.

The online prerequisite test (PT)

Based on years of math teaching in an architecture programme and on the observed recurring lack of basic mathematical skills knowledge amongst students, several categories of essential math prerequisites have been established:

- Knowing how to calculate numbers
- Knowing how to measure sizes
- Knowing how to structure space
- Knowing how to build logical links/associations.
- Knowing how to use scales. We specifically added this last category because of the importance of scales' understanding in architecture.

Following the creation of this list, we developed an online prerequisite test on the academic online platform (see figure 1).

Aperçu de l'examen : Test pré-requis 2

Informations sur l'examen

Description : Ce test est équivalent au premier test de pré-requis qui avait été mis en ligne en octobre. Les questions sont similaires, bien que non identiques. Les consignes sont exactement les mêmes que pour le premier test.

Instructions

Examen en temps limité : Le temps accordé pour cet examen est de 1 heure. Vous serez informé de l'expiration du délai ; vous pouvez continuer ou soumettre. Des avertissements s'affichent lorsque la moitié du temps s'est écoulée ou qu'il reste 5 minutes, 1 minute ou 30 secondes. (Le chronomètre n'apparaît pas lorsque vous affichez l'aperçu de cet examen)

Tentatives multiples : Non autorisé. Cet examen ne peut être passé qu'une seule fois.

Forcer l'exécution : Une fois démarré, cet examen doit être effectué en une seule fois. Ne quittez pas l'examen avant d'avoir cliqué sur **Enregistrer et soumettre**. Les retours en arrière sont interdits pour cet examen. Il est interdit d'apporter des modifications aux réponses après l'envoi.

État d'avancement de la question :

Vous ne pouvez plus modifier cette réponse après être passé à la question suivante.

Question 1 sur 20

Question 1

Ta montre retarde de 15 minutes. Quelle est l'heure exacte si tu lis 3 h 57 à ta montre ?

1 points Enregistrer la réponse

☐ 3 h 38 min

☐ 4 h 06 min

☐ 4 h 16 min

☐ 3 h 16 min

Vous ne pouvez plus modifier cette réponse après être passé à la question suivante.

Question 1 sur 20

Figure 1 Prerequisite test



This test consists in 20 questions from all five aforementioned categories. Each wrong entered answer was followed by a specific feedback inviting students to revise the category of prerequisite associated with the question (e.g. when students enters a wrong answer on a question about how to calculate numbers, the automatic feedback invites them to revise the rules of number calculation). The introduction of specific feedback is in direct line with Nicol's third recommendation encouraging teacher to give high quality feedback to help students to self-correct (2009). Students could complete the test as many times as they wish during a limited period of time. Since the mastery of prerequisites are essential to follow and understand the actual math course, the test was available online only during the first six weeks of teaching. Although the test was not mandatory, it was strongly recommended to complete it and to score 15/20 and higher as to ascertain a good knowledge of the prerequisites. A good proportion of students decided to complete the prerequisite test (57% of the total cohort).

A total of 128 questions provided by the teacher has been entered on the online platform, allowing the teacher to create as many 20-questions test as she wishes.

The true/false quizzes – Intermediate test (IT)

In order to integrate formative assessment within the math course as well as encourage students to engage time and effort in more regular work (cf. Nicol's second principle, 2009), an intermediate test, half-way through the semester, was organised. This intermediate evaluation was also an opportunity for the students to be familiarised with assessment in a university setting, without risking their final grade. All too often, students' first confrontation with university evaluation is during their first exam. Therefore, adding to the already important anxiety of performing well at a task, this first confrontation can also be an extra source of stress.

To create the test, we use the help of a unit specialised in educational evaluation, called the SMART (Système Méthodologique d'Aide à la Réalisation de Tests).



Cochez soigneusement dans ce cadre les cases qui correspondent au codage de votre questionnaire

Nom :

Prénom :

Cours :

Date de l'évaluation : / / 20

Consignes de marquage : cochez la case à l'aide d'un **bic noir** ou **bleu** (pas de crayon ni de feutre) Faites : ☐ Ne faites pas : ☐ ☐ ☐

En cas d'erreur de marquage, ne raturez pas sur la première ligne mais utilisez la seconde ligne pour cocher la réponse définitive

Cochez ci-dessous votre matricule étudiant

3^{ème} chiffre ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9

4^{ème} chiffre ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9

5^{ème} chiffre ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9

6^{ème} chiffre ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9

7^{ème} chiffre ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9

8^{ème} chiffre ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9

QUESTIONNAIRE VRAI/FAUX GÉNÉRALISÉ – 34 questions

1	1	V	F	2	V	F	3	V	F	4	V	F	18	1	V	F	2	V	F	3	V	F	4	V	F
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
2	1	V	F	2	V	F	3	V	F	4	V	F	19	1	V	F	2	V	F	3	V	F	4	V	F
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
3	1	V	F	2	V	F	3	V	F	4	V	F	20	1	V	F	2	V	F	3	V	F	4	V	F
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
4	1	V	F	2	V	F	3	V	F	4	V	F	21	1	V	F	2	V	F	3	V	F	4	V	F
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	

Figure 2 True/false quiz sheet

The SMART helped with the creation of high methodological quality questions and helped decide which sort of answer students would be asked to give (e.g. Multiple-choice questions, true/false quizzes, etc.). A true/false quiz questionnaire has been chosen (see figure 2). During the intermediate test, students received 15 questions. For each question, 4 possible answers were presented. For each possible answer, students had to indicate whether it was true or false, and then report their answer on the special sheet. As for the prerequisite test, the intermediate test was not mandatory but every student whose score was of 12/20 and higher received a 2-points bonus at their January exam.

The students' attendance for the test was quite good (73% of the total student cohort) and the mean score was equally good (12.5/20).

Students receive feedbacks during the following lecture. Beside their grades, the teacher gives correct answers and warnings on the common mistakes to them.

The peer-grading mock exam

Following a similar desire to offer students with the possibility to be exposed to exam's conditions without risking their grade, and therefore deal with its potential anxiety before the exam takes place, we implemented a mock exam. We decided to use the last lecture of the year to organise it. The conditions in which the exam was organised were totally similar to the real exam's conditions. Students were asked to complete last year exam and they had two hours to do so. Using last year exam allowed us to display last year students' good (and less good) answers during the collective correction of the exam which directly followed the mock exam in the same auditorium. By doing so, students had the possibility to be confronted by an example of what is considered by the teacher as being a good performance and a less good



performance, therefore clarifying what standards of performance is expected by the teacher (cf. Nicol's first principle, 2009). However, before displaying last year students' examples, students took the time to peer-grade the mock exam, with the help of the teacher who displayed the right answers on the screen and explained what was expected as an answer and why.

The students' attendance to the mock exam was lower than the one for intermediate test.

The graphic syllabus

Nicol's first principle for good quality feedback consists in the clarification of what exactly is expected from students before, during and, at the end of the year. This clarification can be achieved in many ways. One of those ways is to present the course's objectives to the students. We chose to present the course objective using a graphic syllabus, in which students can find the idea of the programme, the contents of each session as well as the links with others courses in the architecture programme (see figure 3). The graphic syllabus also contains the specific dates of each specific lesson as well as the specific dates and the locations (for presential activities) for the prerequisite test, the intermediate test and the mock exam.

At the beginning of each weekly session, a slide is displayed on the screen showing, on the left side, where the session takes place within the whole sequence of the course and, on the right side of the slide, the theoretical content of the session and the associated exercises that will be done during the practical session (see figure 4).

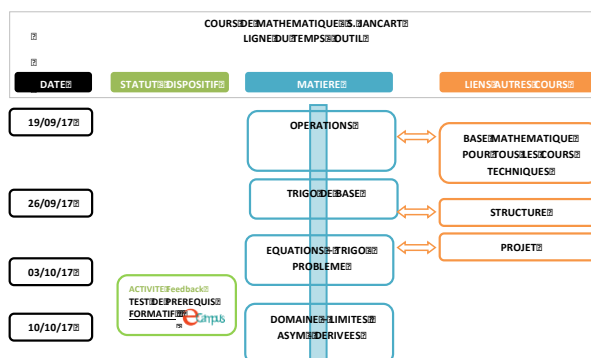


Figure 3 Graphic syllabus – links to others courses

The links and interconnections between maths and other courses (for instance trigonometry can be applied during a structure course) has been greatly appreciated by students. This interrelation between different courses of a same first-year program could results in a decompartmentalisation of the information and help students acquire a more complete and integrative understanding of their cursus. Also, if every teacher from the same year would create their own graphic syllabus and therefore

share the information related to their own course, this could be of great help for the students in order to organise their work and study, according to their different deadlines within each course.

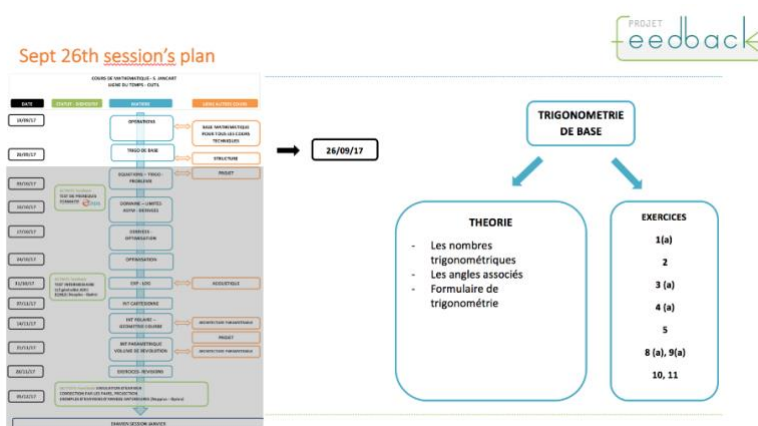


Figure 4 Graphic syllabus – week after week – Theoretical and exercises sessions

The four devices present undeniable qualities on their own, but their greatest advantage is that they work well together to improve students' engagement. In effect, based on students' participation rates, and preparation rates in a lesser extent, the integrative implementation of those devices seems to impact students' involvement in the math course.

THE PEDAGOGICAL REDESIGN AS A RELEVANT FOUR-PIECE INTEGRATED FRAMEWORK ACCORDING TO THE LITERATURE

Taken together, those four devices all worked together to improve students' experience with the math course, collectively meeting important principles of good assessment and feedback practice according to Nicol (2009) : by clarifying what is expected from them in term of courses objectives (i.e. graphic syllabus), math performance (i.e. mock exam and intermediate test) and prerequisite mastery (prerequisite test); but also by encouraging them to put time and effort in challenging learning task (intermediate test and mock exam); by providing high quality feedback to help students self-correct (prerequisite test and to some extent the intermediate test and the mock exam); and, by encouraging interaction about learning between peers and teacher (collective correction of the mock exam). All those devices were also a great source of information for the teacher who could then use it to better shape and optimise her teaching.



To this respect and as suggested above, those four devices could be seen as providing the complementary pieces of a learning-oriented jigsaw, a formative integrated environment embedding various teaching and assessment components, and thus suitable to support both the engagement and the self-regulation ability of students in this course according to the literature. Indeed, this longitudinal combination of three different opportunities of testing, strategically planned, could actually meet “the issues and challenges of helping students reframe their views and definitions of feedback in sympathy with A/L approaches” described by Sambell (2011, p.5), since « from this viewpoint, feedback is seen as a process which is fully integrated into the learning and teaching process, building gradually over time, with active student involvement”.

For the purpose of promoting *active student involvement* in particular, this pedagogical redesign alternating those progressive and formative tests with periods of consecutive feedbacks and teaching inputs, completed by the availability of a holistic communication tool (the graphic syllabus) guiding the students through the whole process to regulate their learning, makes it compatible with the definition of this notion given by Chapuis and Stiggins (writing about *Classroom assessment for learning*) : “student involvement means that students learn to use assessment information to manage their own learning so that they understand how they learn best, know exactly where they are in relation to the defined learning targets, and plan and take the next steps in their learning “ (2002, p. 41).

Beyond its relevance regarding the engagement and self-regulation of freshmen, this four-piece pedagogical redesign was also conceived with the hope to display the features of a formative environment meeting the four institutional conditions that could facilitate students’ retention and success, as listed by Tinto (2010). Indeed, according to him, students are more likely to persist and graduate when they know what is expected from them, in terms of performance and effort; when the amount of support they could find in and outside the classroom and within themselves (self-efficacy) is sufficient to help them achieve the set expectations; when students receive enough opportunities of assessment and feedback about their progress; when students are fully involved in their academic life and community. Thanks to the introduction of those four consistent devices within the math course, we directly managed to improve those conditions of success for our First-Year students. By introducing a graphic syllabus, a prerequisite test, an intermediate formative test and a mock exam, we contributed to offer clearer expectations for students, to enhance the amount of classroom support and, hopefully, the student’s self-efficacy, to create additional experiences of assessment and feedback, all of which in order to support freshmen integration in the university, both academically and socially.

Although the pedagogical redesign of the math course was fruitful according to the literature, it also came with a more challenging side. Rethinking the entire structure



of a course takes a lot of time and effort. Because of the presence of the FFYP within the Faculty of Architecture, and therefore the presence of two educational advisors, the professor was able to put all those changes into place. In the next sections, we expose the major facilitating and challenging factors in doing so.

IDENTIFIED FACTORS THAT MADE THE IMPLEMENTATION OF THE PROJECT SUCCESSFUL

At the level of the professor in charge of the course, one of the typical FFYP traits had a direct effect on both her involvement and reflection: the guidance of a pair of advisers, consisting of a specialist in instructional sciences and a content-domain expert, who held regular meetings in order to acquaint her with feedback issues and to help her in developing, realising ideas and mastering the online platform.

The predominant factors making the project successful at the level of the targeted students were investigated through the result of a questionnaire filled out by 156 students over 255 registered, allowing for instance to derive a list of incentives to pass and prepare the tests.

The analysis of the data collected through the questionnaire revealed that 85% of the respondents reported attending to the intermediate test. Additional results also showed that students reported being highly motivated to participate in ($N = 148$, $M = 5.79$, $SD = 1.9$) and study ($N = 148$, $M = 4.26$, $SD = 2.16$) for the test because of the 2-points potential bonus. However, students reported being moderately prepared for the test ($N = 149$, $M = 3.34$, $SD = 1.86$, on a 7-point Likert scale, from 1 *not at all* to 7 *totally*), with the main reasons for not being fully prepared being the lack of time (33%), self-assessed sufficient knowledge (23%) and architecture project (19%). Every year, architecture students have to present an architectural project that counts for a third of their final grade. The amount of time spent working on that project is therefore substantial.

In effect, when students were surveyed about their participation to the mock exam, only 50% of the respondents reported being present. The main reason for not attending was the architecture project (39%). Moreover, students reported being rather weakly prepared for the mock exam ($N = 118$, $M = 2.61$, $SD = 1.78$). Similarly to the results for the intermediate test, the lack of preparation is mainly due to the architecture project (34%) and lack of time (27%).

Despite those results, when students were asked to evaluate the usefulness of the initiatives, they reported the intermediate test ($N = 145$; $M = 5.04$, $SD = 1.99$) and the mock exam ($N = 105$; $M = 4.3$, $SD = 1.99$) as rather useful. Moreover, when surveyed about the usefulness of the prerequisite test, students reported finding the test as moderately useful ($N = 123$, $M = 3.60$, $SD = 1.93$, on a scale from 1 *not at all* to 7 *totally*).



IDENTIFIED FACTORS THAT MADE THE IMPLEMENTATION OF THE PROJECT CHALLENGING

One of the main challenges to deal with for the professor was to conceive pedagogical devices which would be compatible with the schedules of other First-Year courses and at the same time suitable for students' total workload.

Typical features of the FFYP process like the extensive use of structured moments of collective reflections about the project outputs between the programme's involved professors (plenary meetings) and the recurring suggestion made by the FFYP advisers to prepare a graphic syllabus (or a simple time-line) for each of their First-Year courses seems to be a good start to overcome this challenge.

CONCLUSION

In this paper, we presented a redesign of a mathematics course within an architecture programme. Four devices have been implemented with the aim to improve First-Year students experience with the math course. First, a graphic syllabus has been created to help student understand the sequence of the course, with information for each session as well as important dates for pedagogical activities and clear links between math course and other courses in the architecture programme. Secondly, an online prerequisite test has been developed in order to allow students to assess their own level of crucial math prerequisite mastery and to receive information helping them to fill the gap. Thirdly, an intermediate test with a 2-points bonus has been organised half-way through the semester, to give students an opportunity of formative assessment. And lastly, a mock exam took place just two weeks before the exam.

Able to capitalize on these achievements and encouraged by both the theoretical quality of the four devices (taken individually or together) and the first data collected from students, the professor is looking forward to continue and deepen this experience which hopefully will be considered as an inspiring effort for other teachers in charge of First –Year students and willing to reflect on learning environment likely to support their engagement with the help of formative feedback and A/L theories.

REFERENCES

- Bechard, J. P., & Bédard, D. (2009). *Innover dans l'enseignement supérieur*. Paris : Presses Universitaires de France.
- Chappuis, S. & Stiggins, R.J. (2002). *Classroom Assessment for Learning*. Association for Supervision and Curriculum Development.



- Lizzio, A., Wilson, K., & Simons, R. (2002). University students' perceptions of the learning environment and academic outcomes: Implications for theory and practice. *Studies in Higher Education*, 27(1), 27-52. doi: 10.1080/03075070120099359
- Nicol, D. (2009) Quality Enhancement Themes: The First Year Experience. *Transforming assessment and feedback: Enhancing integration and empowerment in the first year*. Mansfield: Quality Assurance Agency for Higher Education
- Sambell, K. (2011). *Rethinking feedback in higher education : an assessment for learning perspective*. University of Bristol : Escalate.
- Tinto, V. (2010). From theory to action: Exploring the institutional conditions for student retention. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (pp. 51-89). Dordrecht: Springer.
- William, D. (2011). What is assessment for learning?. *Studies in Educational Evaluation*, 37(1), 3-14. doi : 10.1016/j.stueduc.2011.03.001



SKILLS COMPETITIONS AS A TOOL TO DEVELOP VET TEACHERS' AND TRAINERS' COMPETENCE

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ABSTRACT

Many skills competition actors think that competitions are a powerful tool to develop vocational education and training and vocational teachers' competence. However, basic research evidence is scarce available. In Finland, the new legislation on upper secondary vocational education and training will reinforce professional skills. The most important task of Vocational Education and Training (VET) will be to produce individual skills that meet the needs of students and the world of work. The objective is to reform VET so that it could better than nowadays meet the future competence needs. Individual study paths would be created and learning occurring at workplaces would be increased. The reform also challenges teachers' guidance skills in a new way.

WorldSkills is the global hub for skills excellence and development with ongoing activities nationally and globally. WorldSkills works in six focus areas: Research, Promoting Skills, Career Building, Education and Training, International cooperation and, of course, skills competitions (WorldSkills International 2018). Taitaja-competitions are the largest annual VET-development forum in Finland. Participation in Taitaja offers a teacher many opportunities to develop his or her competence. The Finnish Academy for Skills Excellence (FASE) has been gathering experiences from the Taitaja-actors for many years.

The aim of this study is to find out the reasons, which make a teacher year after year to direct students to the Taitaja-competition. The other interesting subject is how the Taitaja-activities affects to the teacher's pedagogical working methods. While involved teacher can find the things that sustain his or her motivation to support professional excellence. These motivational factors become visible in this study.



1. VOCATIONAL SKILLS COMPETITIONS AS A RESEARCH CONTEXT

In Finland the reform of vocational education and training requires the renewal of operational models. With reform, the recognition of the student's skills and the strengthening of the strengths during the studies are further emphasized (Ministry of Education and Culture 2018). Skill Competitions are generally considered as a powerful instrument to develop vocational education and training, including its policies and teachers' competences. Since 1988 Taitaja-Competitions have been one of the options for VET-students to implement an individual learning pathway. Skills Finland has promoted the visibility of vocational training through skills competitions from the year 1993 (Skills Finland 2016). According to several reports and findings, the Taitaja- Competition has become a powerful tool to develop excellence in skills. It has also contributed to the career of many potential experts. However, basic research evidence is scarce available.

Leigh's (2015, 17) research considers the use of skills competitions as an initiative to enhance the quality of vocational education. The proposition of the research is that staff and students who engage in skills competitions may have positive views of their use within vocational education. However, competitions could impose additional demands on staff and students and may challenge their views of the experience of working and or learning within further education. In addition, leaders may need to consider the extent to which students and staff are aware of skills competitions, and how to incorporate the views of those who do not engage in competitions, or having engaged may not have been successful, into quality improvement strategies. The advocacy of the initiative by government to use skills competitions within quality improvement strategies within colleges, whilst appearing to offer a contribution to the range of approaches available, is untested and may have unconsidered organizational implications.

In this article young people, participating in skills competitions will be referred to as top experts. Top experts have success-promoting features that appear in the skills competition context. Korpelainen, Nokelainen and Ruohotie (2009, 33-47) have modeled the features of excellence in their research. The strengths of excellence include time management, socialization, interest in work, desire for competition, development, persistence and stress-tolerance. However, a top expert does not achieve the best performance by its very nature only. He or she needs support and encouragement from networks, cooperation and interaction. For the development and visibility of his or her competence, the top expert needs guidance in right time from the teacher and the workplace instructor. He or she also needs support from his relatives and friends.



The development and maintenance of the teacher's professional and pedagogical skills require continuous updating of their own skills. The teacher passes on the skills and practices required in the field of the profession to the person in the competition training. The aim is to increase the level of performance under the exercise and to support the competitor to rely on their own skills and to think creatively about the task in different situations. (Hakkarainen, Lonka & Lipponen 2004, 134-136.)

The use of competitions in teaching work is a pedagogical and methodological solution, whose goal is not only to promote the excellence student pathway, but also to promote the teacher's own professional growth. The teacher ponders how he or she can contribute to coaching work as part of teaching. At the same time, the teacher recognizes the development challenges of coaching and the work community's work from the point of view of professional competitions. (Isokorpi 2013, 20-21.)

The interest of this study is precisely how vocational skills competitions develop a VET-teacher's competence. The second phase of the study aims to show how Skill Competitions promote the implementation of the reform of the upper secondary vocational education and training.

2. THE PEDAGOGY OF VOCATIONAL TOP EXPERTISE

According to Professor Ruohotie, professional excellence emphasizes strong professional-specific knowledge, ability to apply knowledge in solving practical problems, and metacognitive and high-grade thinking skills. Professional-specific knowledge combines the complexity of knowledge / data structures and the depth of understanding. With increasing change in working life, thinking skills are increasingly emphasized. A peer needs the ability to analyze things critically, use knowledge creatively, anticipate development and its consequences, and react proactively to future challenges. In addition, the excellence needs self-regulation skills and motivational skills such as belief in their abilities and opportunities. It is important that professional studies are organized with pedagogical models that support not only the development of professional specific knowledge and skills but also the development of thinking and self-regulation skills. (Ruohotie 2005.)

In the light of the above-described Ruohotie (2005) and Korpelainen, Nokelainen, Ruohotie (2009) research findings, expert is not only an excellent worker but also a continuous developer of his or her work. This view is also supported by the structural changes made by WorldSkills International to the evaluation criteria for WorldSkills Competitions: the marking scheme of every Skill must be based on WorldSkills standards, which include work organization and time management, communication and interaction skills, innovativeness and creativity.

The pedagogy of vocational top expertise is, on the one hand, the development of



mental qualities (Isokorpi 2013, 27). On the other hand, excellence is only possible when the individual has overall achieved the competences required for a high level of performance. Mulder (2011) describes the development of competence on five levels. The top experts are at Mulder's scale on the level 4. Among the top experts, there are even higher, fifth level experts: the brilliants, the stars of their own field of expertise.

Professional growth for excellence is a highly individualized process requiring timely guidance and support. Professional excellence also includes the visibility of expertise and brand building, which effectively exploits the opportunities offered by digital solutions. However, attention should not be paid solely to the development of a certain level of competence to the highest level, but also the attention to be given to holistic growth and development - mental, physical and social well-being. In this study, the pedagogy of vocational top expertise is understood to identify the individual strengths of a potential excellence and to support professional growth towards the goals of workforce competence and global competitiveness. In order to succeed and develop, both experts and organizations need teams of excellence and collective competence networks. (cf. Eerola 2016.)

3. FRAMEWORK FOR THE VOCATIONAL TEACHER'S EXCELLENCE

Mahlamäki-Kultanen (2016) has designed a framework (table 1) for the professional teachers' excellence for those teachers who are engaged in vocational skills competition. For that framework, she has exploited the results of the research "Vocational education and training - teachers' competences in year 2025" (Mäki et al. 2015) which was done in co-operation with the professional teacher education institutions. Beside that publication, she also exploited another academic thesis done by Paaso (2010) in which Paaso explains her findings with an action model of the recommendations concerning the quality management of vocational education.

During the training process of skills competition experts' the framework has been tested and so far, the preliminary experiences encourage utilizing the framework when recognizing the competences of the experts. In the future, it will be under assessment whether one potential indicator, the digital open badge, is valid when verifying experts' competences.



Table 1. *Reference framework for the vocational teacher's excellence* (Mahlamäki-Kultanen 2016).

Competence area of an actor in European/international vocational skills competitions and the target of evaluation	Criterion for the level of "excellent" The individual
Pedagogical competence	is able to plan, implement, evaluate and develop personalised coaching processes for a young person participating in European/international competitions at the top level of his/her vocational skills is able to support a competitor and a team of competitors during their preparation for and participation in a competition through methods of interaction and mental training
Building a teacher's identity	has the ability to communicate, as part of his/her teaching work, in his/her work organization, regionally and internationally, about vocational skills competitions and prepare for them in a way that will strengthen the positive image of Finnish teachers and Finnish teacher identities is able to motivate and activate new teachers and representatives from the world of work in European/international vocational skills competitions
Management and leadership of teaching and competence	knows how to build learning environments (physical, virtual, social, psychological) for the coaching process, optimizing the expenses and benefits of the process with regard to learning and success



	in European/international vocational skills competitions is able to work as part of a competing team at the European/international level
Facilitating personalised solutions	is able to utilize nonformal, informal and formal learning possibilities in the coaching process cost-effectively in a manner that best supports an individual's needs and skills has the ability to promote his or her personal learning in European/international competition activities in a goal-oriented and documented manner
Workplace competence	is able to recognize, innovate and implement solutions for competition activities and the related coaching that will create a competitive edge for companies and educational institutions
Multicultural competence	is able to take part in European/international vocational skills competition activities, identifying vocational skills concepts and the importance of cultural differences with regard to them is able to take part in European/international vocational skills competitions using the English language, and has a command of the English terminology used in competition activities has sufficient command of the basics of the language spoken in the country organizing the competition so as to



	be able to communicate on matters related to the competition
Building learning communities	has the ability to use competition activities to build a learning community that will support Finnish competitors and that is based on improved competition rules and operating models
Optimisation of learning resources	is able to identify and create alternative forms of funding for coaching activities, justify the need of funding to different actors and implement coaching activities so that they meet the profit expectations of financiers is able to plan, implement, evaluate and develop coaching so that it is linked as effectively as possible to the education provider's other processes (student recruitment, guidance, vocational skills demonstrations) and to the entire student group's studies has the ability to share his/her own competence with other competition actors and to learn from others while at the same time renewing and developing activities
Substance-related competence	is able to compile and analyse information in connection with competition activities (online content and services produced by EuroSkills and World Skills, competition-related activities and presentations) on the European/international development of his/her vocational field to support his/her own teaching and vocational development



Other objectives of an international organization	

4. RESEARCH QUESTIONS AND TARGET GROUP

The aim of this study is to find out the reasons, which make the vocational education and training-teacher year after year to direct students to the Taitaja-Competition. The other interesting subject is how the Taitaja-activities affects the teacher's pedagogical working methods. The target group is the VET-teachers who have directed their students to the national semifinal- or final skills competitions more than six times.

4.1. Research questions

1. What impact does vocational skills competition have on the vocational teacher's work?
2. What motivates a professional teacher to get students to participate in skills competitions?

4.2. Research material

The research material is based on the web-based questionnaire made by the Finnish Academy for Skills Excellence (FASE) for the teacher-coachers of the Taitaja2016-semifinals and the Taitaja2016- finals teacher coaches. In addition, the volunteer teacher coaches who have been involved in the skill competition more than six times agreed to the interview.

4.3. Research Method

Based on previous studies and the theoretical framework, a common understanding of how vocational skills competition is able to develop vocational education and teachers` pedagogical skills has been created among researchers. As a research method, it has been used questionnaire and interviewing.

The study has proceeded as follows:

There were two web-based questionnaires. The first questionnaire (early spring 2016) for semifinal coaches (mainly vocational teachers) was categorized in two classes as follows: a) expert-grade classes b) classes that emerged from the material.



The second questionnaire for the Taitaja2016 finals (May 2016) teacher coaches and team leaders. In this questionnaire, the question of research was included. The results of the survey were classified on the same basis as the semifinal questionnaire. At this questionnaire respondents were asked about the willingness to participate in the interview study.

From this voluntary group eight persons were randomly selected to be interviewed. They are professional teachers from different vocational fields and across Finland. The interviews conducted as semi-structured online sessions in October-November 2016. Interviews recorded for later review. The materials will be analyzed using triangulation in spring 2018. The final results will be published at the end of 2018.

4.4. Reliability of the study

Efforts have been made to improve the validity of the research by utilizing as many aspects as possible (triangulation) to the research topic:

- a) The researcher triangulation: more than one researcher has participated in the same research in its various phases,
- b) The theoretical triangulation: the phenomenon under investigation has been studied from the angle of different theories,
- c) The research material triangulation: more than one material has been used to solve the same problem and
- d) The methodological triangulation: several research methods are used for the processing of material.

5. PRELIMINARY RESULTS

Here is one example chosen of the questionnaire done to the teacher coaches explaining the aim of this research Figure 1 clearly shows that skills competition brings new actors involved, but also that it encourages them to stay in the activity several years. The graph below shows the time of the participation of teacher coaches.

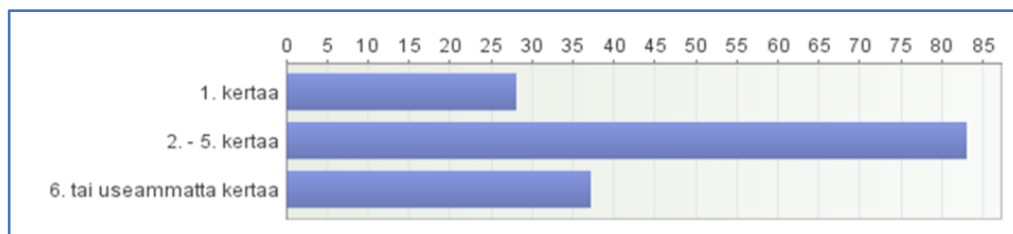


Figure1. A question for teachers: *How many times you have participated as a coach in Taitaja-Competition?* On the top: the first time participants, 27 respondents. In the middle: those who have participated 2-5 times, 84 respondents. The bottom line 6 or more times participated, 37 respondents. Taitaja2016 finals. Finnish Academy for Skills Excellence.

Another research question included in the questionnaire: If you have participated 6 times or more to Taitaja, what motivates you again to be involved in the skill competition? Here is a quotation replies from the answers. It can be seen, how the answers give an indication of what issues are raised from the teacher's point of view. These include e.g. pedagogical development, self-assessment, interaction and networking in the field with the other teachers as well as with the world of work, deepening of expertise, for example by updating technological knowledge. One coach writes: *"I'm a group leader for last year students. I think it belongs to my job. In addition, I believe that students' success in skill competition brings publicity and visibility to the educational institution, which, in turn, may affect the choice of professions for future students."* Another coach sums up: *"Rotating in your own corner does not always open up new perspectives, and does not bring new thoughts or how to develop oneself or develop teaching, and not forgetting the local point of view."* One coach sees the value of developing own working methods like following: *"You see your own work well. While preparing, it also gets something back, so I learn something new."* Interaction and soft skills during coaching are also mentioned: *"When coaching it's always a dialogue between the competitor and the coach. I have learned to professionally every time when I have to guide a competitor."*

Preliminary findings based on the questionnaire can be presented according to the following outcomes:

Short-term benefits (immediately applicable)

- Applying new working methods,
- Positive progress of student's studies,
- Cooperation with other teachers and VET-institutions,
- Benefits of networking,
- Possibility to diversify work,
- Emotional intelligence strengthens.



Long-term benefits (to be exploited longer time)

- Teachers' professional growth,
- Developing pedagogical methods and content of teaching,
- New ideas- widening point of view of VET,
- International aspect to be added in teaching,
- Enjoying students enthusiasm,
- Enjoying young competitors success,
- Student get/earn study credits, possibility to implement individual learning pathway,
- Close cooperation with the world of work,
- Positive attraction (in certain studies) to the VET-institutions.

6. CONCLUSION

In the future, all answers will be categorized according to found the sub-themes. Responses that are already classified can be found in similarities such as excellence in skills, resources, utilization of competitions test projects and assessment, support for students' studies. The study of these themes will be continued and compared to the material collected through the interview. The benefit of this research is precisely its strong linkage to supporting the teacher's skills competition activities. Excellent reference is the frame of reference for a vocational teacher's top expertise by Mahlamäki-Kultanen (2016).

Monitoring your own skill and trade development creates knowledge and expertise that you can spread and root in your own work team. Little by little, the benefits also spread to the level of education and working life collaboration. Through the skills competitions, the teacher has been a forerunner of the competence-based education. Identifying and acknowledging students' competences through the Taitaja-Competitions is clearly increasing. This not only applies to competitors, but a large number of other students participating in the competition preparation and implementation event. The vocational teacher's excellence framework includes a teacher who follows the changes in society and educational field. Without solid co-operation with the world of work, there are no opportunities to meet the competences required in the future. It is not enough to follow the change in world of work but you must be proactive. Professional skills competitions are one possibility to extend resilience and actively be involved in the change - and even accelerate it. While involved, one can influence and find the things that sustain the teacher's own motivation to support professional excellence. These motivational factors are visible in this study.



REFERENCES

- Eerola, T. 2016. *Our understanding of the pedagogy of vocational top expertise*. In Eerola, T. (ed.) *The Pedagogy of Vocational Top Expertise*. Häme University of Applied Sciences.
- Hakkarainen, K., Lonka, K., Lipponen, L. 2004. *Tutkiva oppiminen. Järki, tunteet ja kulttuuri oppimisen sytyttäjinä*. WS Bookwell Oy. Porvoo.
- Isokorpi T. *Huippuosaamisen pedagogiikka*. HAMK AOKK:n publications 5/2013
- Korpelainen K., Nokelainen P., Ruohotie P. *Ammatillisen huippuosaamisen mallintaminen. huippuosaajaksi kasvaminen ja kasvun edellytykset: laadullisen aineiston yhteenveto*. Ammattikasvatuksen aikakauskirja 11 (1), 33–47. OKKA-säätiö 2009
- Leigh, N.W. 2015. *Skills competitions: a winning formula for enhancing the quality of vocational education?* Ed. D. thesis, University of Birmingham.
- Mahlamäki-Kultanen, S. 2016. *Top expertise of a vocational teacher*. In Eerola, T. (ed.) *The Pedagogy of Vocational Top Expertise*. Häme University of Applied Sciences. A pioneering publication.
- Ministry of Education and Culture. 2018. *Reform of vocational upper secondary education*. [Referenced 24.1.2018] Available: <http://minedu.fi/en/reform-of-vocational-upper-secondary-education>
- Mulder, M. 2011. *The Concept of Competence: Blessing or Curse?* Article in Tornainen, I., Mahlamäki-Kultanen, S., Nokelainen, P. & Ilsley, P. (eds.) *Innovations for Competence Management. Conference Proceedings. Series C Articles, reports and other current publications, part 84*. Lahden ammattikorkeakoulu. 11 – 24.
- Mäki, K., Vanhanen-Nuutinen, L., Guttorm, T., Mäntylä, R., Stenlund, A., Weissmann, K. 2015. *Opettajankouluttajan osaaminen Ammatillisen opettajankouluttajan työn tulevaisuus 2015*. HAAGA-HELIA, HAMK, JAMK, OAMK ja TAMK Ammatilliset opettajakorkeakoulut.
- Paaso, A. 2010. *Osaava ammatillinen opettaja 2020. Tutkimus ammatillisen opettajan tulevaisuuden työnkuvasta*. Akateeminen väitöskirja. Lapin yliopisto. Kasvatustieteiden tiedekunta.



Questionnaires for the competition coaches in Taitaja2016 finals. Finnish Academy for Skills Excellence. Häme University of Applied Sciences.

Questionnaires for the competition coaches in Taitaja2016 semifinals. Finnish Academy for Skills Excellence. Häme University of Applied Sciences.

Ruohotie, P. (2005). *Metakognitiiviset taidot ja käsitteellinen oppiminen.* Ammattikasvatuksen aikakauskirja, 7(1), 4 – 11.

Skills Finland. 2018. *Skills Finland's website.* [Referenced 24.1.2018] Available: <http://www.skillsfinland.fi/eng/about-us> Eerola, T. (ed.) 2016. Towards Vocational Top Expertise. HAMK AOKK's publications 2/2013.

Taitaja kilpailun säännöt. 2017. [Referenced 24.1.2018] Available: http://skillsfinland.fi/application/files/1215/0814/0682/Taitaja-kilpailun_saannot_01052017_final.pdf

WorldSkills International. 2018. *What is WorldSkills?* [Referenced 24.1.2018] Available: <https://www.worldskills.org/about/worldskills/>



**THE USE OF AN INNOVATIVE METHODOLOGY IN
THE TEACHING-LEARNING PROCESS, IN THE
ASSESSMENT AND IN THE RELATION TEACHER-
STUDENT VS. STUDENT-TEACHER BASED ON THE
SIMULATOR OF BUSINESS ENVIRONMENT
TECHNOLOGY**

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ABSTRACT

The existent concern in suppress all the identified gaps in the traditional teaching of Accounting and Administration has led to the creation of a new way to be in Higher Education. This new way to be, denominated by Business Environment resulted in the implementation of two curricular units designated by Project of Business Simulation.

The present article has as purpose study not only the potentialities, but also the constraints of the innovative methodology of the teaching-learning process and the assessment used. We intent, to analyse in what measure the Simulator of the Business Environment beneficiates the school success, in result of an improvement in the teaching-learning process and, consequently, in the development of the students' competences.

The results of the study raised issues related to the teaching-learning methodologies traditionally used and the methodology of the Simulator, as well with the assessment methodology and how it develops in students a different attitude regarding the teaching and learning process. The centrality at the student as the focus of this rating



system allows self-regulation of learning through feedback. Individual and group work are presented as key factors in the development of generic skills and behavioural in addition to technical inherent to the profession.

DESCRIPTION OF THE PRACTICE-BASED CASE OR PROJECT. THE RATIONALE BEHIND THE CASE, THE INVOLVED PARTS, THE IMPLEMENTATION OF THE PROJECT AND THE MAIN CONCLUSIONS OF THE PROJECT

The Superior Schools of the country are still far from a reality that is imposed to them from some time now, the financial crisis and the budget allocation prevails. The gigantic structures created in the last fifteen years were not thought with the simultaneous need of self-finance.

The “managers” of these schools are still in a dormancy that does not allow them to see what the future (already passed) holds them: the sustainability through the creation of new services, of networking between the various schools (of the different areas of knowledge), the sharing with the surrounding community and the constant improvement of the Quality of Teaching.

The Model of Simulator of Business Environment

The description of the innovator Model of Simulator of Business Environment (SBE) that supports learning is oriented to the study of the competences that the students of the Superior Course of Accounting and Administration should have arrived at the end of their training process, using an effective process of assessment.

Although we accept that in certain curricular units it may be useful the resource to the strategy of games/simulation of companies, we defend, notwithstanding, that the complete training of competences in the Superior Course of Accounting and Administration requires an availability of a Simulator of the Business Environment that assures to the student a multifaceted participation, as an intervener agent in the process of conception, development and maintenance of the business reality.

This Model of Simulator of technological basis must propitiate a space of learning, based on the simulation of the organizational environment typical of an entity provided with an advanced management profile which involves the student in the application of the knowledge that throughout the course is emerging in a multi and inter-disciplinary form.



The particularity of the skills training process that the curricular units Project Business Simulation I and II are oriented, shape the teaching methodology and the evaluation system itself, which is built on a dynamic basis primarily interested in the progressive effects of the expected change in students, the learning of complex behaviours, but it is also concerned with the verification of the skills acquired having in consideration their final academic certification.

This practice of education and training has the fundamental purpose of linking theory to practice. Therefore, it requires turning the experience of training into professional experience, in which the passive and receiver role of the student gives them time to be an active part of the process.

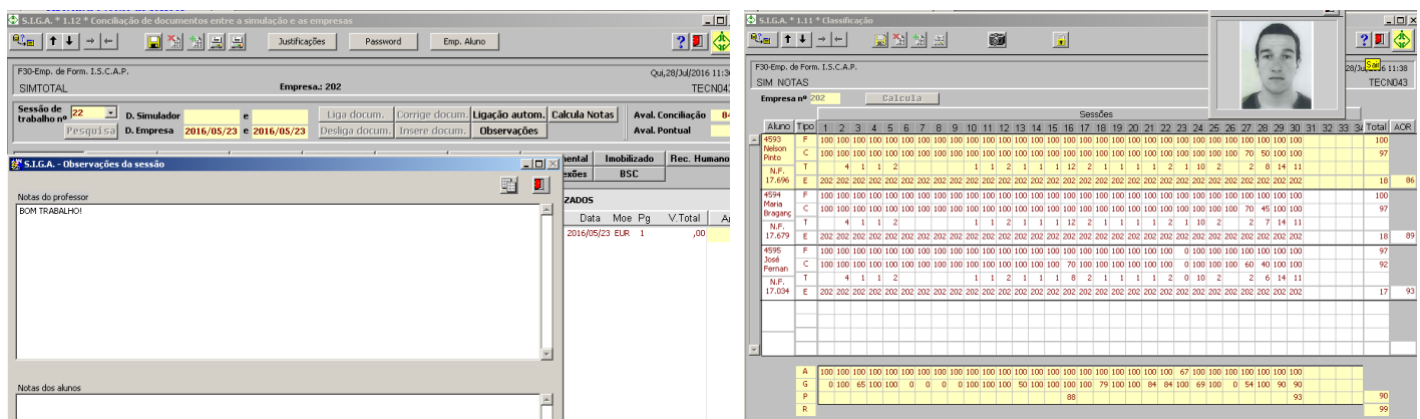
The assessment model

Evaluation, assessment, is interpreted as a process of systematic collection of information (data) to measure the progress of students (for these and the teachers in the two dimensions of self and hetero evaluation) and the decision of the adjustments resulting training considered necessary.

The assessment is continuous, this means that every class is evaluated. The teacher has to see, analyse and correct all the tasks the groups make in every class. As there are two classes in a week, the teacher has to evaluate the first class, so that, in the second class of the week, the students have the feedback (in the system) in “real time”, and so on. This enables the student to analyse and understand the mistakes, and also to correct them. The teaching-learning process does not allow the student to continue his learning without understanding any previous subject.

This feedback is registered in the system (Simulator). So that when the student opens his work session he has access to it. The classification is also registered in the informatics system. This process allows the student to follow his teaching-learning progress.

Figure 1 – Assessment of a session with observations of the teacher/ students





The teachers themselves, responsible for monitoring the curricular units, do so, on a different approach, dealing directly with the real tools of the new technologies available in the field of communication and information, being their function of guidance permanently ensured.

In each of the distinct and gradual steps of the training path, demarcated management, it is important to verify and qualify the degree of progression of the trajectory of accumulation of powers, giving the student the possibility to judge its own evolution, in terms of training, attentive the mandatory rating for administrative purposes, it cannot fail to make a judgment for assessing the satisfaction level of skills acquired by each student.

In summary, the assessment of the degree of competences acquired over the frequency of the curricular units of Project Business Simulation I and II, follows an evaluation system by the feedback permanently given to the student by the teacher and by the obligation of execution, by the student, of the planned tasks in person and monitored by the teacher, in all the working sessions.

Systemic approach

On this Model, the major pedagogical change of the teaching-learning process of accounting and administration lies in creating the same pivot environment, available along all courses, personalized for each student, supported on real technological tools and in the coordinated implementation of all the theoretical knowledge acquired progressively, to form comprehensive professional competences.

In summary, this Model to be adopted, not only in the curricular units at the end of the course, particularly those of Business Simulation, but essentially in all the others that, framed in business sciences, need a pivot environment that ensures the extent of knowing to the action in a common context, duly completed and evaluated.

MAIN GOALS, PROBLEMS AND QUESTIONS THAT GAVE RISE TO THE PROJECT IN THE BEGINNING

The definition of the Course Curriculum and the technical, didactic and pedagogic quality of the teacher are some of the fundamental aspects to consider in the structuring of any Course, average or superior, adjusted to the times we live in.

We consider fundamental a revolution on the actual programmatic contents and the methodologies of teaching and learning existent which condition the development of a Higher Education able to internationalize, thus dignifying students in their professional performance, both in our country or in the world.



For this desideratum was conceived the curricular units of Project of Business Simulation I and II at the Superior Institute of Administration and Accounting of Porto (ISCAP), a Model of Simulator of the Business Environment, which intends to be the “terminal environment pivot”, which gives the students the application of the knowledge gained separately in other curricular units, in the perspective of a systemic integration and with a critical and reflexive approach.

FACTORS THAT MADE THE PROCESS AND THE IMPLEMENTATION OF THE PROJECT SUCCESSFUL

In the modelling and conception of this teaching-learning process some factors were considered essential. Factors such as the integration of technologies of information and communication (TIC) in their dual role of mentoring and facilitator. The priority given to the dematerialization and interaction (of the students) networked in the global market, with a strong reaction dynamics. The execution at the classroom with the teacher, subject to a real calendar, with the possibility of local and remote exploitation (via Internet). The use of the electronic portfolio in the construction of the student’s curriculum. The learning supported by an organizational environment of high systemic complexity, based on a global network by processes. The availability of professional tools and the forms commonly used in the reality of the business world. The subjects as a comprehensive system. The multidimensional treatment of the information oriented to the support of decision making, to the resolution and answer of the “contents/themes/problems/...” placed to the student.

The particularity of this training process

The particularity of this training process, focused on teaching and learning in group and in the development of competencies, shapes the methodology of teaching, learning and assessment. It should be noted that the respective system of learning assessment is built on a computerized database for continuous collection and systematic weighting of a series of indicators.

Individual and group work are the main factors in the development of the generic competences (relational) and behavioural.

The first phase of implementation of this methodology began with the realization of the pilot project which presided over the creation of the curricular units of Business Simulation Project, held at the end of the degree in Accounting and Administration in the Superior Institute of Accounting and Administration of Porto.

Of the various evaluations made in the meantime and which have always pointed out the success of the proposed solution we highlight two investigations carried out within the scope of the competences and the assessment model used. These studies



concluded by the adequacy of the model to the teaching and learning of the same ones, showing, however, the inherent deficiencies to the fact that such pilot project is restricted to only two curricular units at the end of the respective course, thus raising the need to improve the organization of this one to enhance the potentialities of this innovative methodology.

Based on the results of these studies it has been developed another work, which has as purpose to present a proposal so that a new course can welcome this new methodology.

A new superior course of Accounting inspired in this new didactic methodology, which combines the use of a Business Environment Simulator Model - allowing the application of knowledge taught in the various courses of business sciences in a perspective of a coordinated development of knowledge throughout the same - with experience by internship in real environment.

The new solution now proposed contemplates the combination of the Model of Simulation of the Business Environment through all the course, with an internship in real environment at the final of its fifth semester, with the following work hours:

School Semester	Weekly course hours	Business Environment	
		Weekly hours	Type
6	22,5	108	PSE
5	22,5	54	EAE
		54	LAE
4	25,5	162	LAE
3	25,5	162	LAE
2	25,5	162	LAE
1	25,5	162	LAE

Figure 1 – The Business Simulation as Environment in the Superior Course of Accounting and Administration.

Subtitle: PSE – Project of Business Simulation; EAE – Teaching in Business Environment; LAE – Laboratory in Business Environment.

In which the work in LAE will be distributed by three weekly sessions of three hours each, on alternate days. This new course proposal contemplates the combination of the two technological simulators of Business Environment, with the following characteristics:

Description	PSE	LAE
Purpose	Learning instrument to be made available at the PSE at the end of the course	Learning instrument to be made available in the various CUs of the business sciences, along the course



Context	Electronic database and multimedia room	Electronic database
Organizing Principle	Systemic integration	Segmentation
Represented object	Global market in electronic and physical format	Company / organization in electronic format
Logical organization of phenomena	By process	By event
Documentary format	Electronic and physical	Electronic
Type of interaction	Intra and inter companies	Does not exist
Responsibility for organization and planning	Teacher of the PSC CU	Course Direction
Student organization	In group	Individual
Evaluation model	Continuous	Continuous

Figure 2 - Main characteristics of Business Environment simulators.

Subtitle: PSE – Project of Business Simulation; UC – Curricular Unit.

FACTORS THAT MADE THE PROCESS AND THE IMPLEMENTATION OF THE PROJECT CHALLENGING

The teacher has a role of permanent support to the student, as it is a "relationship of peers", and must, using new pedagogies and information and communication technologies suitable to the program content, instil in the student job autonomy and decision making, among other aspects. Thus, the curricular structure, should be reconsidered and must rely on the basic formation of competences, and must "conceive education "always" adopting interdisciplinary and multidisciplinary and a systemic basis.

As methods and pedagogies pointed so that change happens, emphasize active learning methods; the group work; the "learn by doing"; and the motivation of the student by placing him in the centre of this whole process. Thus, the assessment should be formative and not merely forming, having the need to assess the School and the teachers, "rewarding the most efficient".

The real challenge was: changes on the workplace and the necessary change of the "individual thinking".



THE MAIN CONCLUSIONS OF THE PROJECT THAT CAN HELP IMPROVE EDUCATIONAL PRACTICE AND LEARNING IN THESE CURRICULAR UNITS

The main conclusions of the project are as follows:

1º - The challenge of the higher education resides on the formation of the individual as a human being complete.

2º - The focus on the student instead of the focus on the teacher gives a different perspective of how to see the process of teaching/learning.

3º - The student has a real and active role at the classroom and on the growth of its own knowledge.

4º - The Model simulates a set of situations that the students must solve.

5º - The simulated market is fed by the students. The feedback given by the teacher of the work done by them is very important so the students must learn “based on the error”.

6º - The attendance and the punctuality are also evaluated to create responsibility towards the colleagues that work in the group and of course they must know how it works on real live.

REFERENCES

Abrecht, R. (1994). *Avaliação Formativa*. Porto: Edições ASA.

Alarcão, I., & Gil, V. (2004). *Teaching and Learning in Higher Education in Portugal: Overview of studies in ICHED*. Aveiro: Universidade de Aveiro.

Albrecht, S. W., & Sack, R. J. (2000). *Accounting Education: Charting the Course through a Perilous Future* (Vol. nº. 16). E.U.A.

Allal, L. (1986). *Estratégias de avaliação formativa: concepções, psicopedagogias e modalidades de aplicação*. Coimbra: Editora Almedina.

Alves, M. P., & Machado, E. (Novembro de 2002). Dar Sentido(s) à formação de professores: o contributo da avaliação formadora. Lisboa.

Azevedo, L. (2012). *Avaliação das aprendizagens no Ensino Superior: estudo de um sistema de avaliação nas Unidades Curriculares de Projeto de Simulação Empresarial*. Aveiro.

Board, I. (2009). *Exposure Draft Proposal Framework for International Education Standards for Professional Accountants*. International Accounting Education Standards.

Bossel, H. (1992). *Modellbildung und Simulation: Konzepte, Verfahren und Modelle zum Ver dynamischer Systeme*. Braunschweig/Weisbaden.



- Burnier, S. (Set/Dez de 2001). Pedagogia das competências: conteúdos e métodos. *Volume 27, n.º. 3*, pp. 48-60.
- Cardinet, J. (1993). *Avaliar é medir?* Lisboa: Edições ASA.
- Chen, B. (1990). *Experimentelle Optimum-Suchstrategien auf der Basis der Computersimulation zur Unterstützung betriebswirtschaftlicher Entscheidungsfindung*. Frankfurt: Frankfurt A.M.
- Costa, N., Martins, I., & Candeias, I. (2010). *A avaliação e regulação de desempenho profissional* (Vol. Coleção Situações de Formação). Aveiro: Universidade de Aveiro.
- Delors, J. (2001). *Educação: um tesouro a descobrir. Relatório para a UNESCO da Comissão Internacional sobre a Educação para o Século XXI*. São Paulo: Cortez Editora.
- Guillén, D. G. (2011). *La cuestión del valor*. Madrid: Real Academia de Ciencias Morales y Políticas.
- Hönerloch, A. (1997). *Unscharfe Simulation in der Betriebswirtschaft: Modellbildung und Simulation auf der Basis der Fuzzy Set-Theorie*. Göttingen.
- Kirby, A. (1995). *150 Jodos de Treinamento*. São Paulo: T&D Editora.
- Le Boterf, G. (1997). *De la compétence à la navigation professionnelle*. Paris: Les Éditions d'Organization.
- Luckesi, C. (2003). *Avaliação da aprendizagem na escola. Reelaborando conceitos e criando a prática*. Salvador: Malabares Comunicação e Eventos.
- Morin, E. (2002). *Os Sete Saberes necessários à Educação do Futuro* (2ª Edição ed.). São Paulo: Cortez Editora.
- Novaes, A. (2007). *Ética*. S. Paulo: Companhia das Letras.
- Oliveira, L. (2003). *Projecto de Modernização do Ensino Superior da Contabilidade e da Gestão - PECRESC*.
- Ospina, W. (1994). *Es tarde para em hombre*. Barcelona: Belacqua.
- Perrenoud, P. (1993). *Não Mexam na Minha Avaliação! Para uma abordagem sistémica da Meduança Pedagógica*. Porto: Porto Editora.
- Perrenoud, P. (1999). *Avaliação. Da Excelência à Regulação das Aprendizagens. Entre duas Lógicas*. Porto Alegre: Artmed Editora.
- Perrenoud, P. (1999). *Construir as Competências desde a Escola*. Porto Alegre: Artmed Editora.



- Rancière, J. (2005). *O Mestre Ignorante - Cinco Lições sobre a Imancipação Intelectual*. (J. Larrosa, & W. Kohan, Edits.) Belo Horizonte, Brasil: Antêntica Editora.
- Renault, M., & Marcelo, G. (2012). *Ética, crise e sociedade*. Lisboa: Humus.
- Rey, B. (2002). *As Competências Transversais em questão*. Porto Alegre: Artmed Editora.
- Roldão, M. C. (2003). *Gestão do Currículo e Avaliação de Competências - As questões dos professores*. Lisboa: Editorial Presença.
- Sant'Anna, I. M. (1995). *Por que Avaliar? Como Avaliar? Critérios e Instrumentos* (9ª ed.). Petrópolis: Editora Vozes.
- Santos, F. S., & Filho, N. d. (2012). *A quarta dimensão da Universidade: internacionalização universitária na sociedade do conhecimento*. Coimbra: Coedição Imprensa da Universidade de Coimbra e Editoria UnB - Universidade de Brasília.
- Soares, S. (2011). *O Ambiente Empresarial de base Tecnológica na Formação de Competências*. Aveiro.
- Tavares, J., & Alarcão, I. (2005). *Psicologia do desenvolvimento e da aprendizagem*. Porto: Almedina Editora.



ANALYZING A DEMAND-BASED ADULT EDUCATION APPROACH TO INSTRUCTIONAL DEVELOPMENT

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ABSTRACT

The Swiss Science Education project tried to intensify constructivist teaching approaches in experienced Swiss science teachers. In a bottom-up setting teachers were asked for their individual demands and were supported accordingly over a period of three years. The research question asked for the “when” and “how” of generalized individual development occurs. In a controlled longitudinal research study the variables constructivist instruction, meta-cognition, self-efficacy, and the intention to implement inquiry-based learning were evaluated regularly in a pre0-post1-post2-post3 design. Results show that supported teachers develop in the first year and can keep the level.

Gradually, the innovation also diffused in the staff. With these results we recommend a bottom-up top-down participative perspective on school and instructional development. Yet still, innovation needs time to be effective, but could be sped up in this approach. As project teachers kept the higher level after the first year and their colleague teachers caught up to them, we expect a sustainable implementation of innovation in an environment of exchange and collaboration.

INTRODUCTION

Very often a knowledge-action gap appears, if one tries to sustainably implement knowledge from educational research into a praxis environment. Usually, follow-up studies show a return to old habits instead of amended action. This transfer problem of particular interest when the aim is instructional change. Experienced teachers' instruction can be seen as routinised knowledge application in action, because they are experts that do not have to think about each and every step in order to solve instructional problems or follow their pedagogical aims.



Routinised knowledge is hard to change. It can be defined as a series of dependently structured actions which, over time, are memorised as automated action and are stable until the routine cannot be applied anymore (Helmke, 2007). Usually, one would trigger cognitive conflicts and intend change processes. Another possibility to support change is meta-cognitive reflection (Jank & Meyer, 2005; Klinzing, 1998). This approach may be more appropriate in in-service teacher development, because these teachers have a solid basis of experience, can apply change in praxis immediately, and, what is more, can work on their individual practical problems, not on theoretical problems.

In this article we want to present a demand-based adult education approach to instructional development. Our assumption is rooted in the idea that instructional development is a situational and contextual process that needs careful and adaptive support and relies on the teachers' willingness to change (Holtappels, 2013).

THEORETICAL BACKGROUND

Cognitive and constructionist aspects of learning

Cognitive theories indicate that clear-cut and worked examples optimize learning (Sweller, 1994). After rehearsal complex tasks can be proceduralised and more cognitive capacity can be allocated to other aspects during learning processes (Anderson, 1993, 2002). Upon proceduralisation, cognitive flexibility theory (Spiro, Collins, Thota, & Feltovich, 2003) may apply. The theory states that during complex task solving and in ill-structured problems knowledge is being re-structured and re-arranged in order to adapt to the situation. In this case, schemata are not triggered, but rather adapted.

This is in line with Piaget's accommodation theory and also with Deci and Ryan (1990), who argue that reproductive learning may be effective, but constructivist learning allows the formation of flexibly useable knowledge. With this, learning is individual and motivational, and the instruction as well as the material used need to address essential demands of learners. This view is often applied in cognitive-oriented and knowledge-accumulation training situations, e. g. micro-teaching (Allen & Ryan, 1969). In micro-teaching, isolated instructional situations are exercised and routinized.

In constructivist approaches, especially in teacher further education, careful and autodidactic methods seem to be as effective as trainings (Bauer, Kopka, & Brindt, 1996). Yet, the constructivist way allows more flexibility and coherence with individual situations and contexts. The flexibility and individuality of constructivist change processes may therefore need more time to become effective (Harrison,



Hofstein, Eylon, & Simon, 2008; Loucks-Horsley, Hewson, Love, & Stiles, 1998). Harrison et al. (2008) summarise teacher development programmes and synthesise four essential dimensions of successful change:

- Consider teachers in the programme
- Give teachers a chance to apply innovation
- Show teachers the added value of innovating together with pupils
- Counsel teacher how innovation and curriculum can be combined

If one accepts individuality in learning and tolerates a heterogeneity in classrooms, one can transfer this to andragogy, adult learning or teacher professional development. Belanger (2011) points to the fact that cognitivism and constructivism do share many aspects. This view integrates a purely cognitivist view on learning compared to a purely action-driven type of *instruction*. Thus, learning is always cognitive, but needs social constructivist tracers that allow for individual and shared development.

Adult education perspectives

This rationale above is applicable to adult education theory, which defines development as a function of knowledge/ experience and cognitive evaluation (Gruber & Harteis, 2008; Knowles, 1979). Knowles (1989, p. 83f.) depicts six aspects that deserve consideration if one wants adults to get involved in learning processes:

1. «Adults need to know why they need to learn something before undertaking to learn it.»
2. «Adults have a self-concept of being responsible for their own lives ... they develop a deep psychological need to be seen and treated by others as being capable of self-direction.»
3. «Adults come into an educational activity with both a greater volume and a different quality of experience from youths.»
4. «Adults become ready to learn those things they need to know or ... to cope effectively with their real-life situations.»
5. «In contrast to children's and youth's subject-centered orientation to learning (at least in school), adults are life centered (or task centered or problem centered) in their orientation to learning.»
6. «While adults are responsive to some extrinsic motivations (better jobs, promotions, salary increases, and the like), the more potent are intrinsic motivators (the desire for increased self-esteem, quality of life, responsibility, job satisfaction, and the like»

In sum, the list tells one that adults need to see a practical value and immediate relevance for a problem (see also Desjardins, Rubenson, & Milana, 2006). Huber



(2011) points out that «Adults expect that the knowledge and understanding gained is a tool that can be applied in the specific and extremely complex work situation» (p. 839).

In the context of adult teachers this means that teacher further education needs to consider issues that are relevant and utilisable for teachers. In other words, the gist is that teachers may learn, but they can hardly be taught (Wittpoth, 2003). According to Roberts (2010) further education can achieve this by integrating cooperative and critical thinking on praxis to become relevant. Therefore, the school context (e. g. colleagues, pupils, principals, resources etc.) play a vital role in the conceptualization of effective further development:

«Providing the opportunity to set up an interactive cycle of planning, trialling and reflecting, where the essential features of scrutiny and guidance were effected in the trusting environment of 'like-minded' colleagues enabled teachers to overcome their own institutional hurdles to change.» (Harrison et al., 2008, p. 589)

So called top-down bottom-up initiatives that ask teachers to re-think their instruction and formulate demands is seen as a valuable path.

Top-down bottom-up teacher development

Top-down bottom-up implementation strategies comprise a network of exogenous and endogenous factors. Exogenous top-down factors are political or research objectives such as curricula or interventions. Endogenous bottom-up factors may be defined by an individual's demands or objectives. The combination of both is called top-down bottom-up or symbiotic (Hasselhorn, Köller, Maaz, & Zimmer, 2014). Its main feature is a cross-hierarchical negotiation and report processes. As the essential part is the participation of the person who is the receiver of change, the way of involvement and support of self-regulated progress become noteworthy features in a symbiotic design.

From an andragogic perspective the participation and the support of self-regulation processes assists in the formulation and pursuit of personal, demand-based goals as well as the meta-cognitive evaluation, coordination and organization. Gruber and Harteis (2008) state that demand- and praxis-orientation are key aspects in the design of adult further education settings. In combination with well-defined normative objectives a symbiotic top-down bottom-up approach derives, which integrates needs, demands, objectives on both, a praxis and a strategic level.

With reference to the ideas on learning, adult education and implementation strategies, we supported the realization of individual objectives in a project. It is



widely known that this approach enhances the self-efficacy to initiate change or transfer (Knowles, 1975; Roberts, 2010) and should be evaluated in longitudinal research designs (Harrison et al., 2008; Pressley & Harris, 1994).

The Swiss Science Education rationale

Based on these assumptions, the Swiss Science Education project tried to encourage science teachers to re-evaluate their instruction and assisted them in the implementation of constructivist, inquiry-based teaching, e.g. with further education seminars, for three years. Pairs of science teachers in 61 schools were provided with individually tailored coaching and get support in their development. Teachers are supported to reflect the scientific and technical education and develop a competency-based education, to exchange the experience with other schools and build networks. Further details about the project can be found in Koch, Felchlin, & Labudde, 2016; in Koch & Labudde, 2014; or in Stübi et al., 2014; see also www.swise.ch.

RESEARCH QUESTIONS

The research questions we address in this study refer to the development of instruction-related variables. Instruction-related variables are defined as attitudes or beliefs that facilitate or impede concrete action (Blömeke et al., 2009; Fishbein & Ajzen, 2010).

With reference to Schellenbach-Zell (2009) meta-cognition is of particular interest in longitudinal studies, because teachers need time to monitor and evaluate their instruction, and to re-plan it. In longitudinal arrangements motivational variables are also relevant, as they support persistence in instructional change (Bulger et al., 2008; Kanfer & Ackerman, 1989).

The study draws on three research questions:

1. How do instruction-related variables (constructs) develop over three years?
2. What is the function of development (linear vs. quadratic vs. other)?
3. What are circumstances that improve the development of instruction-related variables?

METHOD

Design, methods and instruments

Between 2012 and 2015, 169 teachers in 78 Swiss compulsory schools (42% primary+kindergarten, 58% lower-secondary; 61 project schools, 17 control schools) filled in questionnaires on a regular basis, i.e. in the beginning of the school-



year 2012/13, the end of the school-year 2012/13, end of 2013/14, and end of 2014/15.

The average school experience was 15.6 years, 44% were female.

125 teachers were project teachers, 24 were project teachers' colleagues, and 20 teachers were in a non-involved control group. The amount of further education did not vary between the groups, thus the project participation was an add-on in project teachers and can be seen as an intervention.

Below, Table 2 gives an overview of the variables used for this contribution and their Cronbach-Alpha internal consistencies (i. e. reliability).

Table 2: Constructs and reliabilities over time

Variables/ Reliability	Year 1* α (pre/ post1)	Year 2 α (post2)	Year 3 α (post3)
Planning	.75/ .72	.63	.68
Monitoring	.67/ .77	.76	.80
Evaluation	.70/ .73	.70	.80
Implementation of inquiry-based learning	.70/ .66	.56	.69
Self-efficacy	.63/ .72	.70	.80
Attitude to Science Education	.77/ .79	.76	.80
Constructivist instruction	.82/ .82	.83	.87
⁺ Promote inter-activity	.72/ .62	.71	.72
⁺ Allow learning through crisis	.54/ .55	.67	.69
⁺ Demand-oriented student support	.60/ .56	.63	.72

Notes: *In year 1 in the beginning of the school year and at the end of the same year a questionnaire was administered; ⁺Variables are sub-dimensions of constructivist instruction

All items were rated on a 4-point Likert-scale (1: do not agree – 4: totally agree) and referred to the constructs: Planning, monitoring, and evaluation of own instruction, self-efficacy, the intention to implement inquiry-based learning, and constructivist teaching. The variable constructivist instruction can also be divided into three sub-dimensions (see Koch, 2017). All constructs were reliable with Cronbach-alpha ranging between .56 – .80 both within the constructs over time as well as between the constructs (see Table 2 above).

RESULTS

Descriptively, the results indicate non-linear trends, with ups and downs in average means per year per group per construct. Longitudinal multi-level analyses revealed



statistically significant positive linear development in the constructivist instruction for project teachers in comparison to control teachers ($\beta_{GT}=.05$, $p=.036$). There were also some linear and quadratic main effects of time, but the groups did not differ in the developmental trends.

Individual t-tests by group and between time points showed significant developments in the first year for the project group in evaluating the instruction, implementing inquiry-based learning, and constructivist teaching (see Table 3). There were no effects in the other groups.

Table 3

T-Test comparisons for project group over time

Variables	AM _{DIFF} (SD)		
	Year 1 (pre-post1)	Year 2 (post1- post2)	Year 3 (post2-post3)
Planning	-.02 (.44)	-.05 (.41)	.10 (.41) ^{.046}
Monitoring	-.09 (.43) ^{.030}	-.02 (.45)	.04 (.44)
Evaluation	-.12 (.39)*	-.01 (.41)	.09 (.41)
Implementation of inquiry-based learning	-.20 (.43)**	-.05 (.38)	-.08 (.33) ^{.030}
Self-efficacy	.01 (.29)	-.06 (.32)	-.02 (.31)
Attitude to Science Education	-.04 (.38)	.01 (.36)	.03 (.38)
Constructivist instruction	-.08 (.29)*	-.05 (.25)	-.09 (.24) ^{.005}
⁺ Promote inter-activity	-.10 (.54)	-.06 (.44)	.01 (.47)
⁺ Allow learning through crisis	-.09 (.43) ^{.030}	-.06 (.41)	-.12 (.40) ^{.015}
⁺ Demand-oriented student support	-.07 (.34) ^{.045}	-.05 (.33)	-.08 (.32) ^{.050}

Notes: ⁺Variables are sub-dimensions of constructivist instruction, alpha correction .05/10= .005, * $p<.005$, ** $p<.001$, negative values= positive development, superscript numbers show uncorrected significance

Group-adjusted effect sizes (project vs. control; Klauer, 2001) are given below in Table 4. When the project group develops stronger than the control group, the effect size becomes larger, if the control group develops positively and the project group decreases, the effect size shows a negative value. The Table 4 shows mediocre values of $d \approx .40$ in the first year in meta-cognitive evaluation of instruction and the intention to implement inquiry-based learning. In the second year, the other meta-cognitive dimensions become more relevant (planning and monitoring), but also the promotion of inter-activity of pupils. In the last year, even the teachers' self-efficacy showed an effect, as well as allowing pupils to learn from crisis. Yet, as the negative values in



the last year describe, most developments decreased, especially the evaluation of the own instruction.

Table 4: Effect sizes of the project group development in relation to the control group development

Variables	Year 1 (pre-post1) d	Year 2 (post1- post2) d	Year 3 (post2-post3) d
Planning	.12	.27	-.31
Monitoring	.19	.31	-.24
Evaluation	.40	.14	-.61
Implementation of inquiry-based learning	.31	.21	-.15
Self-efficacy	.01	.05	.36
Attitude to Science Education	.13	.15	-.07
Constructivist instruction	.15	.27	-.24
⁺ Promote inter-activity	.11	.53	-.38
⁺ Allow learning through crisis	.01	.21	.25
⁺ Demand-oriented student support	.09	.31	-.29

It is also found that project teachers' colleagues reduce the gap between them and their colleagues in the second year in terms of effect sizes, but not statistically significant.

DISCUSSION

Main Conclusions

The results show a positive development of teachers that get the chance to work on individual implementations of innovation in science classrooms. These teachers were also expected to share their ideas with their colleague teachers at school. This may be reflected in the reduction of effect sizes after the second project year. The control group did not develop.

On a general level, this study found a smooth and continuous effect for the implementation of innovation. One can see in the effect sizes over the three years that teachers develop – dependend on time – on a variety of variables. In the first year, there seems to be an "evaluate and trial" phase, where teachers evaluate their own teaching and try to implement change. In the second year they monitor their implementation and focus on a specific aspect of their changed instruction, here: to promote inter-activity in class. In the third year they become more self-confident and



also try more complicated change in their instruction. In our study this was to allow more crisis-oriented learning for pupils.

Yet, the results are limited due to the “black box” quasi-experimental design. As some target constructs were not explicitly addressed in every teacher, one could not expect controlled increase. From a practical side this limitation positively resembles the “natural” development of innovative teachers.

Practice oriented discussion

As stated above, we analyzed the “natural” development of teachers that were assisted in the implementation of innovation. In a wider scope this is comparable to educational reform implementation or the praxis-transfer-problem. One can learn from our study that it takes a while until change has an effect. And also, that change is not a matter of a single variable, but rather changes over time. Teachers do set other foci as they develop. In some instance, they might also change their confidence in dealing with pupils. This makes symbiotic change processes an output- and input-oriented way of school and instructional development. Output-oriented, because teachers change their instruction towards a pupil- and understanding-centered way; Input-oriented, because teachers increase their self-confidence, self-evaluation and collaborate with colleagues. This is a today rather neglected aspect of development in educational research.

In a wider interpretation, the effect is due to some deliberate effort to assist teachers in the implementation. One should not hope to effectively implement stand-alone-reforms, but rather build a system of bottom-up top-down structures that help teachers to practice innovation and picks up demands of the teachers. This is widely known in economic organizational development and should be considered in educational school development, too. Although we see the problem that the Swiss Science Education approach takes a lot of resources, we believe that any effort invested in symbiotic and teacher-oriented programs has got a turnover in future, and can overcome both the research-practice gap, as well as the transfer gap in innovation implementation.

REFERENCES

- Allen, D., & Ryan, K. (1969). *Microteaching*. Reading, MA.: Addison-Wesley.
Anderson, J. R. (1993). *Rules of the mind*. Hillsdale, NJ: Erlbaum.
Anderson, J. R. (2002). ACT: A Simple Theory of Complex Cognition. In T. A. Polk & C. M. Seifert (Eds.), *Cognitive Modeling* (pp. 49–68). Cambridge, MA & London: MIT Press.



- Bauer, K.-O., Kopka, A., & Brindt, S. (1996). *Pädagogische Professionalität und Lehrerarbeit*. Weinheim, München: Beltz.
- Belanger, P. (2011). *Theories in Adult Learning and Education*. Opladen & Farmington Hills, MI: Budrich.
- Blömeke, S., Felbrich, A., & Müller, C. (2009). Future Teachers' Beliefs on the Nature of Mathematics. In F. Achtenhagen, F. K. Oser, & U. Renold (Eds.), *Teachers' professional development : aims, modules, evaluation* (pp. 25-46). Rotterdam et al.: Sense Publ.
- Bulger, M. E., Mayer, R. E., Almeroth, K. C., & Blau, S. D. (2008). Measuring Learner Engagement in Computer-Equipped College Classrooms. *Journal of Educational Multimedia and Hypermedia*, 17(2), 129-143.
- Deci, E. L., & Ryan, R. M. (1990). *Intrinsic motivation and self-determination in human behavior* (3rd printing ed.). New York, NY [u.a.]: Plenum Press.
- Desjardins, R., Rubenson, K., & Milana, M. (2006). *Unequal chances to participate in adult learning: International perspectives*. Paris: UNESCO-IIEP. Retrieved from <http://unesdoc.unesco.org/images/0014/001488/148815e.pdf> [15. Juli 2014]
- Fishbein, M., & Ajzen, I. (2010). *Predicting and changing behavior : the reasoned action approach*. New York, NY [u.a.]: Psychology Press.
- Gruber, H., & Harteis, C. (2008). Lernen und Lehren im Erwachsenenalter. In A. Renkl (Ed.), *Lehrbuch Pädagogische Psychologie* (pp. 205–261). Bern: Huber.
- Harrison, C., Hofstein, A., Eylon, B.-S., & Simon, S. (2008). Evidence-based professional development of science teachers in two countries. *International Journal of Science Education*, 30(5), 577–591.
- Hasselhorn, M., Köller, O., Maaz, K., & Zimmer, K. (2014). Implementation wirksamer Handlungskonzepte im Bildungsbereich als Forschungsaufgabe. *Psychologische Rundschau*, 65(3), 140–149.
- Helmke, A. (2007). *Unterrichtsqualität erfassen, bewerten, verbessern*. (5th ed.). Seelze: Kallmeyer.
- Holtappels, H. G. (2013). Schulentwicklung und Lehrerkooperation. In N. McElvany & H. G. Holtappels (Eds.), *Empirische Bildungsforschung: Theorien, Methoden, Befunde, Perspektiven* (pp. 35–62). Münster et al.: Waxmann.
- Huber, S. G. (2011). The impact of professional development: a theoretical model for empirical research, evaluation, planning and conducting training and development programmes. *Professional Development in Education*, 37(5), 837–853.
- Jank, W., & Meyer, H. (2005). *Didaktische Modelle*. Berlin: Cornelsen Scriptor.



- Kanfer, R., & Ackerman, P. L. (1989). Motivation and Cognitive Abilities: An Integrative/Aptitude-Treatment Interaction Approach to Skill Acquisition. *Journal of Applied Psychology*, 74(4), 657 - 690.
- Klauer, K. J. (2001). *Handbuch Kognitives Training*. Göttingen et al.: Hogrefe.
- Klinzing, H. G. (1998). Interagieren als Experimentieren. Entwicklung, Erprobung und Evaluation eines Programms zum Training von Präsentationstechniken zur Optimierung von Sachbeiträgen, Sachreden und belehrenden Reden. In H. G. Klinzing (Ed.), *Neue Lernverfahren. Zweite Festschrift für Walther Zifreund aus Anlaß seiner Emeritierung*. (pp. 231–339). Tübingen: Deutsche Gesellschaft für Verhaltenstherapie.
- Knowles, M. (1975). *Self-directed learning*. New York: Association Press.
- Knowles, M. (1979). *The Adult Learner: A Neglected Species*. Houston et al.: GPC.
- Knowles, M. (1989). *The making of an adult educator: An autobiographical journey*. San Francisco: Jossey-Bass.
- Koch, A. F. (2017). Where is the link between direct, minimally guided and constructivist instruction? A new integrated model of constructivist teaching. *EAPRIL Conference Proceedings 2016.*, (3).
- Koch, A. F., Felchlin, I., & Labudde, P. (Eds.). (2016). *Naturwissenschaftliche Bildung fördern. Indikatoren und Zusammenhänge bei Entwicklungsprozessen in SWiSE*. Bern: Haupt.
- Koch, A. F., & Labudde, P. (2014). Strike the iron when it's hot - Teacher professionalization in Swiss science education. In C. P. Constantinou, N. Papadouris, & A. Hadjigeorgiou (Eds.), *E-Book Proceedings of the ESERA 2013 Conference: Science Education Research For Evidence-based Teaching and Coherence in Learning*. (Vols 1–Part 14 (D. Couso, L. Louca), p. 11). Nicosia, Cyprus: European Science Education Research Association.
- Loucks-Horsley, S., Hewson, P., Love, N., & Stiles, K. E. (1998). *Designing professional development for teachers of science and mathematics*. Thousand Oaks, CA: Corwin Press.
- Pressley, M., & Harris, K. R. (1994). Increasing the quality of educational intervention research. *Educational Psychology Review*, 6, 191-208.
- Roberts, D. (2010). Learning to learn. *Adults Learning*, 21(6), 19.
- Spiro, R. J., Collins, B. P., Thota, J. J., & Feltovich, P. J. (2003). Cognitive Flexibility Theory: Hypermedia for Complex Learning, Adaptive Knowledge Application, and Experience Acceleration. *Educational Technology*, 42(5), 5–11.
- Stübi, C., Doring, B., Fischer, C., Koch, A. F., Rieck, K., Ronnebeck, S., ... Zehetmeier, S. (2014). How Can Professional Teachers Improve Science And Mathematics Teaching? In C. P. Constantinou, N. Papadouris, & A.



- Hadjigeorgiou (Eds.), *E-Book Proceedings of the ESERA 2013 Conference: Science Education Research For Evidence-based Teaching and Coherence in Learning*. (Vols 1–Part 14 (D. Couso, L. Louca), p. 11). Nicosia, Cyprus: European Science Education Research Association.
- Sweller, J. (1994). Cognitive load theory, learning difficulty, and instructional design. *Learning and Instruction*, 4(4), 295–312.
- Schellenbach-Zell, J. (2009). *Motivation und Volition von Lehrkräften in Schulinnovationsprojekten*. Wuppertal: Elektronische Dissertation.
- Wittpoth, J. (2003). *Einführung in die Erwachsenenbildung [Introduction to Adult Education]*. Opladen: Budrich.



TECHNOLOGY ENHANCED LEARNING IN THE HIGHER EDUCATION CLASSROOM: EDUCATORS AS CHANGE AGENTS

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ABSTRACT

This paper reports on research related to bringing about technology-related change in the higher education classroom. The central research question was how to promote and support evolving paradigms in teaching and learning through those who are key in this change, namely the educators themselves. Starting from a constructivist view on the use of technology in education the theoretical base was expanded to include literature on change. Action research was the methodology used. It was implemented through a series of interactive workshops on technology-related pedagogical innovation and the creation of a virtual community. Initial results suggest that breaking away from tradition and embracing change does indeed start at an individual level, however, structured discussion and exchange not only encourage and support but also instil the confidence necessary to incite one to experiment in their delivery. The paper closes with suggestions for developing educators as change agents.

INTRODUCTION

Educational paradigms are evolving as today's society becomes increasingly digital yet there is still a need to increase the digital fluency of educators. As noted in an OECD publication, the impact of technology remains sub-optimal [and contributions] to teaching and learning have yet to be fully realised and exploited



yet, “it is vital that teachers become active agents for change” (OECD, 2015, p. 4). Unfortunately this still rings very true today. This research focuses on both of these issues in the context of higher education.

LITERATURE REVIEW

This research takes place at a crossroads where pedagogy and change intersect and draws on two bodies of literature for its theoretical grounding. The first is based on a constructivist vision of using technology to add value to student learning (Ertmer & Ottenbreit-Leftwich, 2013; Howland, Jonassen, & Marra, 2012; Jonassen, 1996). Despite what would initially appear to be the use of outdated literature with respect to 21st century technology, Jonassen (1996) was focussed on the use of technology to engage student in learning in a manner so as to develop competencies that are more than pertinent today (World_Economic_Forum, 2016). This is then coupled with the literature on change management as what we are faced with goes past just a change in the educational paradigm but calls for a change in the practices of educators. How best to accompany this change becomes central to the digitalization of education.

Technology Enhanced Learning (TEL)

The shift from a focus on course content to one on competency development seen in higher education today means that the emphasis is moving away from the provision of knowledge and information and more towards its use (Oliver, 2002). This suggests that the use of technology can indeed add value to the learning experience as it not only provides access to more information than ever before, but also to the situation or problem to be examined, and, more importantly, the possibility of collaboration at a distance between both the educator and peers.

Despite considerable promise, there are numerous barriers to the successful implementation of technology in the classroom as more than just a *cool tool* (Johnson, Adams Becker, Estrada, & Freeman, 2014) but rather as something that indeed adds value (Kirkwood & Price, 2014). Prensky (2010) cautioned that educators often focus more on the nouns of learning than the verbs meaning that the emphasis is more on the tools than on the learning objectives. Yet the tools are undergoing constant change and it is what one does with the tools that counts. The added-value comes from the integration of technology into the cursus in such a manner that it's use becomes intrinsic to achieving the learning objectives (Gikas & Grant, 2013). Ertmer et al. (2012) provide a detailed discussion of technology integration focussing on barriers related to teachers' knowledge and skills as well as their attitudes and beliefs, suggesting that the latter are insufficiently taken into account. Although the literature is overwhelmingly positive about the possibilities



afforded by technology to add value to the learning experience there is also clearly a need to accompany such change at the level of both the educators and the students. Some of the elements that can be seen to contribute to educators taking on board such change include “a work culture that embraces and supports innovation; a robust technology infrastructure; technology tools that are appropriate for teaching and learning purposes; a senior champion who drives the process; a willingness to consult and share; and supportive managers, peers and support professionals.” (Jasinski, 2007, pp. 4-5). This brings us to the second body of literature that has been referred to in this project.

Change Management

Surprisingly, the past twenty years have seen limited evolution in course delivery which has us turning to the literature on change management (Kotter, 1995; Lewin, 1958; Quinn, Amer, & Lonie, 2012) in search of a solution that will provide long-term impact in tomorrow’s higher education classrooms. Traditionally change management has its foundations in management literature with the exception of several authors who have looked at its application in the area of education. Based on the seminal work of Lewin (1958) and that of Kotter (1995), Quinn et al. (2012) have identified a framework consisting of three phases which is pertinent for use in the higher education arena. These three phases are:

Setting the stage:	this call to action needs to be stimulated by a sense of urgency coupled with a “guiding coalition” in order to “break open the shell of complacency” (Lewin, 1958; Quinn et al., 2012);
Making change happen:	requires commitment and clear strategic vision in order to provide sufficient incentive to empower those involved and encourage the taking of risks that inevitably accompany change;
Making it stick:	and finally, in order to have a lasting impact on the institute or organisation, processes and structures need to be put into place to support the efforts that have been made.

At the macro level one could say that the stage has now been set and change is indeed underway with the digitalization of education now being an accepted phenomenon. At the micro level, however, one sees considerable discrepancy from one school to the other and, this at all levels, as well as between countries.



This project focuses on the higher education arena in Western Switzerland. The main objective of this research, was evaluate whether working closely with educators might impact their acceptance and future use of technology in their course delivery. In the longer term, the idea being to successfully empower educators to initiate technology-related, value-adding change in their own course delivery and subsequently to become agents for change across the institute. In order to reach this objective, the practice-based research questions addressed were:

- a. Can interactive workshops encourage the inclusion of technology to enhance learning in future course delivery?
- b. To what extent do educators currently see how technology enhanced learning (TEL) might contribute to the development of student competencies in the areas of:
 - i. autonomous learning,
 - ii. information-seeking,
 - iii. collaboration.
- c. How effective for TEL related professional development is a virtual space for exchange and discussion?
- d. What additional support measures are necessary for educators to embrace change and, in the future promote such change amongst their colleagues?

METHODOLOGY

This project has been carried out by practitioners in their own classrooms and has therefore turned to the method of action research. Action research (Dick, 1993; du Preez, 2011), comprises three phases: intention, action & review all of which are detailed below.

Action research

Intention

Earlier exploratory research allowed for the trialling of workshops through two pilot courses. The feedback from participants on the course content and their needs related to the use of technology in the classroom allowed for the development of workshops that would be offered across the university's campuses in five different cantons.



Action

Four thematic, half-day workshops, each held five times on different campuses for a total of twenty workshops were available to the faculty at the University of Applied Sciences & Arts in Western Switzerland over a five-month period.

Review

Review began in the classroom through interaction with and observation of the participants. The researchers worked as a binome allowing time for this during the workshops themselves. The development of a virtual community for discussion and exchange accompanied the workshops.

The field

The field was the University of Applied Sciences of Western Switzerland (HES-SO) with some 21'000 students spread across seven cantons. The afore-mentioned workshops were offered in five of the seven cantons for a total of twenty workshops. The sample was a convenience sample comprised by the workshop participants, all experienced faculty at the HES-SO, amounting to 252 participants and equal to 85 individuals as many followed more than one workshop. The participants, for the majority, were teaching at the Bachelor level and had classes of 25-50 students. Clearly there are drawbacks to this as the population cannot be considered representative of all the faculty at the university seeing as the workshops would have attracted especially those interested in the use of technology in the classroom. As highlighted by Quinn et al. (2012), however, it is important to have a group of champions to lead change and in order to nurture and develop such a group the feedback from this particular sample was deemed important.

Data collection

The data collection consisted of workshop (see below for a detailed description) observation. In addition, a follow-up questionnaire was prepared in order to provide preliminary answers to our research questions. We were looking to a large extent for clear answers as to what the participants had done following the workshop attendance the choice was made to use a trichotomous scale: agree, neutral, disagree. With a response rate of 36% the numbers are only sufficient for the presentation of descriptive statistics.

Finally, a virtual community was created using the Google+ platform and which was joined by 79 of the 85 workshop participants. The idea behind this community was two-fold: firstly, to provide a space for exchange, discussion and support and,



secondly to allow for the development of a community of practitioners, across the various sites, interesting in the introduction of technology in their course delivery.

Workshops on Technology in Practice

Technology for formative and summative evaluation

This workshop looked at the world of learning analytics and how the educators could use it to develop online assessments both of a formative and summative nature. The changing nature of assessment was also addressed.

Promoting student autonomy at the individual and/or group level

More and more higher education students are now expected to take responsibility in their own learning, be active in the construction of their own knowledge and even go as to manage the learning process (Charlesworth, Sarrasin, & Murphy, 2016; Conole & Alevizou, 2010; Goulao & Menedez, 2015). This workshop focussed on the use of technology for organization, curation and the use of visual content.

Creating and using Web 2.0 communities for collaborative learning

With the advent of digital technology, collaboration has taken on a whole new meaning as it can now easily occur both synchronously and asynchronously as well as with participants at different locations. This workshop looked at the options available for creating collaborative communities as well as at existing virtual communities that could be joined.

Cool tools for in-class use

This workshop dealt with in-class creativity and how simple tools could be used not just for fun but for educative purposes. A variety of resources from e-voting to videos to curation tools were discussed and tested live by the participants.

FINDINGS

Initial results, based on the class observation combined with the self-report questionnaire, support what has been highlighted in both in the academic and professional literature (Johnson et al., 2014; OECD, 2015) with respect to the limited digital fluency of educators. The findings are presented in relation to the research questions posed.

No results are presented for the question related to the use of a virtual community. Although 79 out of 85 participants did in fact join the Google+ community, little real collaboration or even discussion ensued and this only for a short time following the workshops despite encouragement. There was a clear need on the part of the



participants for further discussion, however, a virtual space did not meet their requirements.

Observation

Twenty half-day workshops having between ten and twenty participants over a five-month period allowed for discussion and observation. It was with some surprise, as the participants could all be considered as “early adopters”, that the most striking observations were:

- A relatively low degree of digital fluency and this by educators having an interest in technology integration;
- A desire for reassurance through contact and exchange with others in similar situations, suggesting a need for external validation and support would increase confidence levels;
- A request to have best-practice, fast-track, cool-tools type lists for quick implementation rather than a review of the pedagogical scenario and the “why” behind the tool.

These observations were in line with the responses to our questionnaire as shown below.

Questionnaire

A questionnaire composed of seventeen items related to the workshops was sent to all the participants (n=85). A total of 39 completed questionnaires were returned. A certain number of questions related to the individual or to the course delivery, faculty, etc... are not presented here. The three tables below present results directly related to the research questions mentioned earlier.

The first question of interest was to see whether interactive workshops might encourage educators to include technology in their course delivery. We see that despite contributing to a better understanding, this was not sufficient to incite even half the respondents to make a change in their teaching in the short term.

Table 2 shows responses related to the participants perception about the contribution of technology to selected areas of student development. It is encouraging to note that a high percentage of participants have a positive view on this.

Finally, Table 3 shows responses to a series of questions related to additional support measures that the participants wanted to continue their journey in the direction of technology inclusion. It would seem that there is interest and that despite the



increased understanding mentioned in Table 1, it will require additional effort and support in order to encourage real change.

Table 1

Interactive Workshops as a Mechanism for Change: Responses in percent (n=39)

Following the workshop, I:	Agree	Neutral	Disagree
- now have a better understanding of how to include digital technology in my teaching	79.4%	10.3%	10.3%
- tested one or more of the tools presented	58.6%	13.8%	27.6%
- have used one or more of the tools presented in my teaching	44.8%	13.8%	41.4%

Table 2

TEL contributes to the development of student competencies. Percentage responses (n=39)

In the areas of:	Agree	Neutral	Disagree
- Autonomous learning	69.0%	31.0%	0.0%
- Information-seeking	79.3%	20.7%	0.0%
- Collaboration	79.3%	17.2%	3.4%

Table 3

Additional support measures. Percentage responses (n=39)

I would like to have:	Agree	Neutral	Disagree
- TEL-related online courses	79.4%	10.3%	10.3%
- Additional thematic workshops	75.9%	24.1%	0.0%
- Personal coaching	58.6%	24.1%	17.2%

DISCUSSION

Johnson et al (2014) go as far as to say “ if they [teachers] are reluctant to embrace new technologies and the promotion of digital literacy, students will not see the importance of these competencies to succeed in the workforce” (p. 22). The competencies identified by the World Economic Forum (2016), seen as necessary to succeed in the workforce in the 21st century are linked to the digitisation that society



is currently undergoing and include: complex problem solving, critical thinking, creativity, communication & collaboration amongst others. All competencies that TEL can contribute to the development of.

Yet, until such time as educators themselves are empowered to act and to initiate change which in turn is supported and valorised they will not become real agents for change. This suggests that there is still a long way to go in supporting educators in their professional development.

Although limited in their generalizability due to the small sample size and the specific type of institution used for the research, the findings presented in this paper can contribute to the rethinking of the way in which next generation educators are supported in their pedagogical practice. There is clearly a need to go past the “available at your request” mode that pedagogical advisors, learning centres, instructional developers often default to. The use of interactive workshops and the development of a virtual community, both at an interdisciplinary level, are just some of the ideas that can be further developed to impact educational practice. Most importantly the message for allowing educational practice to evolve is to let those at the forefront push change through all the while providing clear support and valorising their efforts.

REFERENCES

- Charlesworth, Z. M., Sarrasin, N. B., & Murphy, H. C. (2016). *Evolving paradigms: Methods of delivery and teaching philosophies for a digital age*. Paper presented at the European Association for Practitioner Research on Improving Learning in Education & Professional Practice 2016, Porto, Portugal.
- Conole, G., & Alevizou, P. (2010). *A literature review of the use of Web 2.0 tools in higher education*. Retrieved from Milton Keynes, UK:
- Dick, B. (1993). You want to do an action research thesis? Retrieved from <http://www.scu.edu.au/schools/gcm/ar/art/arthesis.html>
- du Preez, V. (2011). *Taking it further : the practical implications of action research*. Paper presented at the Design, Development & Research, Cape Town.
- Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2013). Removing obstacles to the pedagogical changes required by Jonassen's vision of authentic technology-enabled learning. *Computers and Education*, 64(2013), 175-182.
- Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers and Education*, 59, 423-435.



- Gikas, J., & Grant, M. M. (2013). Mobile computing devlces in higher education: Student perspectives on learning with cellphones, smartphones & social media. *Internet and Higher Education*, 19(2013), 18-26.
- Goulao, M. d. F., & Menedez, R. C. (2015). Learner autonomy and self-regulation in eLearning. *Procedia Social and Behavioral Sciences*, 174(2015), 1900-1907.
- Howland, J. L., Jonassen, D. H., & Marra, R. M. (2012). *Meaningful learning with technology* (4th ed.). Boston: Pearson.
- Jasinski, M. (2007). *Innovate and integrate: Embedding innovative practices*. Australian Government.
- Johnson, L., Adams Becker, S., Estrada, V., & Freeman, A. (2014). *The NMC Horizon Report: 2014 Higher Education Edition*. Austin, Texas.
- Jonassen, D. H. (1996). *Computers in the classroom: Mindtools for critical thinking*. Columbus, Ohio: Merrill/Prentice Hall.
- Kirkwood, A., & Price, L. (2014). Technology-enhanced learning and teaching in higher education: what is 'enhanced' and how do we know? A critical literature review. *Learning, Media and Technology*, 39(1), 6-36.
- Kotter, J. P. (1995). Leading Change: Why Transformation Efforts Fail. *Harvard Business Review*, March-April(Reprint 95204), 1-8.
- Lewin, K. (1958). Group Decision and Social Change. In E. E. Maccoby, T. M. Newcomb, & E. L. Hartley (Eds.), *Readings in social psychology*. New York: Holt, Rinehart Winston.
- OECD. (2015). *Students, Computers and Learning: Making the Connection*. Retrieved from Paris: <http://www.oecd.org/publications/students-computers-and-learning-9789264239555-en.htm>
- Oliver, R. (2002). *The role of ICT in higher education for the 21st century: ICT as a change agent for education*. Paper presented at the Higher Education for the 21st Century, Australia.
- Prensky, M. (2010). *Teaching digital natives: Partnering for real learning*. Thousand Oaks, California: Corwin.
- Quinn, D., Amer, Y., & Lonie, A. (2012). Leading Change: Applying Change Management Approaches to Engage Students in Blended Learning. *Australasian Journal of Educational Technology*, 28(1), 16-29.
- World Economic Forum. (2016). *The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*. Retrieved from http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf



DESIGNING LIVING LABS AT THE INTERFACE BETWEEN SCHOOL AND WORKPLACE

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ABSTRACT

The workshop presented at the EAPRIL 2017 confence is the result of a research project that explored an intervention for promoting the utilization of a set of research-based design principles for living labs (hybrid learning configurations) that are situated at the interface between school and workplace. The workshop (including a Guidebook Living Labs) was developed from the perspective of boundary crossing theory. The workshop participants used the design principles to generate ideas for (re)designing a living lab in their own context. The aim of the workshop was twofold: participants learn to appreciate the utilization of research-based design principles for living labs and they acquire practical and actionable ideas for designing living labs in their own context. The design principles were presented briefly at the beginning of the workshop, illustrated by examples and the main underpinning theoretical concepts. Next, the participants built a prototype of a living lab using handycraft materials, inspired by the design principles. The participants interrogated each other about their prototypes, which yielded a list of strong ideas and a list of challenges for each living lab that was to be (re-)designed. The participants concluded the workshop by stating one actual improvement to put into practice in the near future. They confirmed our earlier research outcomes by acknowledging that the design principles provided a framework and inspiration for developing and evaluating their living labs.



INTRODUCTION

Educational design research yields design knowledge, often in the form of design principles or guidelines that provide the rationale or 'know-why' for the design of educational interventions. As such, design principles can be utilized by designers in contexts other than the research context in which they were generated (Lakkala et al 2012). Although research has shown that quality support is often needed for design success (McKenney et al. 2015), and that stimulating creativity and ideation is important (McKenney & Reeves 2012), less is known about processes that promote utilization of design principles as the rationale for instructional design.

The workshop presented here resulted from a study that explored how an intervention, consisting of a workshop and a guidebook, could support and promote the utilization of a set of research-based design principles for living labs (hybrid learning configurations). A living lab is typically situated at the interface between school and workplace. It is defined here as “a social practice around ill-defined, authentic tasks or issues whose resolution requires transboundary learning by transcending disciplines, traditional structures and sectors, and forms of learning” (Cremers et al. 2016).

THEORETICAL BACKGROUND

The workshop was based on two studies. The first study (Cremers et al. 2016) was an educational design research project that yielded design principles for living labs at the interface between school and workplace. Starting from cognitive constructivist and socio-cultural perspectives a set of initial design principles was developed within a living lab in the Netherlands. Next, these principles were evaluated from the perspective of the participants during three consecutive iterations of design and implementation. This resulted in a set of seven principles that underpin the design of living labs at the interface between school and workplace.

DESIGN PRINCIPLES FOR LIVING LABS <i>Note: 'Participants' can be students, lecturers, researchers, practitioners, etc. 'Working' is understood as carrying out professional activities about which or by which knowledge is created. This might include researching, advising, designing, constructing, acting.</i>		
	Design principle	Description
	Fostering authenticity	Working/learning environment (context, tasks, activities, roles, and communication) reflects working practice, a professional working culture and organization.



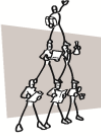
	Creating a learning community	Community: every member should experience a sense of belonging to the community. Learner equity: every member of the community is a learner, each at their own level.
	Utilizing diversity	Diversity is built-in, valued and utilized both at team and organizational levels and in internal and external networks.
	Inter-linking of working and learning	Participants learn by performing real life tasks that are supported by educational interventions. These interventions are attuned to the task and to the individual learner, and they inter-link working and learning.
	Facilitating reflexivity	Participants learn by reflection on tasks and experiences as a person, team and organization. Critical events in the working activities are the starting point for reflection and learning.
	Enabling organization	The organizational structure and culture supports the working process, knowledge creation and sharing at every level (individual, team, organization, society).
	Enabling ecology	The learning configuration is attuned to its surroundings, which includes partner organizations and other stakeholders.

Figure 1. DESIGN PRINCIPLES for Living Labs

The second study (Cremers et al. 2017) explored an intervention for promoting utilization of these design principles in practice. The intervention, consisting of a guidebook (Cremers 2016) and a workshop, was based on boundary crossing theory (Akkerman & Bakker 2011) and prototyping (Brown 2009). Following the theory of boundary crossing, the set of design principles was considered a boundary object (Star & Griesemer 1989) between research and educational practice. The usability of a boundary object can be enhanced if



- additional information and examples of its use in different contexts are available (Kali 2006),
- it is materialized as a product (Wenger 1998)
- its introduction in a new context is facilitated by an expert (also called a ‘broker’) (Wenger 1998).

Since the development of a learning environment such as a living lab requires analytical and creative thinking (McKenney et al. 2015), we considered ‘prototyping’ (Brown 2009) an appropriate working method for generating ideas for features of a living lab, based on the design principles. Prototyping, or ‘thinking with your hands’, is an important element of the method of Design Thinking (figure 2). Prototyping entails the use of physical props as a springboard for one’s imagination. “This shift from physical to abstract and back again is one of the most fundamental processes by which we explore the universe, unlock our imaginations, and open our minds to new possibilities” (Brown 2009, p.87). A prototype can be a sketch, an artefact or a role play. It gives form to an idea to learn about its strengths and weaknesses. As the design process progresses, prototypes become more detailed and more refined (Brown 2009).

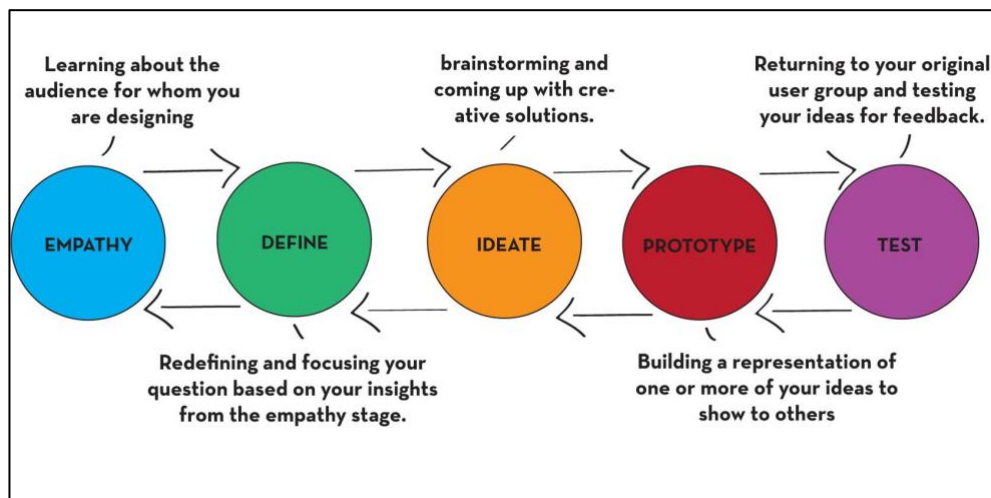


Figure 2. Design thinking method (Stanford D-school)



THE INTERVENTION (WORKSHOP AND GUIDEBOOK)

Based on the assumptions derived from boundary crossing theory, the workshop consisted of a short introduction of the design principles by the workshop facilitator. In order to promote creative utilization of the design principles, the participants were asked to build a prototype of a living lab, inspired by the design principles. They worked in small groups, using handycraft materials (figure 3).



Figure 3. Building a prototype of a living lab at the EAPRIL 2017 conference

The groups interrogated each other about their prototypes, which yielded a list of strong ideas and a list of challenges for each living lab that was to be (re-)designed. The participants concluded the workshop by stating at least one actual improvement to put into practice in the near future.

METHOD

In our research project the workshop was conducted with four different interprofessional design teams of learning environments that either were or intended to become a living lab.



The effectiveness of this ‘boundary crossing intervention’ (workshop and guidebook) was evaluated both as a direct outcome: ‘Is the set of design principles considered useful for evaluation and (re)design of the living lab?’, and as a more indirect outcome, the possible benefits of utilizing the design principles: ‘Is utilization of the set of design principles expected to lead to an improved living lab?’. The intervention was evaluated with respect to content (the set of design principles) and form. The perceived value of the design principles was made operational by asking the participants if they considered the principles to be clear, relevant, and complete. The form of the boundary crossing intervention was evaluated by questions about the usage of the guidebook, the participants’ perception of the workshop (in particular the prototyping exercise) and the role of the facilitator. In addition, information on the participants’ expectations and recommendations for improvement of the intervention in general was solicited.

The workshop was evaluated by a short discussion between the workshop facilitator and the participants at the end of each workshop. This oral evaluation concerned the workshop in general, the role of the workshop facilitator and the prototyping exercise. The workshops were audio-recorded for that purpose. In addition, a digital questionnaire was sent to the participants of the four workshops.

RESULTS

Our research showed that the guidebook and workshop enhanced understanding and seemed to encourage actual utilization of the design principles. According to the workshop participants, utilization of the design principles can foster an enhanced understanding of the structure and coherence of elements of living labs, a shared image of the living lab with its strong points and challenges, and ideas and inspiration for evaluation and (re)design (Cremers et al. 2017). Confirming this earlier research, the workshop participants at the EAPRIL conference discovered different ways to improve or design living labs by utilizing the design principles through building and discussing a prototype of their living lab.

IMPLICATIONS FOR EDUCATIONAL PRACTICE

In the actual process of (re)designing and developing a living lab the design principles can be used as a checklist and a frame of reference. It follows that utilization of the design principles can potentially benefit the design of living labs by facilitating more conscious choices by the design team and by fostering better internal and external communication about both the living lab and the harmonization of its elements. This is expected to enhance the quality of working and learning processes within living labs. The workshop and the Guidebook Living labs can be a first step to achieve this.



REFERENCES

- Akkerman, S. F. & Bakker, A. (2011). Boundary crossing and boundary objects. *Review of Educational Research*, 81(2), 132-169.
- Brown, T. (2009). *Change by design: how design thinking transforms organizations and inspires innovation*. New York: HarperCollins Publishers.
- Cremers, P.H.M., Wals, A.E.J., Wesselink, R., & Mulder, M. (2016). Design principles for hybrid learning configurations. *Learning Environments Research*, 19(3), 309-334.
- Cremers, P.H.M. (2016a) *Handreiking Innovatiewerkplaatsen*. Hanzehogeschool Groningen.
- Cremers, P.H.M. (2016b) *Guidebook Living Labs*. Hanzehogeschool Groningen. <https://research.hanze.nl/nl/persons/petra-hm-cremers>
- Cremers, P.H.M., Wals, A.E.J., Wesselink, R., & Mulder, M. (2017). Utilization of design principles for hybrid learning configurations by interprofessional design teams. *Instructional Science*, 45(2), 289-309.
- Kali, Y. (2006). Collaborative knowledge building using the Design Principles Database. *International Journal of Computer-Supported Collaborative Learning*, 1(2), 187-201.
- Lakkala, M., Ilomäki, L., Paavola, S., Kosonen, K., & Muukkonen, H. (2012). Using dialogical design principles to assess pedagogical practices in two higher education courses. In: Moen, A., Morch, A. I., & McKenney, S., Kali, Y., Markauskaite, L., & Voogt, J. (2015). Teacher design knowledge for technology enhanced learning: An ecological framework for investigating assets and needs. *Instructional Science*, 43(2), 181-202.
- McKenney, S., & Reeves, T. C. (2012). *Conducting educational design research*. Oxon: Routledge.
- McKenney, S., Kali, Y., Markauskaite, L., & Voogt, J. (2015). Teacher design knowledge for technology enhanced learning: An ecological framework for investigating assets and needs. *Instructional science*, 43(2), 181-202.
- Star, S. L., & Griesemer, J. R. (1989). Institutional ecology, 'translations' and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology. *Social studies of science*, 19(3), 387-420.
- Wenger, E. (1998). *Communities of practice. Learning, meaning, and identity*. Cambridge: University Press.



THE ESSENTIAL 8 PROGRAMME. AN ALLUSION TO MASTERY FOR UK GCSE MATHEMATICS RESIT STUDENTS.

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ABSTRACT

This paper aims to report upon the Essential 8 mastery concept mathematics teaching programme and the effect it has had on our learners' perception of their abilities to understand a set of 8 topics and thus their overall approach to mathematics in a general sense. Research uses a questionnaire regarding learner perception with Likert scales from a respondent group of 420 16-19 year old students which is compared against results from 2 corresponding assessments. The qualitative and quantitative evaluation suggests that learner gender may slightly affect perception and outcomes. Results suggests learners appreciate the format, consider it to be of value and perceive some benefits. Whilst not the focus of this research, gender did seem to have a bearing on the data; males believing themselves to be more proficient than reality, the reverse being the case for female learners. Using Pearson coefficient to match perception to performance for each topic, males had many instances of low to medium (0.35 - 0.5 R²) correlation between some topics, whilst females had just one correlation from the 24 possible pairs of topics. Possibly males believe that connections exist between topics where females do not. Further analysis of the data implies males make connections between topics yet do not attain a similar success as their female counterparts. This is at odds with much accepted theory concerning the importance of making connections and may be worthy of further research.



THE 'ESSENTIAL 8' MASTERY PROGRAMME

In an attempt to improve mathematics results for learners re-taking school leaving exams (16-19 yrs) a mastery approach, concentrating on 8 main maths topics is presented every lesson. This was introduced after consultation with the University of Brighton. We called this programme The Essential 8.

Every lesson, learners receive questions on the same topics, in the same order. Posters numbered 1-8 are their main reference resource. Every classroom is identical in layout.

Background

Sussex Downs College, Eastbourne, Maths GCSE department introduced the Essential 8 strategy in January 2016 to try to improve the retention of eight specific topics based on a mastery concept of teaching and learning.

Each week, learners were given one question on each of the E8 topics which they attempted themselves before the teacher ran through the answers, ensuring each student had a correct solution and understanding of the concept. Learners were encouraged to look at posters displayed in each classroom and to use each other as a resource before seeking help from the teacher. Essential 8 questions were always presented in the same order and the same questions were often presented with a three or four week gap in between.

Post 16 education, in the United Kingdom, exists within a secondary educational landscape which has failed around 30% of its mathematics learners.

The Essential 8 programme was launched half way through the 2015/16 academic year. An extra 22 learners obtained a GCSE qualification compared to the previous year (from 11% to 16% success rate). This success rate remained unchanged in 2017. Responses from a paper based survey showed learners were perceiving benefits in the approach in around 84% of cases.

The mastery concept is popular within primary education and its deployment in a further education college is somewhat novel. It is based on practice and whole cohort success, one skill being completely mastered before moving to the next.

It should be noted that mastery may be considered to call into question the efficacy of differentiation, assessment for learning and formative assessment. This is a highly nuanced and evocative concept and the research results must be considered accordingly.



Mastery Pedagogy: A brief overview

Geoff Petty : ‘A review of research on the best revision techniques by Dunlosky et al has found that self testing in a mastery way is perhaps the best revision method.

What is mastery learning?

The basic idea is that every student can learn the important basics in a topic given enough practice.

- It’s okay if you don’t fully understand a concept first time; learning takes time.
- If work is graded, aim to beat your own record, not someone else’s. However, grading should be avoided where possible.
- What counts is whether you understand the problem and solution or question and answer eventually.
- Mistakes are useful. Admit to mistakes and then ask for clarification.
- Set a simple quiz or test focussing on key points.
- Students note the questions they got wrong and note also the correct answers for these questions.
- Retest doing questions similar to those they got wrong.

(Petty, G 2004)

Research Details:

Overview

The question addressed is whether the mastery approach to the Essential 8 programme ‘works’ and if so for whom?

The term ‘works’ must be viewed in context; many learners have failed to achieve exam success due to poor confidence, low self esteem or a lack of self-belief.

Both soft and hard indicators are considered as in this setting, their link is inextricable. The research attempts to evaluate learner perception against learner outcome and identify any factors which may influence success rates.

The research used a blend of both qualitative and quantitative methods to collect data on learner perception and assessment scores.

Electronic tests from a respondent group of around 420 (16-19 year old) males and females were used to obtain data and online surveys, which used Likert style response recording, were used in conjunction.

A longitudinal study of one student was used alongside the main data recording and analysis. This allowed a deeper understanding of the evolution of the programme to be appreciated as the research progressed.

It must be noted that as research/practitioners, there is a honesty and empathy which exists with the cohort. This research is conducted from a decidedly constructivist



paradigm. In terms of ontological position, societal and institutional constraints necessitate a pragmatist stance.

The main statistical tool used was the Pearson coefficient of correlation.

Timeline and overview

01/16 Essential 8 strategy devised and implemented.

06/16 Students reported feeling more confident when tackling the GCSE Maths exams. Teachers noted that students attempted more of the questions and were working for more of the exam time.

08/16 5% increase in C+ grades for GCSE Maths compared with the previous year.

09/16 New intake started on the Essential 8 strategy.

10/16 Learners were given a paper-based Essential 8 Assessment .

11/16 Beginning of the research to evaluate the Essential 8 strategy.

12/16 First electronic Essential 8 worksheet for research data.

01/17 Students were asked to complete a questionnaire for evaluating their confidence in Essential 8 topics and for general feedback on the strategy.

02/17 Second online Essential 8 assessment for comparison data.

Participants

420 GCSE Maths resit students 16-19+ years old.

Data Collection Methods

- Weekly Essential 8 worksheets.
- Data collected from electronic Essential 8 assessments with a gap of approximately six teaching weeks in between.
- Feedback data from student questionnaire.
- Individual student interviews.

Findings

From the first electronic assessment:

- Boys were worse at every topic except Probability.
- No outstanding differences between the different vocational groups.

From the second online assessment and questionnaire:

- The gap between the boys' and girls' performance closed considerably.
- The performance for Straight Line Graphs doubled after a lesson taught on the topic, suggesting much prior learning had been forgotten.
- No overall improvement in performance from the previous assessment.



- Boys felt more confident in their ability to do each of the eight topics compared with the girls.
- There was no correlation between the learner's confidence in a topic and the ability to get the question correct.
- However, there were correlations between Essential 8 topics for the boys' perceived ability, suggesting that the boys make links between the topics. The girls showed similar correlations in the same pattern as the boys but to a far lesser extent.

From the longitudinal study:

One student (chosen at random) confided in an interview that the Essential 8 had allowed her to "*no longer be the dumb one in conversations*".

When asked whether this was only during conversations regarding mathematics she intimated that the success she had found through the Essential 8 programme had brought about a positive change in her self-esteem and opinion of herself.

It should be borne in mind that this student was just 1 out of 420 and her views may or may not be those of the majority.

Recommendations

- Essential 8 questions need rewriting to be more graduated, increasing in difficulty over time. (Now actioned)
- There need to be more sets of the Essential 8 questions and they should be published in a termly booklet given to the students. (Now actioned)
- We need to ensure that the Essential 8 is adapted for the 9-1 syllabus. (Now actioned)
- We should consider how progress in the Essential 8 topics can be captured for individual students. (Tracker is in front cover of booklets now)
- There are cost implications for printing the Essential 8 booklets. (Booklets cost 37% of equivalent in-house printing/paper costs)
- An increase of 5% in exam pass rate occurred in 2016 and remained stable at 16% in 2017).

Justification of research methods

Online assessments: 'They provide instant feedback. Learners can immediately see the consequence of the decisions they make. This makes them very useful for formative assessment.' (Swan, M. 2005)



Multiple choice questionnaires “can be both valid and reliable and can cover a large body of understanding quickly and thoroughly.” (Curzon and Tummons. 2013)

Graphs

The graph (Fig 1.) below shows the difference between the actual scores learners achieved in the online assessment and their self-rated confidence on each question. In most instances for the boys, the perceived confidence outstrips the actual performance; in the question on area and perimeter (Question 2) by more than 30%. For 5 out of the 8 questions, the girls’ actual performance was better than their perceived confidence in that topic although they too overestimated their ability to answer the area and perimeter question. However, the results for question 2 on area and perimeter may reflect the fact that the second assessment question was more difficult than the one on the first assessment.

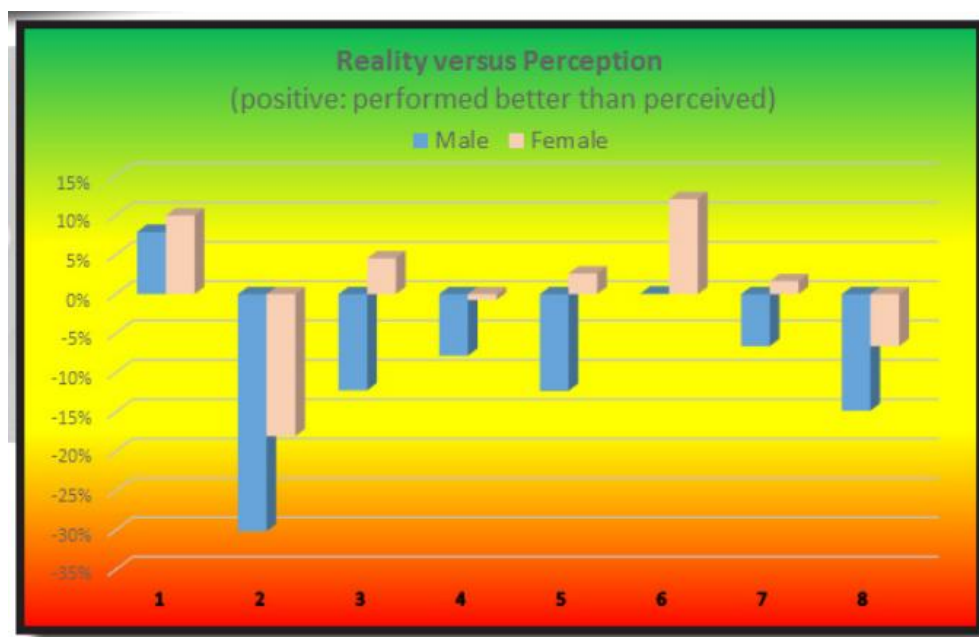


Fig 1.



Question #	Corresponding Topic
1	Transformations Rotations, Enlargements Reflections Translations
2	Area and Perimeter (including circumference)
3	Probability
4	Angles (on parallel lines, around a point in polygons etc)
5	Simple fraction decimals and percentages
6	Ratio and Proportion
7	Algebra (basic notation skills, expanding and factorising)
8	Graphing linear equations and recognising sketched graphs

The graph (fig 2.) shows the average scores for the first and second online assessments for males and females. There is very little difference in these average scores and the pattern for the scores in the different topics is almost identical.

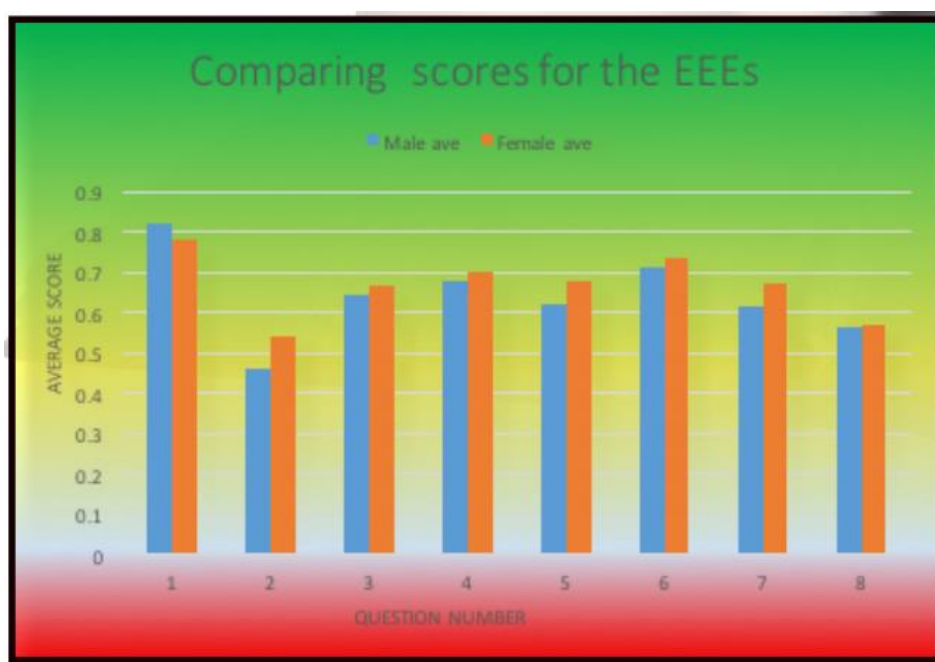


Fig 2.

CONCLUSIONS

The overriding result from the research has been the differences between gender in perceived ability and actual performance. In short, males think they are better in most topics than they actually are and females underrate their mathematical skill.



However, the more subtle and potentially more interesting data lies within the correlation of the soft survey which asked students to consider how proficient learners felt in each topic.

Males had many instances of low to medium (0.35 - 0.5 R²) correlations, whilst females had just one correlation from the 24 possible pairs of topics. This suggests that males believe that connections exist between topics where females do not (there is a similar pattern with females but to a far lesser extent, which preclude claims as correlation).

'Making connections in mathematics' is a well established prerequisite for exam success. However the females in the cohort fared better in exams than their connection-making, male counterparts. On the whole, learners appreciate the Essential 8 as being a learning device which allows them to become proficient in 8 distinct areas of mathematics and see the programme as beneficial.

In terms of actual exam success, there are indicators which suggest the approach is worth maintaining, although only the results in August will confirm this.

There are differences which occur in learners' perceptions of their ability to their actual performance; males overrated their skill, vice-versa for females.

Males make connections between topics (according to their evaluation of their ability) whereas females make far fewer connections.

Unexpectedly (connections traditionally being thought to be desirable) females score better in assessments, despite their comparative lack of self-belief and not making inter-topic connections.

Differentiation has been a byword for educational best practice within UK schools for many years. Assessment for Learning and formative assessment are cornerstones of our educational system and yet over 30% of UK candidates fail maths GCSE.

Whilst learners are evolving, educational best practice may not be keeping pace.

By recreating the repetition, rigour and skill of technology based interaction (video games, instant messaging, less collaborative, more self-centred and intuitive problem solving) we may connect with learners through a channel which considers their individual needs through allowing them to practice and perfect their skill, alongside their peers, rather than behind or in front of them.

Mastery is a pedagogy which may be more suited to evolved, digital-native learners than those of the last millennium. Gender differences may be used to provide an advantage and less emphasis placed on connections, perhaps with more being placed upon better managing learner perceptions.



REFERENCES:

- Coffield, F. *All you ever wanted to know about learning and teaching*. London: LSN Education. 37 (2009).
- Curzon and Tummons. *Teaching in Further Education*. 7th ed. London: Bloomsbury. 408-409. (2013)
- Petty, G. *Formative Teaching Methods* geoffpetty.com/wp-content/uploads/2012/12/FormativeTeachingMethods2.doc. (2004).
Available 31/01/2018
- Petty, G. *Mastery is no mystery*. *InTuition*. 26 (1), p30-31. (2016).
- Northfleet James, A *Teaching the Female Brain: How Girls Learn Math and Science*. London: Sage. 24. (2009).
- Swan, M. *Improving Learning in Mathematics*. London: Standards Unit with BDP Media. 50. (2005)



TEXT-LAB-MODEL TRIAD FOR TESTING ANCIENT TECHNOLOGIES: INTRODUCTORY SCIENCE COURSE FOR 5-GRADERS

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ABSTRACT

Any introductory science course strives to provide middle schoolers with basic models that will scaffold their future learning in the domain. Researches show that the best way to teach scientific models is to build them together with students. We assume that testing ancient technologies provides a meaningful context to support students' model-building activity. Our course exploits a text-lab-model unit design to manage students' learning. First, students learn the main features of a technology from a short essay; then, they plan and carry out simple lab experiments to test how the technology works, and finally, students build a model that helps control the process of interest. Over 250 students (10-11-year-olds) took this 1-year course during the last 5 years. Their learning outcomes were excellent compared with their peers. The approach allows students to feel the sense and learn the meaning of each model built, get a personal experience of model revision and modification, and learn how we as humans gain our knowledge about the world around us. Students practice important literacy skills while reading informational texts, and that provides a robust basis for further learning in science domain.



INTRODUCTION

Science education at primary and secondary school aims at delivering to the students the basic concepts of natural sciences. Besides opening to the students a possibility of a science career, these classes also provide scientific literacy for everyday life (Hodson, 1998; NRC, 1996; Aikenhead, 2006). At the same time, misconceptions and comprehension deficiencies are common even among undergraduate students majoring in natural sciences.

The researchers agree that a good science course should be based on: 1) carefully written informational texts; 2) students' model-building activities; 3) hands-on experiments; 4) group discussions and projects; 5) presentation of social, historical, and technological context of the content taught (Van Der Valk, Van Driel & De Vos 2007; Justi & Gilbert 2002; Wiser & Smith 2008; NRC, 2014). However, it is still a challenge to integrate and balance all these aspects in one effective introductory science course.

Existing science courses often focus on scaffolding natural curiosity (Schweingruber, Beatty, 2017) and entertaining children in order to get them engaged. It means plenty of hands-on demonstrations to the detriment of in-depth analysis of texts and models. Sometimes introductory curriculum compiles fragments of high school courses, which also lacks effectiveness¹³. Interesting projects are made based on STEM-integration (De Meester et al. 2015; Knipprath et al. 2017).

We exploit the idea of testing technologies as a backbone for science education (Aalsvoort, 2004; Matthews, 2014), and we extend STEM-integration to all natural science domains: from chemistry to biology.

As we implement the Cultural-Historical approach (Vygotsky, 1962), we regard development of a child as a process of culture assimilation. Children are aspiring to become grown-ups and progress as they try on grown-ups' roles. We are harnessing this desire rather than trying to adjust the activities to students' current interests. The idea of developing scientific concepts means that we want our students to look at a problem from a grown-up (read professional) point of view.

In the paradigm of the Activity Approach, the acquired concepts and models are considered to be derivatives of students' actions, and special attention is paid to the very early stages of concept formation (Galperin, 1992; Davydov, 2008). So, in order to learn the right models and concepts, the students should learn proper actions. But what action should be learned to obtain a certain concept, especially a basic one?

¹³ Smith & Thompson, (2007) are discussing it regarding teaching algebra.



According to the Davydov's Developmental Instruction (Davydov, 2008) approach, it should be an action that reveals the essential relationships in the domain of interest. We assume that ancient technologies can be a source of these particular actions for the following reasons: a) the labs can be organized in such a way that students will reproduce a key part of an ancient technology and learn first-hand what works and what does not; b) this experience lets students guess what ancient people could think about why it works, and more importantly, how people in the past could plan their actions and adequately predict the results; c) students plan and carry out simple experiments to check their hypotheses; d) students revise or rebuild their models according to the results of the experiments.

In this article we explore the potential of testing ancient technologies as the starting context for learning science. Obviously, the students have to learn about the technologies in order to work with them. The required information can be delivered through educational texts. Thus, students' work can be organized in a triad of text (to learn about the technology), lab (to test the technology), and model (to reflect upon the basic concepts behind the technology).

So, our hypothesis is as follows: integration of the essential features of a good science course can be achieved through testing ancient technologies when students work in text-lab-model triad.

INTRODUCTORY SCIENCE COURSE "NARTURE" FOR 5-GRADERS

"NartURE"¹⁴ introductory Science course was devised as an alternative to the regular observe-and-generalize approach. Our course has the following key features:

- 1) The context of the course is built around testing ancient technologies, traces of which can still be found in modern industry.
- 2) In order to scaffold students' activity, special educational texts have been created. These texts serve multiple purposes: a) problem statement (Why did people do it?); b) source of activity prototypes (How did people do it?); c) source of thinking patterns (How did they think about it?¹⁵). Any text that children encounter does not contain "explanations". It is our students' work to relate their personal everyday experience with the content of the text. In this way, the personal experience is to be revised from the newly adopted viewpoints. To scaffold this conceptual work, the text must allow the reader to extract the information that will form the basis for the new viewpoint; however,

¹⁴ The name of the course derives from two words, "nature" and "art", to stress that children learn about nature through the lens of material culture.

¹⁵ The next question will probably be this: "How did they plan to achieve a certain result?"



rather than presenting it explicitly, the text should contain this knowledge hidden “between the lines” for students to find it.

- 3) The labs are organized to test technologies (or parts of them available for a classroom demonstration). Ancient technologies differ from a regular hands-on experiment because it is bonded with social meanings and archaic ways of thinking. To reconstruct these pre-concepts from the technology features is one of the students’ tasks. Students are not provided with instructions; rather, development of the experimental procedure is one of their tasks. In testing the technologies they have to deal with the fact that natural resources, processes, and objects are not designed to serve human purposes. For example, ore appearance may neither indicate the characteristics of metals that are made from it nor suggest the transformations required to extract these metals. Moreover, the properties of this ore may not be conducive to the extraction of metals from it. While students, by reconstructing certain technologies, transform nature materials into objects essential for human survival, they are challenged to overcome these difficulties. This challenge generates a solid motivation for studying natural sciences in the future.
- 4) Model-building is the core of the course and at the same time a special research object. It is more than a mere reflection of problems that are already solved or a visualization to illustrate the answer. Its major functions are: a) to scaffold the process of generation of the new concept; b) to make a frame for rebuilding problem settings¹⁶; c) to scaffold mental experiments that help to solve a problem or answer a question.

¹⁶ Students are not solving problems and answering questions relying on the text directly; rather, they rely on the model that helps construct the essential relationships of the problem.

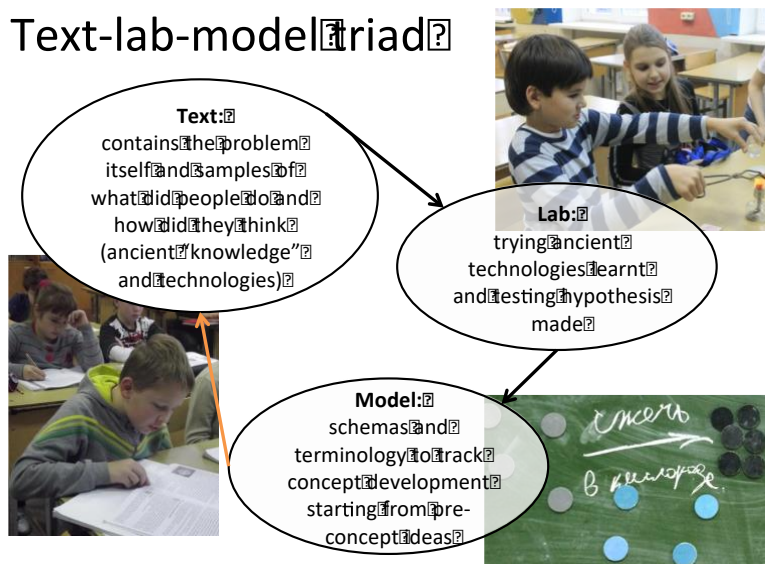


Figure 1. Work in the text-lab-model triad

By learning to move between texts and models (Fig.1), our students master the symbolic language of the models. There will be two kinds of texts: 1) a recipe style text describing a certain technological process; and 2) a “problem” text that lacks some procedural part. The purpose of the first kind of texts is to build models, while working with the texts from the second category the students use these models to fill the gaps in the description of the corresponding technology.

Classwork always deals with analysis of material culture and its history and aims at understanding how people increased their chances of survival by solving certain technological problems. The course consists of 8 chapters: each chapter focuses on some major human need and activities necessary to satisfy it (see Fig. 2)

Chapter	Contents
1. How did people help themselves to survive?	Human basic needs and first activities to satisfy them. <i>Animals and mankind. Settling over the planet. Hunting, gathering, farming and cattle breeding.</i>
2. Edible or not?	Making food. <i>Bread, porridge. Wine, beer, vinegar. Kefir, cheese, curd, butter. Spice, salt, sugar, oil. Food preservation.</i>
3. From head to toe	Making clothes and shoes. <i>Simple clothes. Weaving and knitting. Materials for cloth-making. Making shoes: rubber and leather. Dyes. Soap.</i>



4. Building a house	Building materials and simple mechanisms. <i>Pulley and lever. Natural and artificial materials: clay, bricks, quicklime and slaked lime, chalk, limestone, marble, granite, sand, natron, glass, porcelain, cement, concrete.</i>
5. Taming fire	Ways to build fire. Coal-making. <i>Optics. Burning process and coal-making. Putting out fires. Asbestos.</i>
6. Attack and defense	Means of war: building castles and creating weapons. <i>Principles of castle building. Simple weapons. Bow. Gunpowder. Ballistics. Melting metals from ore.</i>
7. Fighting the unknown	Medicine: <i>treating wounds, curing illness and preventing diseases.</i>
8. Finding the way home	Things, that helped travellers to find their way back. <i>Navigation by constellation. Compass. Maps. Scale. Triangulation. Latitude and longitude. Transport.</i>

Figure 2. “NartURE” contents table

A fragment on “Wine-making”

Each chapter on the one hand corresponds to one of vital human needs and on the other – is dealing with basic concepts of several science domains (Fig. 3). The main question of the course is “How did these concepts come to human concern?”

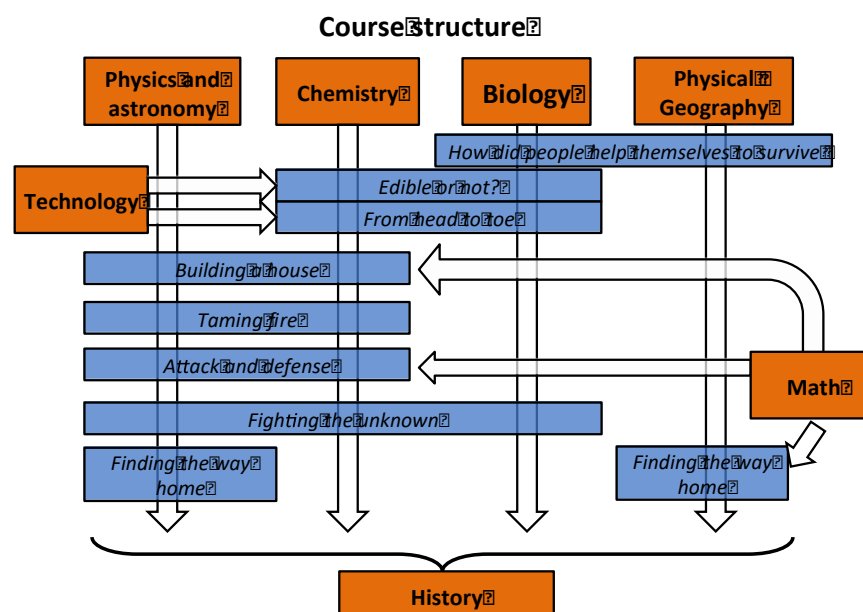




Figure 3. «NartURE» course structure: the interweaved web of science domains

The fragment on wine-making, which we present as an example, is on the crossing of three domains: technology (how are things made?), chemistry (have the particles changed or not?) and biology (is yeast alive or not?) – see Fig.4. It starts two sequences of topics: bread-making and preserving products through getting them sour (different milk-products, sauerkraut).

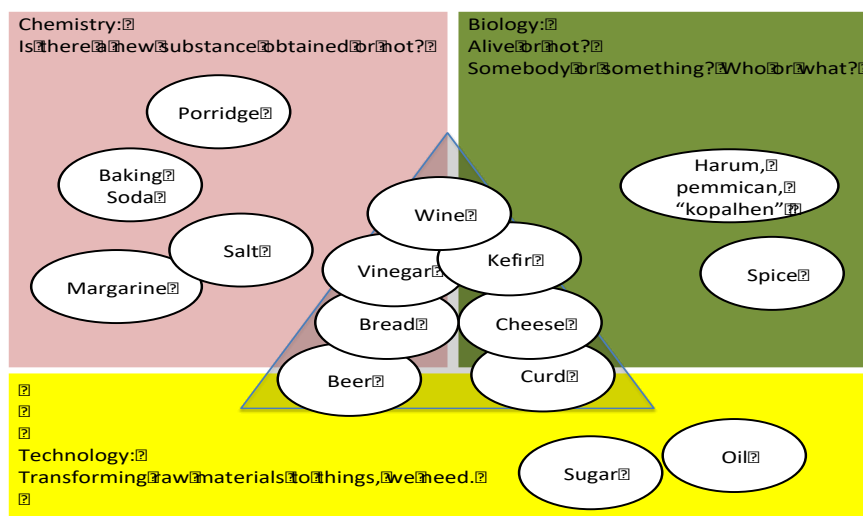


Figure 4. Map of chapter 2 “Edible or not” – Integration of Chemistry, Biology and Technology behind different topics

First children are reading the text (see Appendix 1). The fragment presented follows the text about the secret of making bread porous. The text is followed with questions that students are to answer.

The first question is starting the conversation about yeast. The second and third refer to one of the essential questions of the course: is some process caused by a live being or not (see Fig. 7). The fourth question opens a discussion on beer-making with additional materials about barley and malt. There are two reasons to call beer “liquid bread”: one – because it is also made with yeast, the other – because it is as saturating as bread. Thus, it refers to two major ideas (see fig.7): technology of product making (using vs making) and human vital needs (needs vs whim).

The fifth question refers to the technology of wine-making itself. Students draw the technological flow chart – the sequence of products from raw materials to the final product (see Fig.5).

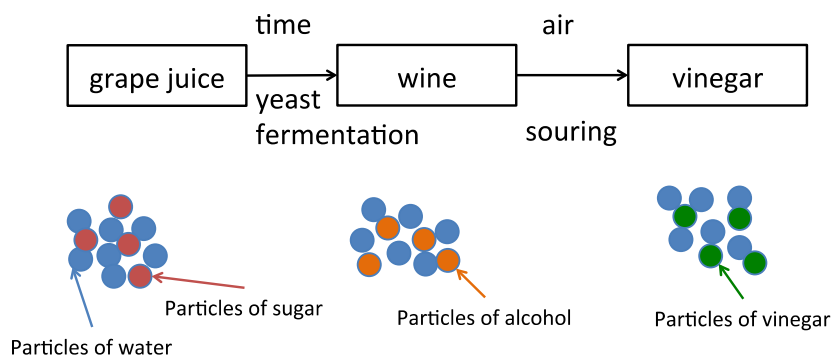


Figure 5. Wine-making: technological flow chart

The flow chart is drawn backward. Students link desired parameters of the products (final and intermediate) to the actions needed to make them. Each time they have to answer questions like “What do we want to get?” “What exactly would it be?” “How do we provide these qualities to be obtained?” “What is it made of?”

Still the fifth question is not yet answered. So we refer to another model – the “magic magnifying glass”, the particle model: “Imagine, that we have a magic magnifying glass. We can see particles of material through it. Here we see particles of wine: particles of water and particles of alcohol. – Now what would we see if we look at the previous stage – the grape juice. What particles *should* we see?”¹⁷

To find the answer, students work with the text. There the hint is given – and at last they find it: “If the yeast managed to complete its job, the wine would lose its sweetness ... such wine contains alcohol ...” Thus they assume, that there was sugar in grape juice, and yeast “worked” to transform it into alcohol.

To test yeast work an experiment can be held by children (Fig.6).

¹⁷ “Should” is written on purpose. Because the crucial idea is: we do not teach, what nature really is, we teach, what people had to think of it to make it serve their purposes.

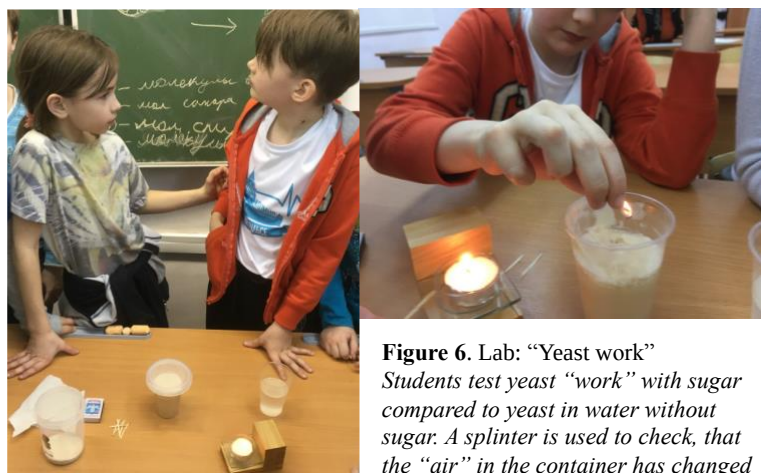


Figure 6. Lab: “Yeast work”
Students test yeast “work” with sugar compared to yeast in water without sugar. A splinter is used to check, that the “air” in the container has changed as a result of yeast work.

2

Conflict	Comment
Using vs making	Students switch from position of mere using ready-made things to making them.
Needs vs whim	The history of culture is seen through vital needs lens. I.e. it is primary important for food to be nutritious rather than delicious.
Voicing vs between-the-lines	Texts are resistant towards the readers. Essential things are latent – not written directly in bold letters. Mere voicing the text will not help to understand it.
Visualization vs Modeling	Models are used to support thinking (as opposed to models used to present the answer). Furthermore, illustrations in the textbook never serve to make things clear. They are more likely to embarrass the reader and serve as an additional material for analysis – another sort of tasks that can be solved (understood).
Personal interests vs human needs	Students motivation shift: their own personal interests and needs give way to social interests and needs, which were adopted alongside with the technological knowledge.
Observing and generalizing vs testing technologies	The general approach to hands-on experiments is: come up with a hypothesis, perform the appropriate experiment, and make a conclusion. Our approach is more specific: suppose the mechanisms behind the technology, you learned about. Devise an experiment testing this mechanism and perform it.

Figure 7. Some of important ideas of NartURE



RESEARCH SCHEME

The study exploits educational design research framework (Van den Akker, et.al, 2006). Five macro-cycles of design research have been done; the sixth is in progress. There were two or three experimental classes in each macro-cycle, 12 in total (over 250 students - 5-graders (10-11 year-olds), 4 teachers, 2 urban schools).

5th graders, that took “NartURE” course, were compared to those, who took regular science programs (that is Biology and Geography) instead – 2 hours a week. The control group was from 3 different public urban schools.

In grade 6 the latter continued with Biology and Geography, while experimental classes took various introductory courses to Chemistry, Biology and Physics (that were also specially devised by our colleagues on the base of Developmental Instruction). Thus, our qualitative analysis was based on materials (classroom observations, students' materials, quizzes, tests, audio-taped classroom discussions, a set of questionnaires, teachers' diaries, reports, and meetings materials, etc.) gathered not only during our course, but as our students proceeded with learning science in the 6th grade.

A specially devised test was used to assess students' progress pre-test in the beginning of the 5th grade and post-test in the end of the year or three-months delayed post-test in the beginning of the 6th grade – see Fig.8.

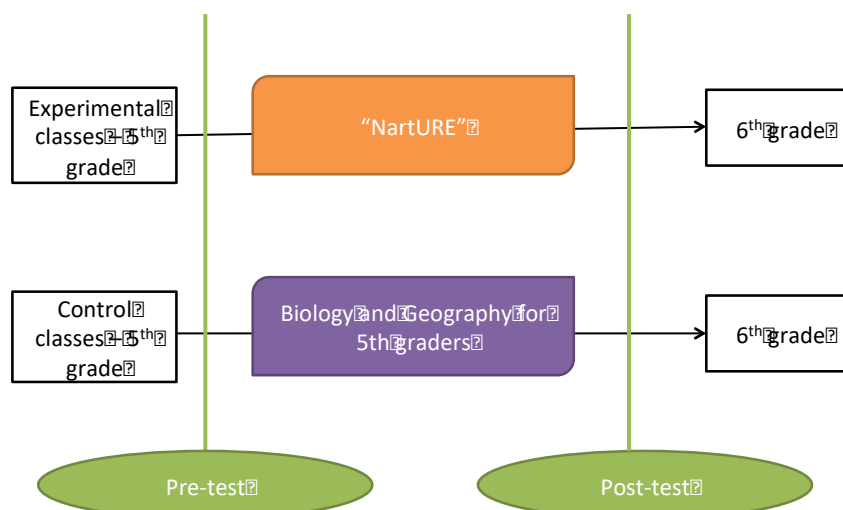


Figure 8. Research Scheme



“Moon” – test

The test was specially devised to assess students' potential in learning some new material in science domain. It contains a text about moon phases as an ancient natural calendar, 9 questions, concerning the text directly, and 3 problems on proportional reasoning (which is crucial for learning sciences) about moon (see examples in Appendix 2). Each assignment was evaluated. The text and assignments were aimed to test:

- 1) Reading comprehension
Students are either reading the text as it is, “voicing” it in their head. Or they are reading “between the lines”, asking right questions as soon as they see the corresponding answer. They are either passive readers – waiting for the text to lead them somewhere and teach them something, or they are active learners, and they work with the text keeping tasks and questions (personal and cultural) in mind.
- 2) Using models
Working with a problem students rely on models as a real tool (not formally) and use them adequately.
- 3) Critical thinking
Students do use newly adopted concepts in problems that confront common and scientific ideas of how “it works”.

The topic of the text – using moon phases as a calendar – is common, yet, it was not discussed directly during primary school, nor during 5-6 grades (either in our course or in alternative curriculum). Task instructions do not allow mere guessing the answers. Tasks can be solved only if students use special means that one can get from the text – the way to solve the problem is embedded in the text and has to be extracted by the students.

RESULTS AND DISCUSSION

Results (Fig. 9) show:

- 1) Students' performance in general is low (only 6 graders performed at least half as good, as one can).
- 2) Students of the experimental school perform in general better than our control group.
- 3) The progress in experimental classes is significant ($p < 0,05$), while the difference between 5th and 6th average classes is not significant.

School #91 is implementing Developmental Instruction since V.V.Davydov began his experiment in 1960. Students there perform better in general. Both: because the school gets more motivated students in the beginning and because Developmental



Instruction (throughout primary school) gives good results. That is why we were interested not in absolute value, but rather in students' growth during the 5th grade. As the increase of performance in experimental classes was significant, we assume, that our curriculum was effective, though much more work is to be done, especially concerning proportional reasoning. Additional courses are advisable and can be integrated with "NartURE" (see Vysotskaya et al., 2014). We also are discussing the possibility of moving "NartURE" course to the primary school. This year we have an experimental class with 3rd-graders and we are hoping for better results.

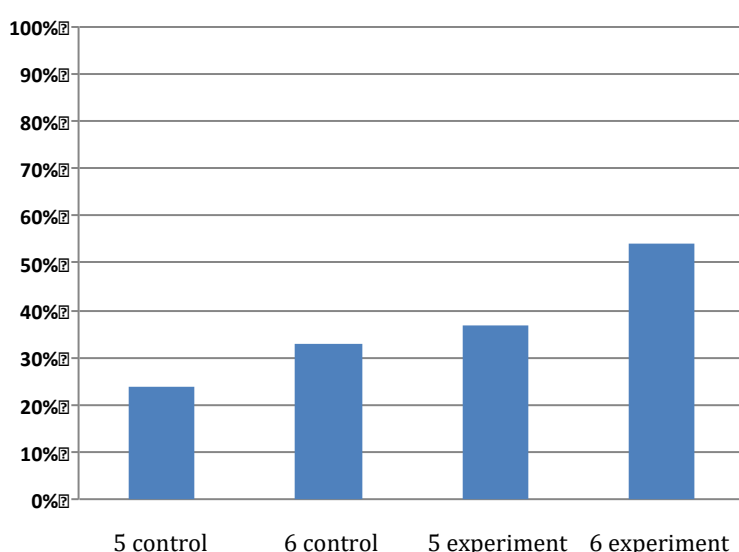


Figure 9. Results

Qualitative Analysis

Analysis of the lessons of "NartURE" demonstrates the following:

- 1) Students' answers (either in written tests or in class discussions) become more meaningful. In class discussions there are always students that refer to the models and text (and thus give right answers) even when it is against the "common sense" and the rest of the class is arguing with them.
- 2) Motivation remains high during all classes such that the teachers need to moderate it rather than stimulate students.
- 3) Students' attitude to the learning process shifts: they are ready for discussions and group work, whereas their peers prefer individual work.
- 4) Towards the end, the students stop questioning the merits of this course.



- 5) Students' fondness of demonstrations fades: while they are working with models, they can "forget" to check the answer if it is evident. Hands-on experiments that lack accuracy do not confuse them.
- 6) Reading skills improve: in the beginning of the 5th grade students have difficulties with grammar constructions, not to mention lack of comprehension. Near the middle of the school year, they become comfortable with the texts to the degree that they start referring to them on their own when working with a problem, an activity that is never observed in the beginning.
- 7) In general, our main aim was to prepare students for the 6th grade science courses. This is the result that we have achieved. Students are careful when reading texts and adequately apply the models from "NartURE". We have received many praises regarding our students from their 6th grade STEM teachers.

CONCLUSION

Testing ancient technologies proved to be a proper context for building the very basic scientific models with 5-graders. Scientific concepts are introduced in the context of their origin and evolution within human meaningful activity. At the same time, students get them as instruments of their own practical actions. Thus, we believe that testing ancient technologies can be a powerful source of students' cognitive and personal growth. The approach allows students to feel the sense and learn the meaning of each model built, get a personal experience of model revision and modification, and learn how we as humans acquire our knowledge about the world around us. The text-lab-model unit design proved to support well the students' model-building activity and should be tested at the next steps of the model development. Our students obtain a deep understanding of basic science models and gain some modeling experience. Practicing important literacy skills while reading informational texts provides a robust basis for further learning in science domain.

APPENDIX 1

Wine-making

Since ancient times, fermentation of grape juice is known as a key-process in winemaking. In order to produce juice and make it ferment, people trampled the gathered grapes by foot in big stone basins that had outlets opening into huge tanks. To make good wine, someone had to fill the tanks entirely, and the wine itself was stored in tightly closed or sealed jars.

The variety of grape and the winemaking technique would affect the quality of the wine. If the yeast managed to complete its job, the wine would lose its sweetness



and become what was called a “dry” wine. Such wine contains alcohol that would make people drunk.

Besides, the quality of wine depended on how big the winery was. When a small amount of grape was taken, it often turned sour before the fermentation was complete. In this case, the alcohol disappeared. Instead, the product contained vinegar that was valued as a condiment. The remainders of wine often contained vinegar; if diluted with large quantities of water, they would make a refreshing drink consumed during hot seasons.

1. *What makes the bread soft and fluffy?*
2. *For what reason do people stir yeast with warm water? What will change if they use cold water?*
3. *Pieces of baked bread were not used as a leavening agent (starter). For what reason?*
4. *Beer was often called “liquid bread”. Why?*
5. *If wine is stored in an open jar, vinegar is found in the vessel. Where does it come from?*

APPENDIX 2

“Moon-test” tasks-examples:

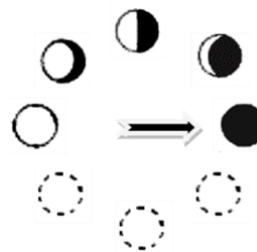
1.4. Here is the “moon clock”. It is handy when the weather is dull – so we know, what the moon looks like behind the clouds.

As you can see, the clock face is not yet finished. Take your pencil and complete it.

1.7. By all accounts Tom Sawyer and Huckleberry Finn were to arrive on their raft to town in three weeks. But they lost days’ count soon, so for now they can’t tell how long they have been sailing. On the shore lights appeared, they approached. But is this the town they needed? Huck is sure, that they started with the full moon above... Throughout the cloudless night and even in the morning they watched the sky, but there was no moon.

Thus boys came to the right conclusion. What did they conclude?

- 1) they arrived at the right place;
- 2) they are to sail one week more;
- 3) they are to sail two weeks more;
- 4) they should have stopped a week ago.





REFERENCES

- Aalsvoort, J. V. (2004). Activity theory as a tool to address the problem of chemistry's lack of relevance in secondary school chemical education. *International Journal of Science Education*, 26(13), 1635-1651.
- Aikenhead, G. S. (2006). *Science education for everyday life: Evidence-based practice*. Teachers College Press.
- Davydov, V.V. (2008). *Problems of Developmental Instruction*. Nova Science Publishers (Original work published in 1986).
- De Meester, J., Knipprath, H., Thielemans, J., De Cock, M., Langie, G., & Dehaene, W. (2015, January). Integrated STEM in secondary education: A case study. In *Nuovo Cimento C: colloquia and communications in physics* (Vol. 38, No. 03). Societa Italiana di Fisica (SIF).
- Galperin, P. I. (1992). Stage-by-stage formation as a method of psychological investigation. *Journal of Russian and East European Psychology*, 30(4), 60–80.
- Hodson, D. (1998). *Teaching and learning science: Towards a personalized approach*. McGraw-Hill Education (UK).
- Justi, R. & Gilbert, J. (2002). Models and modelling in chemical education. In Gilbert, J.K. et al. *Chemical Education: Towards Research-Based Practice*. Kluwer Academic Publishers (ch.3, 47- 68).
- Knipprath, H., De Meester, J., Boeve-de-Pauw, J., Ceuppens, S., De Cock, M., Dehaene, W., ... & Struyf, A. (2017). Integrated STEM makes a difference!
- Matthews, M.R. (Ed.). (2014). *International handbook of research in history, philosophy and science teaching*. Springer.
- National Research Council. (1996). *National science education standards*. National Academies Press.
- National Research Council. (2014). *STEM learning is everywhere: Summary of a convocation on building learning systems*. National Academies Press.
- Schweingruber, H., Beatty, A., & National Academies of Sciences, Engineering, and Medicine. (2017). *Seeing students learn science: Integrating assessment and instruction in the classroom*. National Academies Press.
- Smith, J., & Thompson, P. W. (2007). Quantitative reasoning and the development of algebraic reasoning. In J. J. Kaput, D. W. Carraher & M. L. Blanton (Eds.), *Algebra in the early grades* (pp. 95-132). New York: Erlbaum.



- Van den Akker, J., Gravemeijer, K., et al. (Eds.). (2006). Educational design research. Routledge.
- Van Der Valk, T., Van Driel, J.H. & De Vos, W. (2007). Common characteristics of models in present- day scientific practice. *Research in Science Education*, 37, 469–488.
- Vygotsky, L. S. (1962). Thought and language (1934). *Trans. Eugenia Hanfmann and Gertrude Vakar. Cambridge, MA: MIT P.*
- Vysotskaya, E., Rekhtman, I., Lobanova, A., & Yanishevskaya, M. (2014, November). From proportions to fractions. In EAPRIL Conference Proceedings (p. 42).
- Wiser, M. & Smith, C.L. (2008). Learning and teaching about matter in grades K-8: When should the atomic-molecular theory be introduced? In Vosniadou, S. (Ed.) *International handbook of research on conceptual change*. Routledge, 205-239.



ETHICS IN THE ALBANIAN EDUCATION SYSTEM

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ABSTRACT

Mary Ward Loreto Foundation (MWL) is a non-profitable organization providing development programs for vulnerable communities in Albania. Being inspired by values of Mary Ward Loreto, which are: FREEDOM, JUSTICE and SINCERITY, MWL has made a thorough research study and a comprehensive picture of ethical issues and integration of Ethics in the Albanian Education System, which have not been studied before. This paper is a review of the Study Report done by MWL on Ethics in the Albanian Education System (2017). The study research exposes the most extreme cases across all study levels. Students, parents and teachers from pre-school to higher education were included in the research. The research explores the perceptions of teachers, parents and students on unethical behaviours in terms of severity and occurrence. The study also explores institutional bias and oversight that can lead to unethical behaviour, and brings recommendations for strengthening structures that will cultivate an ethical ground for education institutions that will shape future generations. To achieve the objectives of this study, a mixed-methods sequential explanatory design was conducted initially through collecting quantitative data followed by qualitative. The data for the quantitative study was collected from September to December 2016. It includes a large-scale survey using a stratified sampling method on national level, including pupils, students, teachers, lecturers, and parents across all levels of public education (n =3771). For collecting quantitative data, 12 different questionnaires were prepared to measure ethical and unethical behaviours in all levels of the Albanian public education system. In addition, in the qualitative study, teachers, lecturers, parents, pupils, and students were interviewed face to face, by a skilled interviewer.



INTRODUCTION

Globalization calls for new economic, technological, demographic, environmental and political realities in the world and in Albania as well. Council of Europe, (2014) has emphasised the fact that all the above changing realities have initiated new developments on a number of structures, skills and values; however, education systems often struggle to face these changes at a global and local level. The European Parliament and the Council of Europe have addressed the problems of current education systems in several documents by recommending the Candidate member states such as Albania to consider again their attitude toward education, emphasising the need to provide young people with the competences necessary in present economic and social life (*Recommendations of the European Parliament and of the Council, 2006*). They proposed changes in the learning environment, new pedagogies, cross curricular approaches, greater involvement of students in designing their learning, and comprehensive and holistic teacher-training (*Communication from the Commission to the European Parliament, 2008*). This new philosophy on teaching requests teaching as a moral activity, considering teaching as a moral activity, with schools encouraging integrity and providing an ethical service, and teachers being moral agents. Therefore, teacher-training needs to comprise moral and personal development, ethical knowledge, and reflective capability (Campbell, 2003). The Council of Europe (2010) highlights that teachers are the pillars in the process of building sustainable democratic societies, and must develop the necessary transversal competences: interrelated knowledge, skills and attitudes, enabling them to model democratic and participatory processes based on respect for human rights, diversity and human dignity. Albania signed the stabilization and Association Agreement (SAA) with the EU in 2006. The Albanian Government adopted a revised national Plan to implement the European Partnership (Council of the European Union, 2008) priorities and the SAA, accepting the need for Albania to improve the governance and legislation of the education system, to improve teacher training, and to integrate human rights issues in all levels of education. As Gluchmanova, (2015) points out the transferring of the moral and ethical values through education has a direct influence on the quality of the people's lives. Whereas Palmer (1987) says that the transmission of these values helps children develop the social and ethical skills and teach them how reconcile and solve conflicts. Ethical education is a new concept in the Albanian education system. Its perception in education refers mostly to corruption. Corruption in the Albanian education system has become an issue of research in Albania, since 2006 (World Bank, 2006). Corruption in the Albanian Education system has concerned different reports (IDRA, 2015), where unethical cases are made evident. Therefore, it is requested by the European Union that Albania needs to undergo deep changes in the educational system. These changes will be successful only when the Albanian government will introduce a new pedagogy detached from the communist regime,



which will reflect values and interests of the students, teachers, parents and all the actors that are part of the education system in Albania.

DESIGN AND METHODS

The study based its research on a number of objectives which were focused on the description of unethical behaviours in all levels of the Albanian Education. After doing the research unethical issues in the Albanian education system the researchers came up with recommendations for the policy makers and all actors of the education system to develop national programs and policies on ethical issues.

Some of the objectives mentioned in the study research were (*MWL, Ethics in the Albanian Education System – A Study Report, 2017*):

1. To develop a strategy and methodology for the collection of comprehensive, reliable and culturally adapted statistical data on unethical behaviours in the Albanian education system.
2. To carry out a representative national survey of unethical behaviours in all levels of education in Albania.
3. To describe the most frequent and most severe unethical behaviours of teachers and parents in kindergarten and elementary school.
4. To describe the most frequent and most severe unethical behaviours of teachers, students and parents in secondary school.
5. To describe the most frequent and most severe unethical behaviours of teachers, students and parents in high school.
6. To describe the most frequent and most severe unethical behaviours of lecturers and students in University.
7. To compare the frequency and severity of unethical behaviours between teachers, students and parents.
8. To compare the frequency and severity of unethical behaviours between different levels of education in Albania.
9. To describe the factors influencing unethical behaviours of teachers, students and parents.
10. To explain the educational, psychological, social and familial conditions that cause teachers, student and parents to commit unethical behaviour.
11. To provide recommendations for the development of national programs and policies for ethical progress in the Albanian education system.

Mixed-Methods Sequential Explanatory Design

For the study research a mixed – methods sequential explanatory design is used in order to successfully attain the specific objectives set by the researchers. So, a school population census in addition to qualitative data would have been the best research



design (*MWL – Ethics in the Albanian Education System, 2017*). The reason of choosing a mixed-methods sequential explanatory design was to do quantitative and qualitative research to estimate the levels of ethics in the Albanian Education System after the communist regime was overthrown in 1990 (*Creswell et al. 2003*). The collected qualitative data were used to analyse clearly explain the unethical issues in our education system. Then they were used to help process and develop the quantitative results obtained in the first phase.

Quantitative study

In this phase of the study research, which is considered as the present interpretative study, multiple research methods were combined in order to help examine and compare unethical behaviours in different levels of education and among different actors of the Albanian Education System (*MWL – Ethics in the Albanian Education System, 2017*). As the quantitative research method is competitive (*Howe, 1993/1995*) researchers followed the following steps to conduct the quantitative study.

The sampling frame

The sampling frame was provided by the Albanian Institute of Statistics (INSTAT) and by the statistical yearbook of education from the Ministry of Education, Youth and Sport (MEYS). As MEYS does not possess a list of all Albanian pupils, students, teachers and parents a random sampling and systematic random sampling cannot be employed for the purposes of the study and in order for the study research to attain its objectives the sequential stratified sampling procedure has been employed (*MWL – Ethics in the Albanian Education System, 2017*). The population that was selected for this study research was pupils and students in five different levels of the Albanian education system: kindergarten, lower secondary of basic education, upper secondary education and higher education students (*MWL – Ethics in the Albanian Education System, 2017*). The population was selected randomly, which advantage is that it reduces selection bias of students, teachers and parents. The following sampling frames were used for quantitative data collection: kindergarten kids, basic education pupils, upper secondary education pupils and higher education students. The number of teachers working with children in pre-primary education is 4,144. Based on this number, with a confidence level of 95% and confidence interval of 5%, the sample size for this target group is 352 teachers. As a result, for the purpose of the study, the same number of parents that have children in kindergarten under the supervision of selected teachers was selected. The number of parents and teachers was the same for triangulation reasons. In conclusion, in the pre-primary education system 352 teachers and 352 parents were selected to complete the study questionnaire (*MWL – Ethics in the Albanian Education System, 2017*).



Table 1: Population and sample size for preschool education

No.	Study group	Population	Confidence level	Confidence interval	Sample size
1	Teachers	4,144	95%	5%	352
2	Parents	152,832	95%	5%	352
Total		159,976			704

The total number of basic education pupils sampled for this study research for the year 2014 in Albanian private and public schools was 377,074. Based on this number, with a confidence level of 95% and confidence interval 5%, the sample size was 384 pupils selected randomly from Albanian basic schools. The sample size of parents was the same as the sample size of pupils for basic education. The number of basic education teachers for the year 2014 in Albanian private and public schools was 25,051. Based on this number, with a confidence level of 95% and confidence interval 5%, the sample size was 378 teachers selected randomly in Albanian basic schools. However, in all sections of the study the number of pupils, teachers and parents was decided to be the same for triangulation reasons. In the section below are displayed the detailed tables for all basic education study groups. In conclusion, in the basic education system 384 teachers, 384 students and 384 parents were selected to complete the study questionnaire (*MWL –Ethics in the Albanian Education System, 2017*).

Table 2: Population and Sample Size for Basic Education in Albania.

No.	Study group	Population	Confidence level	Confidence interval	Sample size
1	Pupils	377,074	95%	5%	384
2	Teachers	25,051	95%	5%	384
3	Parents	754,148	95%	5%	384
Total		115,6273			1,152

For the upper secondary education the study applied data collection for pupils, parents and teachers. The number of upper secondary education pupils for the year 2014 in Albanian private and public schools was 151,937. In the public section there were 120,696 pupils studying full time in high school. Based on this number, with a confidence level of 95% and confidence interval 5%, the sample size will be 383 pupils selected randomly from Albanian high schools. The sample size of parents will be the same as the sample size of pupils for high school. The number of upper secondary education teachers for the year 2014 in Albanian private and public schools was 8,606. Based on this number, with a confidence level of 95% and confidence interval 5%, the sample size will be 368 teachers selected randomly from Albanian high schools. However, the number of teachers will be the same as the



number of students for triangulation reasons. In the section below are displayed the detailed tables for all study groups of upper secondary education. In conclusion, in the upper secondary education system 383 teachers, 383 students and 383 parents were selected to complete the study questionnaire (*MWL –Ethics in the Albanian Education System, 2017*).

Table 3: Population and Sample Size for Upper Secondary Education in Albania

No.	Study group	Population	Confidence level	Confidence interval	Sample size
1	Pupils	151,937	95%	5%	383
2	Teachers	8,606	95%	5%	383
3	Parents	303,874	95%	5%	383
Total		464,417			1,149

The last phase of the study research was conducted to the higher education students and academic staff. The number of students for the year 2014 that were engaged in full time study in Albanian public universities was 117,313. Based on this number, with a confidence level of 95% and confidence interval of 5%, the sample size is 383 students selected randomly from Albanian universities. In this phase, parents will not be part of the study groups. The number of academic staff for the year 2014 in Albanian public universities was 3,153. Based on this number, with a confidence level of 95% and confidence interval of 5%, the sample size will be 383 lecturers selected randomly from Albanian public universities. However, also in this phase, the number of lecturers will be the same as the number of students for triangulation reasons. In conclusion, in higher education system 383 students and 383 lecturers were selected to complete the study questionnaire (*MWL –Ethics in the Albanian Education System, 2017*).

Table 4: Population and Sample Size for Higher Education in Albania.

No.	Study group	Population	Confidence level	Confidence interval	Sample size
1.	Students	117,313	95%	5%	383
2.	Academic staff	3,153	95%	5%	383
Total		120,466			766

The researchers elaborated 12 different questionnaires to evaluate ethical and unethical behaviours at all levels of the Albanian education system which comprised three major sections: demographic, an ethical description section and an unethical behaviour scale for teachers, students and parents.



Instrument development phases

For the purpose of developing 12 different questionnaires, unethical behaviours were examined in a variety of ways:

1. Theoretical view and other studies unethical behavior.
2. Codes of Ethical behaviour in the Albanian Education System.
3. Students, teachers and parents filled in twenty-five questionnaires.
4. The university staff filled in six questionnaires.
5. One focus group with high school students mentioned exemplars of unethical behavior observed by the teachers, students and parents.

The 7 point Likert scale was used by the researchers of this study from 1(not unethical at all) to 7 (extremely unethical) in order to rate the unethical behaviours observed by the students, teachers and parents. This methodological procedure checked the questionnaires, got feedback from a considerable number of respondents from different level of the Education System in Albania.

Qualitative Study

Participants in the qualitative study were teachers, pupils and parents from all levels of the Albanian Education System. Semi-structured interviews with teachers, parents and students were performed. The interview had three parts: the introduction, ethics knowledge and the description of unethical behaviours, and lastly the explanation of unethical behaviours and future recommendations (*MWL –Ethics in the Albanian Education System, 2017*).

Qualitative data analysis

The study research used the Weft QDA program, which is an open-source too for qualitative data analysis. Transcripts were read and analysed by coding each sentence, where possible, through conceptual labels of ethics topic. These were either written onto a copy of the transcript or onto a piece of paper, together with relevant extracts from the transcript. Analysis was carried out on each interview transcript in turn. Throughout the analysis, and especially during the initial stages of coding, the analysis remained close to the data. Transcripts were read and reread repeatedly during the process of analysis to provide further evidence to support or challenge emerging codes. After determining the codes, specific categories that explain the unethical behaviours and contributing factors were created. In the last phase of analysis themes of qualitative data were created (*MWL –Ethics in the Albanian Education System, 2017*).



CONCLUSIONS AND RECOMMENDATIONS

The study research has employed a Mixed-Methods Sequential Explanatory Design to describe unethical behaviour at all levels of education in Albania. After the data analysis of the quantitative and qualitative study the researchers have come up to recommendations for the policy makers and all the actors that participate in the education system to develop the right policies, to design adequate national programs and specific interventions to enhance the education system in Albania (*MWL –Ethics in the Albanian Education System, 2017*). To achieve the main goal and the specific objectives of the study, the responses of 3.771 participants (teachers, parents, pupils, teachers and students) were statistically analysed and 70 in-depth interviews were conducted with all the stakeholders of the education system (*MWL –Ethics in the Albanian Education System, 2017*). The results of the study showed that pupils and students are violated by their teachers and parents as far as ethical issues are concerned. The use of violence is conceived as a normal disciplinary measure for the child. Parents see violence as a normal form of discipline. Teachers use verbal violence in the classroom along with various punitive practices to manage the class. Violence by teachers and parents is regarded as an effective means to resolve a momentary situation (*MWL –Ethics in the Albanian Education System, 2017*).

Recommendations

As violence is considered an evil in the Albanian Education System the researchers have given a number of recommendations to be followed by policy makers and all the actors that take part in the Albanian Education System. They are very explicitly explained in the Study Report by MWL in 2017 about Ethics in the Albanian Education System (*MWL –Ethics in the Albanian Education System, 2017*).

1. Strict enforcement of existing laws and guidelines in order to address violence in schools.
2. Improvement of the legal framework for the prevention, protection and treatment of school violence by the MoEYS.
3. Develop policies for violence prevention in school by the MES and MoEYS.
4. Encourage denunciations of cases of violence in school to the relevant authorities.
5. Encourage teachers to report observed cases of violence.
6. Encourage students to report observed cases of violence.
7. Improvement of the legal framework and the mechanisms for the prevention, protection and treatment of cases of prejudice in Pre-university Education.
8. Enforcement of the directive on inclusiveness from the RED, EO and the schools.



9. Initial Professional Development to successfully achieve students' inclusiveness and their maximum potential.
10. Professional development of teachers to work efficiently regarding achievements for the inclusion of students so that they use their maximum potential by the MoEYS, EDI, RED and EO
11. Comprise the concepts of inclusiveness in the curricula of pre-university education by the MoEYS and EDI.
12. Better focus on the cooperation of students through Joint projects to reduce prejudices.
13. Continuous training for teachers on the importance of implementing the Code of Ethics and Ethical Standards.
14. Drafting of systemic teachers' professional development plans related to the recognition, implementation and internalization of ethical behaviour in schools.
15. Establishment of Ethics' Committees and its qualification thereof, in preuniversity educational institutions.
16. Improving the institutional regulations of the school.
17. The development of longitudinal studies on ethics in the pre-university education system. Development of quasi-experimental studies to assess the specific policies or interventions related to ethics in education.
18. Develop specific studies to establish action plans to improve ethics at RED, EO or school levels.
19. Drafting the bylaws of the Law No. 80/2015, by the MoEYS.
20. Develop DCMs on ethical standards regarding activities and scientific research as well as judicial regulations of the activities of the Boards and Agencies established by the law.
21. Improvement of university curricula and research programs for the deepening of ethics' study as a practice, as well as in research.

REFERENCES

- Ajdukovic, D. (2004). Social contexts of trauma and healing. *Medicine, Conflict and Survival*, (20)2, 120- 135
- Campbell, E. (2003). *The Ethical Teacher*. Maidenhead, UK: Open University Press.
- Campbell, E. (2010). *Ethica*
- Council of Europe (2010). Declaration on the Conference Theme. Standing Conference of Ministers of education, Teacher Education for a Sustainable Democratic Society, 23rd Session, (p. 2-3). Ljubljana, Slovenia, 4-5 June.



- Council of Europe (2014). Education for change: Change for education. Manifesto. Strasbourg: Author. Council of Europe & Ministry of Education and Sport (2012). Edukimi kunder korrupsionit. Manual për mësuesit. [Education against corruption. Teachers manual]. Tirana: Author.
- Council of the European Union (18 February, 2008). Council decision. Official Journal of the European Union. Retrieved from: <file:///C:/Users/Fujitsu/Desktop/albania%20%20European%20Partnership%202008.pdf>
- Gluchmanova, M. (2015). The importance of ethics in the teaching profession. *Procedia - Social and Behavioral Sciences* 176, 509 – 513
- Howe, K. (1995). Democracy, justice and action research: Some theoretical developments. *Educational Action Research*, 3, 347-349.
- Howe, K., & Dougherty, K. (1993). Ethics, IRB's, and the changing face of educational research. *Educational Researcher*, 22(9), 16-21.
- MWL, Ethics in the Albanian Education System – A Study Report, 2017
- Palmer, P. (1987). Community, Conflict, and Ways of Knowing. *Change*, 19(5), 20-25
- Recommendation of the European Parliament and of the Council on Key Competences for Lifelong Learning, PE-CONS 3650/1/06, European Parliament, (2006).
- World Bank (2006). Main Report. Public expenditure review (PER). Washington, DC: World Bank. Retrieved from: <http://documents.worldbank.org/curated/en/274981468005978873/Main-Report>
- World Bank (2012). ALBANIA: Secondary and Tertiary Education Policy Brief #2 – How Teachers Teach in Secondary School Classrooms? Retrieved from: <http://documents.worldbank.org/curated/en/713621468209654011/pdf/689870BRI0P1020ia0AAA002000v-0final.pdf>



TEACHING AND ASSESSING REFLECTION COMPETENCES WITH E-PORTFOLIOS

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ABSTRACT

This article explains how we teach writing reflections in e-portfolios and how we assess them. We start with a short explanation of the institutional background (peer tutoring training program) of our work and describe how peer tutoring can be a basis for fostering the development of key competences. We continue by illustrating the connection of life long learning, reflection competence and e-portfolios before we introduce our reflection model and describe how we introduce it to our students. Afterwards we introduce our assessment criteria and discuss the pros and cons of it as well as the feedback we received during our workshop at the EAPRIL 2017 in Hämeenlinna, Finland.

FOSTERING KEY COMPETENCES THROUGH PEER TUTORING

The following article is about the way we teach at the European University Viadrina writing reflections with e-portfolios and how we assess them. The aim of this passage is to explain how peer tutoring fosters the development of key competences at universities. The Center for Key Competences and Research-Oriented Learning at the European University Viadrina coordinates the offers for key competences. Centre piece is the Viadrina peer tutoring project which seeks to apply the method of peer tutoring as a basis for fostering the development of key competences.



PEER TUTORING AS DIDACTICAL APPROACH

The term ‘peer’ „signifies people of same age, same status, colleagues and more. Accordingly, peer tutoring is learning from and with each other, it is a mutual learning activity. Peer tutoring¹⁸ creates a learning environment on eye-level. Peer tutors offer capacity building and guidance. They encourage their fellow students to reflect on their learning process and problems through the use of moderating and consulting techniques. This collaborative process benefits both the learners and the peer tutors. During their training and work, peer tutors develop skills and key competences from which they profit not only during their own studies but even years beyond their graduation in various contexts of work life. Peer tutoring facilitates the learning and reflection process while all participants contribute to the group with their knowledge, experience and learning methodology. A positive learning environment actively fosters self-reliant and independent working and critical thinking (Boud, 2001; Bruffee, 1978; Topping, 2005).

The Viadrina PeerTutoring training program

For successful peer tutoring it is vital that peer tutors go through a qualifying training. The Viadrina PeerTutoring training program focuses on both theoretical and practical aspects. The program encompasses trainings in seven different core areas e.g. academic writing, foreign language methodology, intercultural competence, learning strategies, presenting and e-learning. The training program consists of four different modules. The first module ‘collaborative learning: organizing and leading’ focuses on basic elements of peer learning and research. The second module ‘accompanying learning: peer tutoring’ offers the possibility for future peer tutors to specialize in one of the seven core areas. The third module ‘peer tutoring: practice’ gives future peer tutors the opportunity to gain experience through practical of everything they learned. During the course of the training program, the students work intensively with e-portfolios¹⁹. They are supposed to collect different forms of artefacts like reflections, summaries, pictures, videos, homework and so fare. The fourth module is the presentation of an extra-created presentation portfolio,

¹⁸ The term “peer tutoring” was coined by Kenneth Bruffee. In the 1970s as a professor for the New York Brooklyn College he noticed that consultations for academic writing offered by students were decisively more successful than those offered by teachers (Bruffee, 1978). His commitment to various forms of peer learning contributed to the institutionalization of peer tutoring in universities around the world. Today peer tutoring is common in many universities and is becoming even more important especially at German universities.

¹⁹ We chose Mahara to realize our e-portfolios because it can be easily integrated into Moodle and students can use their account after graduating university.



which only shows chosen artefacts of their regular portfolios. This best-of portfolio will be presented at graduation day.

The following graphic shows the peer tutor training program with its four modules:



Scheme of the Viadrina PeerTutoring training program (Center for Key Competences and Research-Oriented Learning, 2017)

To foster our students abilities to think about their own learning process and to assume responsibility for it we use a wide range of learner centred methods, project work and autonomously organized group work. Upon graduation, peer tutors receive an official certificate that documents the steps taken in the program and is valued in university and work life contexts alike. After graduation, the students can apply for a job as peer tutor and work at the Center for Key Competences and Research-Oriented Learning.

Regardless of the core area and the module of the peer tutoring training program there are common learning objectives. In every module the students should be able

- to reflect their own learning process,
- to acquire independently new working technics, methods and know-how,
- to work together collaboratively and effective,
- to think critically and
- to give and to receive constructive feedback.



Below we will focus on the learning target fostering reflection competences with e-portfolios.

FOSTERING REFLECTION COMPETENCES WITH E-PORTFOLIOS

This chapter tends to explain how we at the Centre for Key Competences and Research-Oriented Learning foster the development of reflection competences with e-portfolios. Therefore, the definition of key competences and reflection competences is described followed by the connection between reflection competences and the lifelong learning approach. The chapter ends with the explanation why we use e-portfolios therefor.

Reflection competences as the heart of key competences

‘Key competences’ is a concept that has exerted much influence in scientific, academic and education policy dialogue since the 1970th. We understand key competences as a combination of knowledge, skills and attitudes that we need to be competent actors, active citizens in the face of individual and societal challenges (Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning, 2006). Professional knowledge can be attained through studying but key competences need practical training and tutelage. Like you cannot learn to drive a car from theoretical discussion or reading a book, key competences need practical experience. The more experience you gain, the less you (need to) think about it. You know when to shift a gear or how to react to heavy traffic. The capacity of driving a car has become implicit knowledge. But while driving a car is taught in driving school, key competences are still rarely explicitly taught and it is assumed that everyone at a university implicitly knows how to:

- Write good texts
- Act competently in intercultural contexts
- Learn foreign languages
- Attain factual knowledge
- Communicate competently (Center for Key Competences and Research-Oriented Learning, 2013)

We understand the lifelong learning approach as a mission to support our students in becoming self-conscious and self-determined learners. Learning how to learn is the best way to reach the target of “learning from cradle to grave”. Lifelong learning means all purposeful learning activity throughout life improving knowledge, skills and competencies. The lifelong learning approach stresses that learning occurs



during the whole course of a person's life. Formal education as well as non-formal settings contributes to one's personal, civic, social and/or employment-related development (OECD, 2001; Commission of the European Communities, 2001).

According to the Organisation for Economic Co-operation and Development (OECD) reflectiveness²⁰ is the heart of key competencies. It is defined as the ability to think critically about experiences and to draw conclusions for future thoughts and actions. It is about the relation between what we actually want to do and what is really happening at the end. Until we do not really think about what has happened and why, experience is meaningless (Dewey, John 1916 quoted by Bowman, Lowe, Sabourin & Salomon Sweet 2016). To think reflectively complex mental processes are necessary because the subject of a thought process becomes its object. Reflection competences is not only about thinking critically it also involves the ability to deal with constant change, act with a critical stance and adapt to new contexts (OECD, 2005). Furthermore, it is also about the construction of experience more generally, "including [...] thoughts, feelings and social relations. This requires individuals to reach a level of social maturity that allows them to distance themselves from social pressures, take different perspectives, make independent judgments and take responsibility for their actions" (OECD, 2005, p. 9).

E-portfolios as a way to foster reflection competences

In higher education, the use of e-portfolios is seen as one way to support students to think reflectively which is considered as a "key to unlock the doors of learning and knowledge creation" (Bowman et al., 2016, p. 2). E-Portfolios are online-based electronic folders which enable students to create their own learning environment to document their learning process, competences and skills (Reinmann & Sippel, 2011; Arnold, Kilian, Thillosen, & Zimmer, 2013). "Behind any product, or presentation, lie rich and complex processes of planning, synthesizing, sharing, discussing, reflecting, giving, receiving and responding to feedback" (JISC, 2008 quoted by Joyes, Gray, & Hartnell-Young, 2010, 16). Portfolios enable students to look back on their progress and their acquired knowledge. This helps them to improve their thinking skills through comparing, analysing and planning (Bowman et al., 2016).

In the context of Viadrina PeerTutoring the main advantages of e-portfolios are the following:

- E-portfolios correspond technically to our ability to think permanently. They are perfect tools to produce artefacts or notes ubiquitously. The only condition therefore is access to internet and to the platform.

²⁰ The OECD refers to the term „reflectiveness“ whereas we stress in our approach the ability to think and act reflective. That is why we use the term reflection competences.



- Users are able to embed a link or other interesting digital content to their portfolio and explain how this influenced the learning process. This is a clear improvement compared to a paper-based portfolio and an advantage itself (Bowman et al., 2016).
- The learner decides whom he wants to give access to their portfolio e.g. peers, tutors, trainers or potential employers. The e-portfolio gives students the chance to create a more holistic view on their experience, knowledge, skills and competences including not only academic but also extra-curricular, professional and personal experience (Bowman et al., 2016).
- It is quite simple to give and to receive feedback. You can write comments and send them to the owner of the portfolio. Within a peer group it is easier to share work and to look at it through new eyes and to evaluate it from an outside perspective. Constructive feedback fosters the development of reflectiveness by clarifying what is seen by the feedback partner and what is expected from the assesment. It helps to close the gap between current and desired performance. It encourages a dialog about learning with peers, students and teachers (Bowman et al., 2016; Juwah, Macfarlane-Dick, Matthew, Nicol, Ross & Smith 2004).

Reflection through e-portfolios allows students to look retrospectively at their progress as a member of scientific community but also at their personal development. Clear criteria, feedback and the possibility to revise are elementary for successful work with e-portfolios. The lifelong learning approach, reflection competences and e-portfolios can be regarded on its own but in our opinion they unfold their full potential through mutual reinforcement. Thinking about thinking is the starting point for a self-determined way to plan and to realize one's own learning process.

TEACHING AND ASSESSING REFLECTION COMPETENCE

In the following chapter, we will illustrate the reflection model we use in our training program, introduce our assessment criteria and discuss the pros and cons of the latter as well as the feedback we received during our workshop at the EAPRIL 2017 in Hämeenlinna, Finland.

Reflection Model

For us, to be able to reflect means intentionally analysing one's own experience and drawing conclusions for future acting (Schwarz & Vogler-Lipp, 2017). We believe that most students are not familiar with intentionally reflecting their own behaviour and experiences in such a structured way we want them to do. As with all competences, also reflection competence needs a lot of exercising, training, and



feedback on the process. So, as a main point of their e-portfolios our students have to write reflectional texts²¹. In every seminar, we provide a comprehensive guidance on how to write reflections and how these reflections will be assessed later²².

Amongst many different theories about reflective learning, we settled on Gerd Bräuer (2008, 2016) and Tobias Jenert (2008). For us, a combination of these two models provides a comprehensive framework which is easy enough to understand and apply for the students and profound enough to guarantee a certain quality in the reflectional texts.

Bräuer differentiates four levels of reflection: (1) Description & Documentary, (2) Analysis & Interpretation, (3) Assessment & Evaluation, and (4) Planning (Bräuer, 2008, p. 96ff.; Bräuer, 2016, p. 28). Jenert distinguishes three dimensions of reflection which are required for a self-organised learning: reflecting on the learning object (what?), on the learning action (how?), and on the learning goal (why?) (Jenert, 2008, p. 6-12).

We basically follow Bräuer's levels of reflection and integrate the three dimensions of Jenert:

Level 0²³: Goal (learning goal – why?)

Level 1: Description & Documentary (learning object – what?)

Level 2: Analysis & Interpretation (learning action – how?)

Level 3: Assessment & Evaluation (learning action – how?)

Level 4: Planning (learning action – how? and goal – why?)

Level 0: Learning Goal (why?)

At this level we require our students to express a learning goal they have either set for themselves for the activity to be carried out or which has been set by someone else (e.g. by the teacher). In order to be able to gain a certain depth at reflecting it is important to ask yourself why you are doing something and what you want to achieve by doing something. Only if you have a goal, you can refer to a standard and examine if the outcome of your activity was good or bad.

²¹ We are aware that this text-based form does not suit all types of students, especially those who are not very strong in their writing competence. But since our university only offers degree program within the humanities, all of our students have to write assignments at some stage within their studies. We try to support them as much as we can with (peer-)feedback on their texts. We also encourage them to go to our writing center to talk about their texts and enhance their writing skills.

²² At this point we want to already mention that we are not assessing the actual content of the reflection but solely the quality of it. Further details can be found in the next chapter.

²³ We call it level 0 because Bräuer's model starts with level 1 and we added Jenert's questions of the learning goal (why?) before level 1.



Central questions: What was the goal of my activity? Why did I do it? What did I want to learn?

Level 1: Description & Documentary (Learning Object – what?)

This level is about the learning object. By describing and documenting their activity students recapture what exactly they have done during the course of activity. Furthermore, the students are asked to set the activity in a broader context of the overall act (e.g. the total lecture/assignment/group work etc.).

Central questions: What exactly did I do? How was the course of my activity?

Level 2: Analysis & Interpretation (Learning Action – how?)

The second level of reflection is about the quality of the activity: By analysing and interpreting their activity students are asked to take a detailed look into how they did something as well as into the circumstances of their activity. The analysis should refer to their own performance and achievement, while the interpretation is about the consequences of their action and the connection to the broader context.

Central questions: How exactly did I do it? What was my experience? How did I feel during my activity? What was (not) helpful?

Level 3: Assessment & Evaluation (Learning Action – how?)

The third level is about the comparison of the actual outcome/course and the desired outcome/course of the activity. Students are asked to refer to the learning goals, stated in level 0, and assess and evaluate the terminated activity. They should also give reasons for their evaluation by stating internal and/or external assessment criteria which should be explained in detail.

Central questions: How did it work? What went good/bad? Why? How did I feel with the outcome?

Level 4: Planning (Learning Action – how? And Learning Goal – why?)

The last level requires an outlook for future actions. Students are asked to plan any changes and adaptations in their activity based on the insights and findings of the reflection on the activity. The future planning should be explained and justified referring to the assessment and evaluation level.

Central questions: What did I learn? What am I taking with me? How will I do it the next time? What will I do differently the next time?



Teaching of Reflection Model

We introduce this model with a very simple example of a written reflectional text and ask our students to identify the different levels within the text. This leads to a broader discussion on how easy it is to identify the levels and if it is altogether possible and/or desirable to have a sharp distinction between them. In this way the students get familiar with the model and gain an idea of what we expect them to do in their written reflections.

The assignment for their first reflection is normally a very precise and single activity. For example: “Try one of the time management methods we discussed in class for three days and reflect on your experiences by including all levels of the reflection model and answering all of the stated questions.” Having a precise activity they can carry out and observe their experiences at the same time makes it easier for students to apply the reflection model. They can get used to the questions, get familiar with the structure of the text, and practice their writing skills. After each reflection they get a peer-feedback from their fellow students. We therefore prepare a session where students learn how to give and receive constructive feedback and what they are supposed to focus on when giving peer-feedback on a reflection (Juwah et al., 2004). Depending on the size of the class we give a very detailed feedback on the (quality of the) texts every two to three weeks over the course of the semester.

It often happens that within the peer-feedback students comment on the content rather than the quality of the text. Although, we do ask them to also give feedback on the quality of the text and give them some guiding questions for that (e.g. Can you identify all levels of reflection in the text? Are all questions answered?). But at the same time we believe that this is only beneficial for our students as they get a lot of suggestion on how to improve their activity's outcome the next time from their peers.

During the course of the class, assignments for reflection get more complex (e.g. “Reflect on our discussion in class today”). In the end students are supposed to be able to reflect on experiences which are very broad and not connected to one single activity (e.g. “Reflect on your choice of major subject in your studies”).

Assessment Criteria

Right from the beginning we provide our students with the assessment criteria we use to grade the quality of their reflectional texts. We believe that being transparent about the grading makes it easier for students to understand what we expect them to do in their assignments. Combined with weekly (peer-)feedback on their texts our experience shows that the quality of the reflectional texts reach a very high standard.



As already mentioned above: we solely focus on the quality of the text and disregard the actual content of the reflection. For the example given above this means: We are not ‘interested’ in how well or bad the students applied the time management methods; we are only interested in how well or bad they reflect on their experiences in their texts, no matter what these experiences have been. We emphasize at various opportunities and several times that we do not grade the actual content of the reflection but exclusively the quality of the text. Usually, after seeing and explaining the assessment criteria students find it easy to understand the difference between quality and content of a text, and know what we expect them to do in their reflection assignments.

The assessment criteria are used for giving feedback as well as for grading the student’s texts:

Levels of Reflection	Goal	Description & Documentary	Analysis & Interpretation	Assessment & Evaluation	Planning
Description of Criteria	Writer names individual learning goals for his/her activity.	Writer documents the course of his/her activity.	Writer analyses and interprets the circumstances of his/her activity.	Writer assesses and evaluates the terminated activity.	Writer plans new strategies as a consequence of his/her finished activity.
Quality Insufficient	Reader is not able to identify individual learning goals.	Reader is not able to identify the documented activity as such.	Reader is not able to identify the circumstances of the activity.	Reader is not able to identify any assessment or evaluation of the activity.	Reader is not able to identify any future plans or strategies.
Sufficient	Reader is able to identify parts of individual learning goals.	Reader is able to identify „milestones“ of the documented activity.	Reader gets the most important background information of the activity.	Reader is able to identify some assessment and evaluation criteria.	Reader is able to identify some aspects of future plans or strategies.



Comprehensive	Reader gets a comprehensive overview of detailed individual learning goals.	Reader gets a comprehensive insight of the activity's course.	Reader gets a comprehensive explanation of the activity's circumstances.	Reader gets internal and external assessment criteria which are comprehensively explained.	Reader gets a detailed and well-thought-out planning with clear explanations.

Table 1: Assessment Criteria for Reflectional Texts, adapted from Bräuer/Keller, 2013, p. 270.

For developing our assessment criteria we stuck once more to Bräuer who had already generated a scheme for assessing reflectional texts (Bräuer & Keller, 2013, p. 270f.). We adapted the scheme slightly, e.g. adding the level 0: learning goal from Jenert, and adjusting minor things in the description of the quality criteria, to fit our reflectional model.

The scheme basically mirrors the reflectional model introduced in the former chapter. The columns show the five levels of reflection, stating in the first row the central aspect of this level. The rows below display the so-called quality stages for the levels: insufficient, sufficient, and comprehensive. In the cells a description of what the reflectional text is supposed to fulfil for meeting the quality stage can be found. With the clear distinction of the different levels and quality stages it is easy to detect where exactly a reflectional text is of poor quality, and which parts are already well written quality-wise. A reflection with a very good quality is supposed to meet all the criteria required in the comprehensive quality stage for all levels.

Critical Discussion of Assessment Criteria and Feedback of Workshop

The main critique of the assessment criteria refers to the *general fact that we grade reflectional texts* as they are very personal and individual texts. We acknowledge the fact, foster an open discussion about this in our seminars, and make sure that our process is transparent for students. Nevertheless, we believe that it is possible to *distinguish between quality and content* of a text. By having clear criteria relating to the requirements of the written assignment, the reflection, it is possible to analyse the text only focusing on those criteria. This grading process requires some exercise and getting used to as in most cases it is not the usual procedure for grading written assignments (in Germany). As we are a large team all working with written reflections as assignments we also have the possibility of getting a second opinion from a colleague when we are unsure about the quality of a reflection. Most of the time this happens when a *text is very poorly structured and it is difficult to detect the*



different levels of reflections and therefore makes it difficult to determine the quality stages of the levels. The assessment criteria are a scheme and when something derives from the norm things are getting more difficult. We advise our students to stick to the order of levels of reflection within their texts. Nevertheless, sometimes students do not follow the order but still fulfil most of the criteria for a good reflection. It is then a difficult and time-consuming task to detect the levels and determine their quality stage.

While presenting our reflection model and assessment criteria in our workshop at EAPRIL 2017 in Hämeenlinna, Finland, we asked our participants to give a feedback on both after they had completed writing and grading a mini-reflection themselves. One of the criticism made by our participants was that they found it *difficult to make the difference between level 1 “what did I do?” and level 2 “how did I do it?”* Indeed, it can be quite difficult to separate these two questions as the second one (how) implies the first one (what). Hence, the text passage is prone to be redundant.

Another critique refers to the *question of objectivity within the grading process with the assessment criteria*. We often hear the question “How do you determine, what is sufficient and what is comprehensive? And how do students know?” This was another point of critique in our workshop. In the end, there is always a part left to subjectivity of the teacher. However, we try to give our best to make the whole grading process comprehensible. As mentioned above, we are giving our students a lot of feedback before we grade any reflections, and we provide several examples of reflections to illustrate what we expect from them. Experience of the last five years show that students gain a very good understanding of what is a good reflection, equalling a comprehensive quality stage, and we hardly ever have any issues with the grades. Beyond doubt, there are always things to improve but we believe that we are on the right way.

CONCLUSION

During the course of the Viadrina PeerTutoring training program the most important learning objective is the development of reflection competences. We want our students to be able to think critically about experiences and to draw conclusions for the future. Fostering reflection competences needs theoretical explanation, practice, feedback and the opportunity to revise. We decided to use e-portfolios because the students can adapt it according to their individual wishes and needs, access it any time, any place, and share it with their peers to give and receive (peer-)feedback. E-Portfolios are flexible enough to show the learning process, specific learning outcomes or competences, skills and attitudes. During the presentation of the portfolios, we see that our students really appreciate and use the freedoms to create the portfolio pages according to their own preferences. They embed digital content



like videos, pictures, personal notes to indicate the breadth and depth of their learning process. They foster their digital competences without noticing it. The students use the software actively, learn how to write in online-media and pay attention to aesthetical perspectives.

At the end of every seminar, we ask for feedback from the class. During this occasion we often hear that, in the beginning, it was difficult for the students to reflect in such a structured way. After getting used to the reflection model, receiving and giving peer-feedback and receiving feedback from the teachers it is perceived as being very helpful. Some of them internalize the reflection model and use it in their private life. When we read and assess the final reflections, we are proud of our students and their development as individuals and as members of the scientific and social community.

REFERENCES

- Arnold, P., Kilian, L., Thillosen, A., & Zimmer, G. (2013). *Handbuch E-Learning: Lehren und Lernen mit digitalen Medien* (4. erweiterte Auflage). Bielefeld: W. Bertelsmann Verlag.
- Boud, D. (2001). Introduction: making the move to peer learning. In D. Boud, R. Cohen, & J. Sampson (Eds.), *Peer Learning in Higher Education. Learning from & with each other* (pp. 1–20). London: Kogan Page.
- Bowman, J., Lowe, J. B., Sabourin, K., Salomon Sweet, & Catherine. (2016). The use of ePortfolios to support metacognitive practice in a First-Year writing program. *International Journal of ePortfolio*, 6(1), pp. 1–22. Retrieved from <http://www.theijep.com> [20.01.2018].
- Bräuer, G. (2016) (2. Auflage). *Das Portfolio als Reflexionsmedium für Lehrende und Studierende*. Opladen und Toronto: Verlag Barbara Budrich.
- Bräuer, G. (2008). Reflexive Praxis – bildungspolitischer Papiertiger, Zankapfel im Berufsfeld oder hochschuldidaktische Herausforderung. In U. Stadler-Altmann, J. Schindele & A. Schraut (Eds.), *Neue Lernkultur - neue Leistungskultur* (pp. 90–107). Bad Heilbrunn: Verlag Julius Klinkhardt.
- Bräuer, G., & Keller, S. (2013): Elektronische Portfolios als Katalysatoren für Studium und Lehre. In: B. Koch-Priewe, T. Leonhard, A. Pineker, J. Christoph Störtländer (Eds.), *Portfolio in der LehrerInnenbildung – Konzepte und empirische Befunde* (pp. 265-274). Bad Heilbronn: Klinkhardt Verlag.
- Bruffee, K. A. (1978). The Brooklyn Plan: Attaining Intellectual Growth through Peer-Group Tutoring“. *Liberal Education*, 64(4), pp. 447–468.
- Center for Key Competences and Research-Oriented Learning (2013). *What are key competences?* Retrieved from <https://www.europa->



uni.de/en/struktur/zsfl/Hintergrundinformation/Warum-SK/index.html
[20.01.2018].

Center for Key Competences and Research-Oriented Learning. (2017). *Peer Tutoring training program*. Retrieved from <https://www.europa-uni.de/en/struktur/zsfl/peer-tutoring/Zertifizierte-Ausbildung/index.html> [20.01.2018].

Commission of the European Communities (Ed.). (2001). *Making a European Area of Lifelong Learning a Reality* (COMMUNICATION FROM THE COMMISSION). Brüssel. Retrieved from <http://eur-lex.europa.eu/legal-content/DE/ALL/?uri=LEGISSUM:c11054> [20.01.2018].

Joyes, G., Gray, L., & Hartnell-Young, E. *Effective practice with e-portfolios: How can the UK experience inform implementation?* (No. 1).

Juwah, C., Macfarlane-Dick, D., Matthew, B., Nicol, D., Ross, D., & Smith, B. (2004). *Enhancing student learning through effective formative feedback*. Retrieved from http://ctl.illinoisstate.edu/downloads/modules/design/enhancing_learning_through_formative_feedback.pdf [20.01.2018].

OECD (Ed.). (2001). *Lifelong learning for all policy directions: Summary*. Retrieved from [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=D EELSA/ED/CERI/CD\(2000\)12/PART1/REV2&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=D EELSA/ED/CERI/CD(2000)12/PART1/REV2&docLanguage=En) [20.01.2018].

OECD. (2005). *The definition and selection of key competencies Executive Summary*. Retrieved from <http://www.oecd.org/pisa/35070367.pdf> [20.01.2018].

Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning, European Parliament; Council 2006.

Reinmann, G., & Sippel, S. (2011). Königsweg oder Sackgasse: E-Portfolios für das forschende Lernen. In T. Meyer, K. Mayrberger, S. Münte-Goussar, & C. Schwalbe (Eds.), *Medienbildung und Gesellschaft: Vol. 19. Kontrolle und Selbstkontrolle. Zur Ambivalenz von E-Portfolios in Bildungsprozessen* (1st ed.), (pp. 185–202). Wiesbaden: VS, Verl. für Sozialwiss.

Schwarz, S., & Vogler-Lipp, Stefanie. (2017). *E-Portfolios, «eine Möglichkeit, viel für sich selbst zu lernen». Der Einsatz von E-Portfolios als Reflexionsinstrument am Beispiel der Viadrina PeerTutoring-Ausbildung*. Retrieved from <http://www.medienpaed.com/article/view/468> [02.02.2018].



Topping, K. J. (2005). Trends in Peer Learning. *Educational Psychology*, 25(6), (pp. 631–645).



DEVELOPING A CURRICULUM TOWARDS A “PEDAGOGY OF SOLIDARITY”

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ABSTRACT

In order to assure a future of peace and solidarity, each State should take initiatives to develop an effective education related to diversity and humanity, giving to the notion of effectiveness a more humanistic character. However, apart from the need of formulating such an education policy, what is needed is an acceptable basis in this direction. This base is the adult population of each country, and, in the first instance, teachers and parents, people directly and indirectly involved in education. The aim of our research is to develop an adult education curriculum in Greece based on the concepts of:

tolerance, empathy, solidarity, and the fundamental values of human rights, supporting lifelong learning, equity and quality teaching, and promoting teacher development as a continuum. To this end, qualitative research is being carried out through semi-structured interviews in order to draw on elements related to the concepts of solidarity, empathy, equality, and, generally, the fundamental values of human rights and to support the development of the curriculum.

Research objectives:

- a. Investigating national education policy on issues of diversity.*
- b. Shifting education as a policy, as a science, and as a practice towards a humanistic point of view.*
- c. The orientation of adult education towards the formation of “solidarity consciences” not as an idealistic request, but as a demand of our times.*



INTRODUCTION

Numerous daily racial discrimination and persecution - xenophobia, homophobia, prejudice against women, sexism, prejudice against vulnerable groups, anti-semitism, islamophobia, ethnocentrism - can also be attributed to inadequate education in the values of equality, dignity, which are also included in the fundamental values of human rights. That is why action is needed.

Each state has to take initiatives to develop a culture of diversity, tolerance, human rights, equality, freedom, dignity. Purpose of education to ensure solidarity is to raise people's awareness of the fundamental values of human rights and to promote the development of skills and competences that lead to joint action and coexistence. Modern needs imply the school's obligation to this goal. Talking about such issues has to convey specific knowledge and develop skills regarding the importance of fundamental human rights, both for the rights of individuals and for the principles of formation and development of society. However, the need to formulate a corresponding education policy presupposes a fertile ground, a good base for such a direction of solidarity. This base is none other than the adult population of the country, and in the first instance teachers and parents.

The question, now, is how we can develop to people who are directly and indirectly involved in education (parents-educators) a set of values in which the concepts of tolerance, empathy and solidarity are central, to contribute through their roles in forming a more solid world.

The purpose of this study is to develop a curriculum of adult education on the concepts mentioned, so that the so-called "Third Millennium" schools are oriented in a humanitarian direction and include value contents, not only aligned with the market needs but also with the needs of man as a political and social being. Developing and delivering a suitable curriculum to parents and educators can be the beginning of such a fruitful direction in which the notion of diversity will not have a negative sign but will be treated as an opportunity for learning and cultural enrichment.

Linking theory and practice, this ongoing research is based upon the theoretical framework of anti-racist education and quality in education, in conjunction with theories of curricula. It is a fact that in Greece practice-based research based on adult education is not developed as a part of education policy, while in other countries there are educational policies related to the topic.

The key research questions are:

- a. Which is the education policy on diversity issues in Greece?



- b. In what ways do educators, policy-makers and parents define the concept of diversity?
- c. What are the educational and parenting needs of information on issues of diversity?
- d. In what ways can these needs be met within the framework of adult education?

Our planned research makes connections between theory of quality and effectiveness in education and practice-policies.

Quality and effectiveness in education are wide terms and should involve a more humanistic perspective, as given by our project. In this framework, a well-organised curriculum will improve both theory and practice. Concerning practice:

- a. the adult population will be trained (on human rights and values),
- b. the adult population will be more tolerant to diversity issues,
- c. teachers will improve their teaching material using schedules combined to the topic.

CONCEPTUAL FRAMEWORK

The main concepts of the present study are as follows:

1. Bias

The bias research understands the term "bias" as a negative attitude towards groups or individuals. This approach defines bias as a unified and steady reaction in a negative way towards members of a particular group that could be extended to any other group. An individual, therefore, is not underestimated because of his personal characteristics, but simply because he has been categorized as a member of a "foreign" group. It is totally insignificant if and how much this person views himself as a member of this group or whether this membership is based on real facts.

What is decisive, however, is the attitude of the person who breeds or expresses prejudices. Typical examples are: violence against women, prejudices towards people with disabilities, attitudes and perceptions that still exist today.

In this study, it is particularly interesting to study the attitudes and perceptions of teachers and parents towards vulnerable social groups such as migrants and refugees.

2. Racism

Racism is always up to date and remains invisible, while it acts deeply within society and individuals through its' reproduction (Berman & Paradies, 2008; Koller, 2009). It is a major social issue, and there are many questions related to the construction of the concept. The fact is that racism has a varied influence on everyone (Bonilla-



Silva, 1997). While theories of racism are rich material to be processed, it is particularly important to develop a curriculum that, through specific stages, contents and criteria, will provoke the critical thinking of learners.

3. Empathy / Tolerance / Solidarity

Empathy is often associated with altruistic motives and seems to have significant influences on the quality of social life but also on moral importance. Empathy is connected, depends and built upon self-awareness: the more we are open to our own emotions, the more we will be able to perceive feelings (Matthews, Zeidner & Roberts, 2002). For Schopenhauer, compassion for the other is not a feeling separate and distinct from the true feeling experienced by the person experiencing the problematic situation, as both are parts of a larger ontological whole. Empathy, tolerance and solidarity seem to depend on one another. Thus, an integrated adult education program needs to seek to trample the learner's "passions" through engagement with art forms such as literature or painting, as art has been shown to have a significant influence on the individual's psychosynthesis (Elias et al., 1997).

4. Human dignity

Human dignity presents a peculiarity in its' conceptual approach. Although universally recognized, it is described as being neutral. Human dignity is one of the fundamental principles in the constitutions of many states.

This is where the question arises: what has led people to put human dignity under total protection outside and beyond any limitation or exclusion? One possible explanation is that human dignity is not only a fundamental right but the very foundation upon which human rights are based (Meier-Mesquita, 1994). So if anyone attacks it, it opens the way to totalitarianism and mankind is led into conflict, injustice, violence, slavery and war. Freedom, peace and democracy are directly threatened. Respect for human dignity is, therefore, a self-evident component in the creation of a world that is governed by justice, freedom, equality and solidarity (Wigerfelt & Wigerfelt, 2014). What, however, may be the importance of human dignity and human rights regarding discrimination, the devaluation of the "other" in the daily perception of people?

In the context of the study, the concept of human dignity is been further explored, correlated with the perceptions of parents and teachers, and it is one of the elements that will set an integrated curriculum.



5. Equality, diversity and human rights

A critical challenge for modern society is to accept cultural differences without violating human rights (Troyna & Williams, 1986). Protection against discrimination is a fundamental principle of human rights, that is, every human right is inherent in all people without discrimination. Thus, the concepts of equality, diversity and human rights constitute the theoretical foundations of this study, which are explored both in bibliography and on the basis of research into attitudes and perceptions of teachers and parents in order to collect as much as possible data for setting up an integrated adult curriculum.

6. Quality in Educational Policy

Educational policy that is not based on a coherent view of education usually serves orientations of the political, religious and economic status quo, and fails to identify the nature and prerequisites of educational development as well as the appropriate methods for imprinting them through teaching.

The basic question of educational policy needs to be the one that finds its references to the society we want to build, since it must include fundamental ethical decisions that will act as safe criteria of the quality of life, meaning in a universal form and education as quality as well as education. This universal conceptual approach is necessary since we cannot define as "educational" everything a society seeks to impart to its young people (Kazepides, 1995).

Within such a view of education, a curriculum as proposed may be included in formal education.

7. Educational effectiveness and quality in education

One of the original tenets of the educational effectiveness research was the belief in social justice, but along the way many changes took place. Seeking to define the educational effectiveness and quality in education, Townsend (2012, p. 182) points out:

We have conquered the challenge of moving from a quality education system for a few people to having a quality education system for most people. Our challenge now is to move from having a quality education system for most people to having a quality education system for all people.

“Thinking and acting both locally and globally” (Townsend, 2009) needs responsible adults, critical thinkers, and to this direction it is necessary to deliver an



education to the world's population: education must be seen as a global experience, where people work for the betterment of each other, an assumption that leads to new understandings about effectively educating teachers, parents, people (Townsend, 2012, p. 183).

Educating "third millennium people", not paying attention only to "third millennium schools" (Townsend et al., 1999) should be a priority too.

8. Adult Education and Transformative Learning

According to the theory of Transformative Learning, the adult trainee criticizes the already accepted concepts, reevaluates the assumptions on which their beliefs are based, and takes action based on the thought arising from the transformed view as a consequence of their re-evaluations (Mezirow, 1990).

Transformative learning is a theory of adult learning that uses dilemmas to challenge adults' thinking. Students-adults are encouraged to think if their underlying assumptions and beliefs about the world are accurate. Therefore, adults control the critical experiences they have gained during their childhood or even later and are involved in correcting distorted affairs concerning mental, social, cultural or other areas of life. Transformative learning is the technique by which we will detect key elements for shaping a dynamic curriculum, where aesthetic experience will open a dialogue with learners' cognitive habits.

METHODOLOGY

Purpose of the research

The purpose of the research is the development of an adult curriculum on the concepts of tolerance, empathy and solidarity and the fundamental values of human rights.

Specific objectives of the research

- a. Exploring national education policy on issues of diversity.
- b. The shift of education as a policy, as a science and as a practice towards a humanistic content.
- c. The orientation of adult education towards the formation of "solidarity" consciences not as an idealistic request but as a demand of modern times.



Participants

The research will be attended by 50 teachers and parents (in Athens), as well as education policy makers whose attitudes and perceptions on diversity will be explored.

Method of analysis of research data

Initially, with regard to the type of research approach of this study, it is noted that it is a qualitative ongoing research using semi-structured interviews. This research method covers the needs and objectives of the work, as it offers the opportunity for a fuller investigation and tracing of participants' perceptions about the subject under study. Analysis of the research data of this research will be carried out using the content analysis method, and in particular through the definition of axes, which will be based on coding.

Limitations of the study

- a. Participants are adults.
- b. They are in an evolving process of development, not in the beginning of a process.
- c. They bring with them a set of experiences and values.
- d. They come to education with specific intentions.
- e. They have specific expectations in terms of the learning process.
- f. They present competitive interests.
- g. They have already shaped their own personal models of the world (Rogers, 1999).

INNOVATION OF THE RESEARCH

It is a fact that in Greece there is not a comprehensive adult education and training program dealing with issues of diversity aiming at forming a more solidarity-based society. Greece has become a host country without having the proper infrastructure and without having provided a corresponding education to its' citizens. The racist attacks are increasing, the statements of citizens and politicians make evident their wrath. This research is also practical and therefore it brings something really new, useful and necessary to our society, as the studies that already exist, although enlightening, do not go through the implementation and promotion of an integrated adult education program on issues of diversity.



CONTRIBUTION TO THEORETICAL AND APPLIED SCIENTIFIC KNOWLEDGE

The development of a curriculum of a both theoretical and applied nature is a necessity in the scientific field. In Greece, the concept of curriculum is interwoven with school education, and it is a fact that the development of a curriculum for adults that does not belong to "formal education" - in the sense of the institutionalized, chronologically classified and hierarchically structured "education system - ranging from first school education to higher education at the university - is a challenge for Greece.

In particular, the development of a non-formal education curriculum for adults with a cognitive and social orientation - development of critical thinking, human values, ethics, civic education - in combination with its alignment with philosophical, pedagogical, psychological, political and practical contributes to the interdisciplinary knowledge, to its systematization and enrichment, and ultimately to the emergence of the necessity of interdisciplinary access of the research areas under the purpose of promoting social well-being. It is worth noting that the results of the research will be the basis for developing the curriculum in such a direction.

DEVELOPMENT OF A TRANSFORMATIONAL ADULT EDUCATION PROGRAM

So far, there is no scientific-theoretical knowledge about learning objectives and contents, about methodological suggestions, ways and tools for evaluating diversity education been edited by experts in the curricula. Therefore, during the course of the research, individual elements of Curriculum referring to Human Rights are been studied, and value-educational approaches as well as teaching and learning prerequisites of education towards a pedagogy of solidarity are been examined.

Thereafter, there will be identified and defined:

1. learning objectives and goals
2. content of learning and teaching based on tolerance, solidarity, empathy and the concept of the right
4. teaching methods
4. the nature of the curriculum, which will be defined as "open"
5. teaching principles
6. the models on which the curriculum will be developed
7. approaches and strategies



DISCUSSION

The notion of values is a key-term in the discussion of the challenges of education in democracy and postmodernity, due to the fact that education in the era of modern democracies should not focus only on conventional school issues, such as curriculum, assessment criteria, school effectiveness or examinations. Whatever we decide to do at the level of education makes sense only when it concerns the wider context of what society wants to do by investing in education. An education for all combined to an anti-racist education can suggest alternatives to a more equal and prosperous global society in the times of postmodernity (Pantazis, Koutouvela & Katseli, 2017).

The present shapes the future. Forecasts of the needs of the future, however, co-shape the present. Freire (2014) underlines the necessity of a "Pedagogy of Hope", revisiting the theme of social justice and education. Within this study, pedagogy of hope is the one that builds its' foundation on the concept of man. Slee (2011, p. 94) reminds us Ball (2007, p.191) who points out:

We need to struggle to think differently about education policy before it is too late. We need to move beyond the tyrannies of improvement, efficiency and standards, to recover a language of and for education articulated in terms of ethics, moral obligations and values.

REFERENCES

- Ball, S. (2007). *Education Plc: Understanding private sector participation in public sector education*. London: Routledge.
- Berman, G. & Paradies, Y. (2008). Racism, disadvantage and multiculturalism: towards effective anti-racist praxis. *Ethnic and Racial Studies*, 1-19.
- Bonilla-Silva, E. (1997). 'Rethinking racism toward a structural interpretation'. *American Sociological Review*, Vol. 62 (No. 3), 465-480.
- Elias, M.J., Zins, J.E., Weissberg, R.P., Frey, K.S., Greenberg, M.T., Haynes, N.M., Kessler, R., Schwab-Stone, M.E., & Shriver, T.P. (1997). *Promoting social and emotional learning: Guidelines for educators*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Freire, P. (2014). *Pedagogy of hope*. Bloomsbury Academic.
- Kidd, C. (2006). *The Forging of Races. Race and Scripture in the Protestant Atlantic World*. Cambridge: University Press.



- Kazepides, T. (1995). The logic of educational policy. *Canadian Journal of Education*, 20 (3), 272-283.
- Koller, Ch. (2009). *Rassismus*. Paderborn: UTB.
- Matthews, G., Zeidner, M. & Roberts, R. (2002). *Emotional intelligence. Science and myth*. London: The MIT Press.
- Meier-Mesquita, C. (1994). Rasse, Rassismus und Rassentheorien. Die Entstehung des Rassismus und das Bild der außereuropäischen Völker in Europa. In U. Rauchfleisch (Hrsg.), *Fremd im Paradies. Migration und Rassismus* (pp. 45-60). Basel: Lenos.
- Pantazis, V., Koutouvela, Ch. & Katseli, Ch. (2017). Democracy in education in the times of postmodernity: Challenges for an anti-racist education. *International Conference on Critical Education*, Athens, Greece (28th June-2nd July).
- Pettman, J. (1986). 'Rationale'. In B. Chambers & J. Pettman (eds), *Anti-racism: A Handbook for Adult Educators* (pp. 1-12). Canberra: Australian Government Publishing Service.
- Slee, R. (2011). *The irregular school. Exclusion, schooling and inclusive education*. London & New York: Routledge Taylor & Francis Group.
- Townsend, T., (2009). Third Millennium Leaders: Thinking and acting both locally and globally. *Leadership and Policy in Schools*, 8 (4), 355-379.
- Townsend, T., (2012). Thinking and acting both locally and globally: The future for school effectiveness and school improvement. In C. Chapman, P. Armstrong, A. Harris, D. Muijs, D. Reynolds & P. Sammons (Eds.), *School effectiveness and improvement. Research, policy and practice* (pp. 177-187). London and New York: Routledge Taylor & Francis Group.
- Townsend, T., Clarke, P. & Ainscow, M. (1999). *Third Millennium Schools: A world of difference in effectiveness and improvement*. The Netherlands: Swets and Zeitlinger.
- Troyna, B. & Williams, J. (1986). *Racism, Education and the State*. Kent: Croom Helm.
- Wigerfelt, A. & Wigerfelt, B. (2014). "A Challenge to Multiculturalism. Everyday Racism and Hate Crime in a Small Swedish Town". OMNES. *The Journal of Multicultural Society*, Vol 5 (No 2), 48-75.



LEARNING POWER: THEORY AND DATA DRIVEN INNOVATIONS USING TEACHER DESIGN TEAMS

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ABSTRACT

This contribution outlines the Learning Power research and development project at the Teacher Education Department of the Artesis Plantijn University College in Belgium. Twenty-four teachers redesign the learning environment for various applied didactics' course modules in six content-clustered Teacher Design Teams (TDTs). They are supported in their process by coaches and two types of inspirational materials: a didactic framework, referred to as the Chameleon model, and research-data on their own students' background variables, learning strategies, motivational drives, perceptions on the learning environment and (perceived) learning outcomes. Research incorporated into the project has a twofold aim: (1) Identifying enhancing and impeding factors in TDTs with special attention devoted to the role the didactic models and student data play in this process. (2) Measuring the impact of the innovation on students' perceptions on their learning environment and their learning outcomes. To explore TDT processes, personal and group reflections of participants and interviews with coaches are analysed. The impact on students' perceptions and learning outcomes are investigated using self-report questionnaires and student-administration data. A quasi-experimental design is used. Data analysis techniques include analyses of variance, linear regressions and SEM. Initial results on the first research aim demonstrate that participants perceive student data as both beneficial and impeding their innovation process. Up till now, the didactic model is mentioned neither in a positive nor negative way.



INTRODUCTION

The so-called democratisation wave of higher education has not only led to an increase in student numbers, it is also paralleled by a diversification of the student population (Schuetze & Slowey, 2002). Students enrolling in the first year of higher education differ from each other in background variables such as socio-economic state, language skills, age, prior education, ..., but also in learning strategies they have already acquired and motivational drives for the courses they enrolled in. This seems especially true for countries in which open access to higher education is granted (Noyens, Donche, Coertjens & Van Petegem, 2016), as is the case in Flanders. At the same time higher education is struggling hard to enhance students' study success and decrease drop-out rates (OECD, 2013). Crucial in attaining this aim is the creation of powerful learning environments. These top-end platforms should not only take into account the heterogeneity of incoming students but also focus on reaching a broad spectrum of high-quality learning outcomes, including substantive goals, language skills, learning strategies and/or (self-)regulatory competences. This often necessitates the sustainable innovation of current learning environments and requires the professional development of the lecturers involved.

Research argues that this sustainable innovation cannot be achieved by disconnected professional development activities, such as workshops (Stes, 2008) or by a top-down initiated innovation policy (van den Akker et al., 2012). In the latter there is little to no lecturer involvement in the design or development process (Handelzalts, 2009), leaving teachers disconnected from the innovations. A bottom-up approach that relies on local initiatives and involves teachers in the innovation seems more effective and tends to lead to a more high-quality innovation (Johnson, 1993). As it stands, Teacher Design Teams (TDTs) fulfil these criteria. Teacher Design Teams can be defined as teams of at least two teachers or lecturers who collaborate on a regular base to (re)design part of their curriculum or learning environment (Huizinga, Handelzalts, Nieveen, & Voogt, 2014). Initial research results on these teams look promising (Voogt et al., 2011), although they also point to conditions that need to be met for teams to be successful in their innovations. For instance, studies suggested the quintessential importance of an external coach for the teams, high-quality inspirational materials for lecturers or the deliberate composition of the teams (Binkhorst et al., 2015).

Research on TDTs however is still in its infancy. A lot is still unknown about factors enhancing or inhibiting the efficiency of TDTs. The Learning Power project is a practice-oriented research project that is currently being conducted at the teacher education department of the Artesis Plantijn University College in Antwerp. It employs six content-clustered Teacher Design Teams for the sustainable innovation of various course modules on applied didactics. The objective of the Learning Power



project is to scrutinise the innovation process of the TDTs and pinpoint the critical success factors that determine the quality of the innovation process and its accompanying outcomes. Two factors are of particular interest to the research project: (1) How do TDTs take into account student-data in their innovation and (2) how do they incorporate guidelines from a didactic framework (i.e. the Chameleon model).

Over time, the Learning Power project also explores whether or not the innovated learning environment results in a change in student perceptions on that learning environment or leads up to different learning outcomes with students. However, as the project is still in a start-up phase, the current contribution focuses on the general set-up of the project and on preliminary findings regarding success factors as perceived by TDT participants.

THEORETICAL FRAMEWORK

Teacher design teams

A TDT is a group of minimum two lecturers who collaboratively (re)design their curriculum (Huizinga et al., 2014). TDTs are related to concepts such as Communities of Practice (Wenger, 2010), Professional Learning Communities (Stoll et al., 2006) or data teams (Schildkamp & Ehren, 2013). They all share the notion of teacher empowerment, teacher collaboration and teachers taking ownership in their professional development (Handelzalts, 2009). With Communities of Practice and Professional Learning Communities, TDTs have the triple aims of (1) Designing curriculum materials, (2) Professional development of teachers and (3) Organisational innovation in common. However, whereas the focus of the first two types of communities is predominantly on sharing and learning from each other (professional development), the emphasis in TDTs is more focused on co-creating specific materials or curriculum innovations (Huizinga et al., 2014). Teachers do learn while taking part in TDTs, but these learning activities are primarily regarded as instrumental to developing high-quality curriculum materials (Binkhorst et al., 2015). Data teams and TDTs share the aim of wanting to solve local, context-specific problems and challenges (Schildkamp & Ehren, 2013). Nonetheless, data teams primarily aim to do so by gathering data and conducting research. Research-data can also play a role in TDTs, but are regarded as one of many means to get input for redesigning curriculum materials.

Existing research on TDT effectivity argued, among other things, for the following conditions to be quintessential: (1) *Organised meeting time*, preferably at the school or institute and within the hours of a normal 'working week'. Participants should



experience taking part in a TDT as 'being part of the job, not as 'being an addition to the job'. (2) *Presence of an external (process) coach*. Ideally this coach takes on the dual role of regulating social group processes and providing substantive expertise. (3) *Availability of inspirational materials*. Teachers often want to innovate but lack ideas on which direction to take. In this case inspirational materials can serve as a starting point for discussion (Handelzalts, 2009). (4) *Composition of the team*. Individual characteristics of the team members play an essential role in the efficiency of TDTs. The composition of the teams therefore must be well-considered. Motivation, work and design experience and innovation ambition are factors that can enhance or inhibit the success of TDTs. First, teachers or lecturers who are autonomously motivated, are more willing to participate in professional development initiatives and are more likely to implement reforms (Gorozidis & Papaioanna, 2014). Secondly, decisions in the design process are based on the work experience of team members (Roschelle & Penuel, 2006). Thirdly, individuals with a clear innovation ambition achieve more goals within their TDT. Furthermore a shared innovation ambition is essential. Teams with a non-shared and vague ambition show less progress in developing new curricula and materials (Handelzalts, 2009). (5) *Features of the design task*. An added-value and a long-term perspective are important criteria (Becuwe et al., 2015). Designing for real-world use, supports the design process (Svihla et al., 2015).

The Learning Power project explores the impact of two types of inspirational materials. On the one hand, TDTs are provided with research-data on the characteristics of their own student populations and learning environment perception. On the other hand, TDTs are equipped with a didactic model that can serve as framework for their innovations. Existing research argues that data-driven innovation works (Schildkamp & Kuiper, 2010; Schildkamp & Ehren, 2013). At the same time studies show that teachers have great difficulties interpreting such data. In addition, they find it challenging to apply research findings for innovative purposes (Van Gasse, Van Hoof, Mahieu, & Van Petegem, 2015). Prior research on TDTs also suggests that teams tend to get caught up in organisational and substantive discussions at the expense of didactic ones (Handelzalts, 2009). In an effort to counter this natural tendency, TDTs in the Learning Power project are provided with a didactic model, called the Chameleon model, as a reference. Research will have to demonstrate if, how and why TDTs use these types of inspirational materials to facilitate their innovation process.



THE LEARNING POWER PROJECT SETUP

Organisation

Twenty-four lecturers teaching applied didactics in the teacher education department (at professional bachelor level) participate in the project. They have been clustered in six domain-oriented TDTs with the aim of redesigning their learning environment for applied didactics. On a monthly base, TDTs convene during (three) working hours under the supervision of a coach. Taking part in these TDTs is scheduled in the teachers' workload. Coaches are substantive experts in educational psychology and received a two-day training in coaching. Coaches take part in monthly supervision sessions, led by a coaching expert.

TDTs have three academic years to complete their innovations. The project started with a kick-off day in January 2017 during which lecturers were informed about the general aim of the project and the idea of TDTs. In addition, lecturers took part in a workshop to familiarise them with the didactic model and learning how to interpret student-data. The general timeline expects TDTs to finish a first draft of their innovation by the end of the first academic year (2016-17). This initial version will be implemented during the second academic year (2017-18) and redesigned based on experiences and student-feedback. A second and final implementation will take place during the 2018-19 academic year. At this point the effect of the innovation on students' perceptions and learning outcomes will be explored (Research aim 2).

Didactic model

The Learning Power project implements the Chameleon model (Dutch: kameleon) as a didactic reference for TDTs. Kameleon is the abbreviated acronym (in Dutch) of 'Kansen op MEer LEren in ONderwijs', which translates in English to: 'Enhancing chances for learning in education'. It is the internal didactic model of the AP University College and it is still under construction. The emphasis in this model is on a broad focus in teaching, which conveys the idea that contemporary higher education lecturers are expected to not only deliver content knowledge in their learning environment, but also support students in developing a wide variety of competencies such as language proficiency, social skills, learning strategies and self-regulation. Teachers are challenged to do so in an inclusive way.

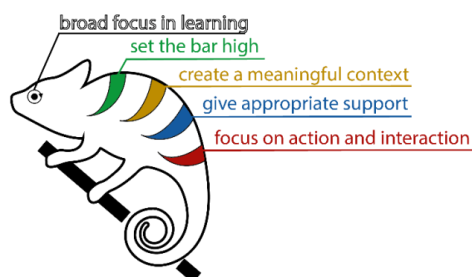


Figure 1: The Chameleon model: pillars

The Chameleon model provides didactic suggestions, based on four theoretical models: (1) Universal Design for Learning (UDL; Burgstahler & Cory, 2008), Content and Language Integrated Learning (CLIL; Mhisto, Marsh & Frigols, 2008), Basic Needs Support (Niemic & Ryan, 2009) and Visible Learning (Hattie, 2008). These didactic impulses were clustered around four pillars, each holding three didactic suggestions: (1) Provide high expectations, (2) Create a rich contextual setting, (3) Offer appropriate support, (4) Induce action, interaction and collaboration. Table 1 provides an overview of the didactic suggestions.

Table 1: The Chameleon model: Didactic suggestions

Pillar	Suggestion 1	Suggestion 2	Suggestion3
<i>Set the bar high</i>	High expectations	Communication	Trajectories and differentiation
<i>Create a meaningful context</i>	Value and relevance	Providing information through various channels	Transfer
<i>Provide appropriate support</i>	Feedback	Modelling and examples	Scaffolding
<i>Focus on action and interaction</i>	Common goals and individual accountability	Question and answers	Alternation of provision and processing of information

The use of student-data

Students who are enrolled in the various course-modules for applied didactics (N=317 at the start of the academic year) are questioned on several occasions during the academic year with the aim of providing TDTs with student-data. In all instances



self-report questionnaires are used. Additionally, background information and performance measures are retrieved from the student administration office.

At the start of the academic year student enrolment profiles were created, incorporating students' (self-reported) study motivation, self-efficacy and learning strategy use. These data were obtained using the LEarning strategy and MOTivation questionnaire (Lemo, Vanthournout et al., 2016). Students language proficiency was also diagnosed. At the end of the semester students' learning strategies, social integration (Beekhoven, de Jong, & Van Hout, 2002) and study commitment (Bosma, 1992) are mapped. During the second semester, students also provide data on their perceptions of the didactic quality of the applied didactics' learning environment they were enrolled in and on the self-perceived learning outcomes. To gather this data, a self-report question was developed, based on existing perception questionnaires (e.g. Course Experience Questionnaire; Ramsden, 1991) and guided by the didactic suggestion from the Chameleon model (See Table1).

TDTs are provided with descriptive statistics and correlations on the various variables through report cards. These reports also contained information that supported participants in the TDTs on interpreting results, without actually providing them interpretations.

RESEARCH IN THE LEARNING POWER PROJECT

Research aims

As stated at the end of the introduction, the Learning Power project addresses two research aims. These aims were each operationalised in two research questions. The first research aim involves exploring enhancing and impeding factors that influence the success of innovation using TDTs. Special attention is devoted to the effect of student data and a didactic model as inspirational materials.

- RQ1: What factors do participants in TDTs perceive as being enhancing or impeding to the success of their TDT? Do these factors change over the course of time?
- RQ2: To what extent do participants in TDTs perceive student-data and a didactic model to be enhancing or impeding factors for the success of their TDT? When and under which conditions are these factors mentioned?

In the current project, a successful innovation is defined as an innovation that results a positive impact on the student perceptions of the learning environment and their learning outcomes.



The second research aim of the project is to investigate whether or not the innovations of the various course modules on applied didactics were successful.

- RQ3: What is the impact of the innovation on the students' perceptions on the learning environment?
- RQ4: What is the impact of the innovation on the learning outcomes?

Research design and instruments

A qualitative research design is set up to investigate the influencing factors in TDTs. In order to pinpoint the impact of the innovated learning environment on students' perceptions and learning outcomes, a quantitative quasi-experimental design is forwarded.

To explore influencing factors, participants in the TDTs fill out individual written reflections at the end of each TDT meeting. In addition, they also record an oral group reflection at the end of each meeting. Given the fact that coaches are additional, important stakeholders in the TDT process, researchers also record the supervision sessions. Coaches are interviewed at the end of each semester on the progress of their TDT. In addition a sample of participants in TDTs will be interviewed during the second and the third year of the project.

Grounded theory (Straus & Corbin, 1997) is used as reference for data analysis of success factors. An initial coding scheme is developed by one of the researchers based on the reflections of the first TDT meeting of the six TDTs. This coding scheme is used as a starting point for analysing the remaining reflections. Gradually, the coding scheme is developed and refined as meetings and TDTs progress. In a next phase, results for various meetings and TDTs are combined to analyse general trends, differences between TDTs and developments in reported success factors. In a final step, more detailed analyses are conducted on when and how both the Chameleon model and student-data are mentioned in the reflections.

The success of the designed innovation is primarily monitored using student-data. Thus, these data are not only communicated to the TDTs as inspirational materials, but also used as research data in a quasi-experimental design. Data gathered in the first year of the project, when TDTs are starting up, serve as a control condition, while the data that will be gathered in the third year will be used to measure the effects. Two types of effects are investigated: changes in students' perceptions on the learning environment and changes in student outcomes. Students' perceptions on the learning environment are explored using a questionnaire developed and validated during the project, called the MATEY. The questionnaire uses the Chameleon model as a reference and maps various didactic aspects of the learning environment using internationally acclaimed instruments such as the Teacher As Social Context



Questionnaire (Belmont, Skinner, Wellborn & Connell, 1988) or the Course Experience Questionnaire (Ramsden, 1991). Learning outcomes are mapped in a twofold way: First, student grades are considered as an outcome variable. Secondly, outcomes are also measured in a more qualitative way by asking students' perceptions on the degree to which they have acquired specific skills during applied didactics. These skills under question are based on existing questionnaires measuring learning outcomes such as the learning outcome questionnaire (Stes, 2008). To measure the impact of the innovation in applied didactics on students' perceptions and learning outcomes, we plan on conducting various forms of regression analysis, ranging from analysis of variance to structural equation modelling (Kline, 2015).

Given the fact that the project is currently only at the end of its initial academic year, it is only possible to provide preliminary results. To give readers a grasp of initial results we present preliminary findings on the following research questions:

- RQ1: What factors do participants in TDTs perceive as being enhancing or impeding to the success of their TDT?

PRELIMINARY RESULTS

Up till now, participants' individual reflections of 13 TDT meetings were analysed. For each TDT, reflections on at least two meetings were available. Overall, 44 different enhancing factors and 25 different impeding factors were mentioned. Cited positive factors outnumbered the negative ones (140 vs. 82). Due to word limitations, we restrict ourselves to discussing the most frequently mentioned factors.

Participants' perceptions of enhancing factors

Coaches are mentioned most frequently as being a factor for success (Table 2). Participants in TDTs appreciate the fact that coaches make preparations for the meetings and also provide reports afterwards. The constructive way in which coaches support the innovation process is also valued.

Table 2: Most frequently cited enhancing factors

Factor	Number of cites	Number of sources (max=13)
Coach	19	7
Openness and constructive attitude	14	5
Collaboration and sharing	12	5
Student-data	10	9
Different angles	8	7



Lecturers cite the openness and constructive attitude of fellow-participants as the second most important factor for success. Lecturers participate in the TDTs with an open attitude. All topics are open for discussion. In most cases, teams are concordant on the direction they want to proceed with the innovation. If participants have a *different angle* on teaching, have other conceptions on teaching or apply different instructional methods, this is perceived as enriching. Participants appreciate getting to know each other's practices and enjoy learning from each other. Participants value the fact that they have the time and *opportunity for sharing and collaborating* built in their workload. They are grateful for the fact that the project provides opportunities for structural collaboration.

Finally, *research-data on students* are cited as a factor enhancing the process. Participants especially appreciate that data are provided on their own student population and (in the second half of the semester) on students participating in their course module on applied didactics. Lecturers state that the report on students' perceptions regarding the didactic quality of their course module, although at times confronting, raises awareness and provides guidelines for innovation.

Participants' perceptions of impeding factors

Participants also point out some impeding factors. Three factors are cited most commonly. *Ambiguity regarding the aim of the project* and lack of direction at the start of the project are regarded as the strongest impeding factors. Initial meetings centred around exploring and searching on how to proceed. Lecturers feel the need for clearer guidelines.

Table 3: Most frequently cited impeding factors

Factor	Number of cites	Number of sources (max=13)
Ambiguity & vagueness	13	6
Absence of colleagues	11	6
Student-data	6	4

Absence is perceived by participants as an important obstruction for the innovation process. This entails both participants not being present, turning up late or running out of the meeting as well as feeling that other colleagues should be involved in the TDTs for innovations to be meaningful.

Research-data on students is also cited as a negative factor. Most complaints centre around the fact that initial reports only mention results at the whole-group level and not at the level of the course-module. Thus, participants perceive the information to



be too general to be useful. Other objections state that the data were too ‘analytical’ and do not coincide with intuitive feelings about students or people’s own learning environments.

PRELIMINARY CONCLUSIONS

The Learning Power project aims at designing sustainable educational innovation by placing teachers at the heart of the innovation process. Content-clustered teacher design teams were implemented to achieve this aim. Participation in these teams is calculated into participants’ regular workload. Teams are supported in their design process by coaches and by two types of inspirational materials: a didactic concept called the Chameleon model and research-data on their own students. Preconceived outcomes of the project include an innovated learning environment for various course modules on applied didactics, but also enhanced expertise of participants, e.g. on the interpretation and application of research-data. Research in the project focuses on a twofold aim. On the one hand, the research explores enhancing and impeding factors in TDTs with a special focus on the role of the didactic model and student-data play. On the other hand, the study investigates the effect of the innovation on students’ perceptions of the didactic quality and on students’ learning outcomes.

Research, design and education are closely intertwined in this project. Data gathered with students is not only utilised as information for participants in TDTs, it is also drawn on to investigate effects of the innovations. Participants experience the value of research and enhance their experience in using data for developmental purposes. This also potentially affects students through lecturers’ education. Participants’ opinions on enhancing and impeding factors, ventilated through their individual and group reflections are picked up by the researchers, discussed with the coaches and translated into better support tools for the participants. This close nexus between research and educational design potentially has a positive effect on the overall quality of the teacher education programme and on the mind-set of its constituting lecturers.

Research is still ongoing, so results are preliminary at the moment. Most findings on enhancing and impeding factors are in line with existing research. The quintessential role of coaches, composition of teams and practical organisation of the TDTs (Handelzalts, 2009; Binkhorst et al., 2015) are confirmed in our current study. A kick-off day with cut and dried information, a manual for participants, the availability of coaches and two types of inspirational materials could not prevent participants from feeling disorientation and witnessing a lack of direction at the start of the innovation process. Van den Akker (2012) attributes this ‘mist-phase’ to the fact that teachers are not familiar with the role of self-directed designer of their learning environment. It is comforting to see that TDTs cite student-data as an



important enhancing factor in the innovation process. Data specificity and support in interpretation seem to be conditions for data to be perceived as relevant. The didactic model is mentioned neither as a positive nor negative factor. Several hypotheses can be forwarded for this observation. First, as participants in the TDTs are teacher educators teaching applied didactics, they probably perceive themselves to be more of an expert in didactics in comparison to research-data. Therefore they might possibly conceive the didactic model as being redundant. Secondly, the didactic model postulates four pillars and twelve underlying didactic suggestions and still requires translation and learning environment specification. It might be that the model in its current form is too general for teachers to be of relevance. Finally, most teams are still in the process of exploring the existing situation, demarcating goals and planning actions at the time of writing. It is feasible that student data play a more dominant role in this first, exploratory phase, while the didactic model might be more relevant in a future phase, when specific instructional methods and materials will be designed. Future research will demonstrate how the importance of these factors may change over time.

REFERENCES

- Beekhoven, S., De Jong, U., & Van Hout, H. (2002). Explaining Academic Progress via Combining Concepts of Integration Theory and Rational Choice Theory. *Research in Higher Education*, 43(5), 577-600.
- Becuwe, H., Pareja Roblin, N., Tondeur, J., Thys, J., Castelein, E. & Voogt, J. (2017). Conditions for the successful implementation of teacher educator design teams for ICT integration: A Delphi study. *Australasian Journal of Educational Technology*, 33(2), 159-172.
- Belmont, M., Skinner, E., Wellborn, J., & Connell, J. (1988). *Teacher as social context: A measure of student perceptions of teacher provision of involvement, structure, and autonomy support*. Rochester: University of Rochester Press.
- Binkhorst, J., Handelzalts, A., Poortman, C.L., & van Joolingen W.R. (2015). Understanding teacher design teams – a mixed methods approach to developing a descriptive framework. *Teaching and Teacher Education*, 51, 215-224.
- Bosma, H. A. (1992). Identity in adolescence: Managing commitments. In G. R. Adams, T. P. Gullotta, & R. Montemayor (Eds.), *Adolescent identity formation* (pp. 91-121). Thousand Oaks, CA: Sage.
- Burgstahler, S., & Cory, R. (2008). *Universal design in higher education. From principles to practice*. Cambridge: Harvard education press.



- Gorozidis, G. & Papaioannou, A. G. (2014). Teachers' motivation to participate in training and to implement innovations. *Teaching and Teacher Education*, 39, 1-11.
- Hajer, M., & Meestringa, T. (2011). *Handboek taalgericht vakonderwijs*. Bussum: Uitgeverij Coutinho.
- Handelzalts, A. (2009). *Collaborative curriculum development in teacher design teams*. Twente: University of Twente.
- Hattie, J. (2008). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. New York: Routledge.
- Huizinga, T., Handelzalts, A., Nieveen, N., & Voogt, J. (2014). Teacher involvement in curriculum design: need for support to enhance teachers' design expertise. *Journal of Curriculum Studies*, 46, 33-57.
- Johnson, N. A. (1993). Reconsidering curriculum-development - A framework for cooperation. *Interchange*, 24, 409-433.
- Kline, R.B. (2015). *Principles and practice of structural equation modelling*. New York: The Guilford Press.
- Mehisto, P., Marsh, D., & Frigols, M.J. (2008). *Uncovering CLIL: Content and Language Integrated Learning in Bilingual and Multilingual Education*. London: Macmillan Education.
- Niemic, C., & Ryan, R.M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *Theory and Research in Education*, 7, 133-144.
- Noyens, D., Donche, V., Coertjens, L., & Van Petegem, P. (2017). Transitions to higher education. Moving beyond quantity. In E. Kyndt, V. Donche, K. Trigwell, & S. Lindblöm-Yläne (Eds.) *Higher education transitions. Theory and practice*. New York: Routledge.
- OECD (2013). *The state of higher education 2013*. Paris: OECD Higher Education Program Publications.
- Ramsden, P. (1991). A performance indicator of teaching quality in higher education: The course experience questionnaire. *Studies in Higher Education*, 16, 129-150.
- Roschelle, J. & Penuel, W. R. (2006). Co-design of innovations with teachers: Definition and dynamics. In S. Barab, K. E. Hay, & D. T. Hickey (Eds.), *Proceedings of the 7th international conference on learning sciences* (pp. 606-612). Bloomington: International Society of the Learning Sciences.



- Schildkamp, K., & Ehren, M. (2013). From "Intuition"- to "Data"-based decision making in Dutch secondary schools? . In K. Schildkamp, M. Kuin Lai & E. Loma (Eds.), *Data-based Decision Making in Education*. Dordrecht: Springer Nederland.
- Schildkamp, K., & Kuiper, W. (2010). Data-informed curriculum reform: Which data, what purposes and promoting and hindering factors. *Teaching and Teacher Education*, 26, 482-496.
- Schuetze, H., & Slowey, M. (2002). Participation and exclusion: A comparative analysis of non-traditional students in higher education. *Higher Education*, 44, 309-327.
- Stes, A. (2008). *The impact of instructional development in higher education: Effects on teachers and students* (Unpublished doctoral dissertation). University of Antwerp. Antwerp.
- Stoll, L., Bolam, R., McMahon, A., Wallace, M., & Thomas, S. (2006). Professional learning communities: a review of the literature. *Journal of Educational Change*, 7, 221-258
- Svihla, V., Reeve, R., Sagy, O. & Kali, Y. (2015). A fingerprint pattern of supports for teachers' designing of technology-enhanced learning. *Instructional Science*, 43(2), 283-307.
- Van den Akker, J. (2012). Principles and methods of development research. In J. van den Akker, R. Maribe Brent, K. Gustafson, N. Nieveen, & T. Plomp (Eds.). *Design approaches and tools in education and training* (pp.1-14). Dordrecht: Springer.
- Vanthournout, G., Van de Mosselaer, H., Donche V., & Vansteenkiste, M. (2016). Discovering and strengthening learning strategies and motivation using the Lemo-instrument. In P. Bonne & D. Nutt (Eds.). *Ten times the first year. Reflections on ten years of the European First Year Experience Conference*. Tiel: Lannoo Campus.
- Voogt, J., Westbroek, H., Handelzalts, A., Walraven, A., McKenney, S, Pieters, J., & de Vries, B. (2011). Teacher learning in collaborative curriculum design. *Teaching and Teacher Education*, 27, 1235-1244.
- Wenger, E. (1998). *Communities of practice: learning, meaning and identity*. Cambridge, University of Cambridge Press.



THE CHAMELEON-PROJECT: DEVELOPMENT OF A DIDACTICAL SUPPORT MODEL AND VALIDATION OF AN ACCOMPANYING FORMATIVE SURVEY

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ABSTRACT

This submission outlines the ongoing development of the 'CHAMELEON-model' at the Artesis Plantijn University College. The model was developed as a didactic support model for teachers with the aim of helping them attain a broad focus in their teaching. The latter denotes teaching that does not only transmit content, but also devotes attention to accessibility of the content, motivation of students and the development of generic competences such as language competences, social competences and self-regulation. The model is based on a literature search that integrates insights from Self-Determination Theory, Content and Language Integrated Learnings, Universal Design for Learning and Visible Learning. These insights were synthesized in four pillars and twelve didactic suggestions. The model was further refined on the basis of interviews, feedback sessions and the use in professional development activities. To help teacher assess the didactic quality of their learning environment according to the CHAMELEON-model, a student-perception questionnaire was developed. Based on a literature review relevant scales from existing high-quality self-report questionnaires were inventoried, combined and adapted to fit the context of higher education. A feedback report for teachers was also designed. Psychometrical analyses (N=312), including confirmatory factor analyses and reliability analyses, confirmed the quality of the instrument.



INTRODUCTION

The CHAMELEON-model arose from two complimentary observations. First, contemporary society and economic reality are asking for flexible, critical, language proficient, self-regulated, motivated citizens and employees (Gijbels, Raemdonck, & Vervecken, 2010). This challenges higher education to devote attention to the development of generic competences and professional skills in addition to the transmission of content knowledge (European Union, 1995). To attain these aims, teachers are requested to create a broad focus in their teaching and design a powerful learning environment that is accessible for the diversity of students in their student-population (Heikkilä, Niemivirta, Nieminen, & Lonka, 2011). This broad focus may encompass devoting attention to language skills, study motivation, learning strategies (Cornford, 2002), generic professional competences (Kyndt et al., 2014), soft skills, 21st century skills and/or students' personal development (OECD, 2001). Broadening their focus in teaching requires teachers to adapt and innovate their learning environment. This however, can put a lot of strain on teachers as most of them are primarily experts in their substantive domain, rather than didactic experts. Broadening their focus thus requires them to not only follow up on developments in their own domain, but also to familiarize themselves with (multiple) models on how to stimulate specific skills and competences. Given constraints in time and energy, teachers' (perceived) didactic expertise and existing workload, this seems to be a daunting task. To put it differently, teachers not necessarily lack the 'will' to innovate their learning environment and broaden their focus in teaching, but they sometimes lack 'skill' and 'time'.

Second, despite the fact that motivation, student learning, language proficiency support or accessibility all have their own models and frameworks like for instance Self-Determination Theory (Deci & Ryan, 2000), Content Based Language instruction/sheltered instruction (Majer & Meestringa, 2011), Visible Learning (Hattie, 2008) or Universal Design for Learning (Nelson, 2013). It is surprising that most of these models propose similar didactic recommendations. For instance, all these models emphasize high-quality feedback as a powerful instrument to enhance learning and motivation. So, although the aims of the models and frameworks may differ, there seems to be an overlap in means or recommendations to attain these aims.

These two complementary observations sparked the authors of the current submission to look for the common ground in several frameworks and construct a synthesizing model with a dual aim: On the one hand such a model would strengthen professional development activities in different areas (in our institution) as they would be based on a single model. On the other hand, the model would concede to teachers' requests for an easily usable and transparent model for structuring



innovations in their learning environments. The resulting model became known as the CHAMELEON-model. When teachers were confronted with the model, it became clear they would also be interested in an instrument to diagnose the didactic quality of their learning environment according to the CHAMELEON-model. The authors therefore decided to construct and validate a self-report questionnaire for students to assess their learning environment's didactic quality. Using the data from the validation study the authors also conducted some preliminary substantive empirical research on relation between the scales in the instrument and the variation in perceptions across different learning environments.

Therefore, the research aims underlying the development of the CHAMELEON-model and the subsequent design and validation of the questionnaire were as follows:

1. Can we design a straightforward and usable model that can support teachers in attaining a broad focus in teaching?
2. Can we develop a valid and reliable diagnostic tool for assessing the didactic quality for specific learning environments according to the model we designed?
3. How are students' perceptions of the learning environment related to each other?
4. Do students' perceptions vary across variants of the course-module?

The remainder of this submission briefly describes (1) the underlying frameworks of the CHAMELEON-model, (2) its development process, (3) the development of a self-report questionnaire that enables students to assess the didactic quality of a learning environment they are enrolled in. (4) Validation of and (5) empirical research on the questionnaire we developed.

UNDERLYING THEORETICAL FRAMEWORKS

Chameleon incorporates didactic suggestions from four theoretical frameworks: Universal Design for Learning (Diversity; Nelson, 2014), Visible learning (Didactical quality; Hattie, 2008), Self-Determination Theory (Motivation; Stroet, Opdenacker, & Minnaert, 2014) and teaching language through content (Language development; Hajer en Meestringa, 2011).

Universal Design for Learning

Universal Design for Learning (UDL, Nelson, 2013) is a set of principles for curriculum development that provides equal opportunities to learn to all students. UDL is a well-known model for assessing an enhancing accessibility to education for a diverse student population. It puts into question inflexible, one-size-fits all curricula and takes variability between students as a starting point for designing



curricula. UDL translates the concept of accessibility for all students in three guiding principles: (1) Provide multiple means for representation; (2) provide multiple means for action and expression; (3) provide multiple means of engagement. These principles are further operationalized in nine guidelines, as presented in Figure 1. Putting into practice these guidelines is said to enhance learning opportunities for 'all' students

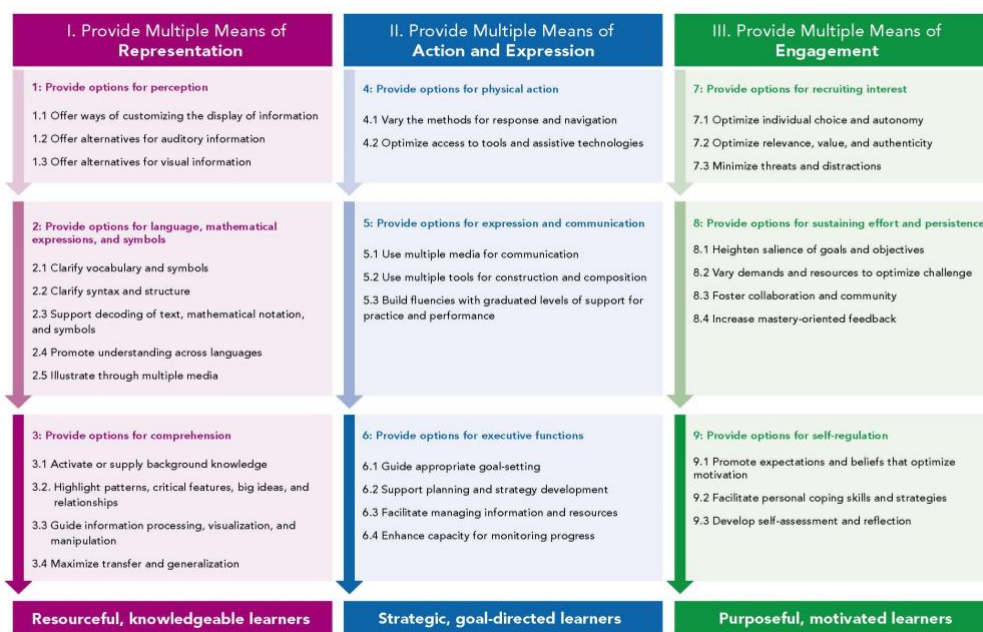


Figure 1: Universal Design for Learning model (c) CAST

Visible learning

In 2008 John Hattie and colleagues published an encompassing study on factors enhancing student outcomes (Hattie, 2008). Factors were structured in four categories and organised according to effect-size. Factors included 'student factors', 'School factors' 'family factors' 'teacher factors' and factors in the 'learning environment'. The idea is that teachers and educational institutions can use these factors (and their effect-size) to assess and enhance the didactic quality of their learning environment in light of student outcomes. For the development of the CHAMELEON-model, we consulted and took into account 'teacher factors' and 'factors in the learning environment' with a high effect-size.



Self-determination theory

Self-determination theory is a contemporary theory on human motivation (Deci & Ryan, 2000). The framework is composed out of five mini-theories. One of those theories, basic needs theory, is concerned with how the fulfilment of the basic human needs of autonomy, competence and relatedness affects peoples' motivation (Sierens, Vansteenkiste, Goossens, Soenens, & Dochy, 2009). One of the fields where this theory is applied, is the context of (higher) education. Within this context basic needs theory provides insights on how the fulfilment of students' psychological needs in the learning environment impacts on their study motivation (Stroet, Opdenakker, & Minnaert, 2013).

The need for autonomy is fulfilled when students feel they decide on their own choices and regulate their own behaviour. Teachers can satisfy this need, amongst other things by providing choice, by explaining the value and relevance of the content they are teaching or by incorporating students' opinions in their learning environment. The need for competence refers to students' wanting to feel capable in their behaviour and feeling a potential for growth. Teachers can support this need by being transparent about the aims they want students to achieve, by providing high-quality feedback and by providing challenges for students. The need for relatedness is concerned with students' feelings of being respected and being engaged in meaningful relations. Teachers can support this need by showing interest in students, by being available when students ask for support and by organising learning activities in which students can collaborate with each other.

The more teachers are able to fulfil students' basic needs, the more students are inclined to intrinsic or autonomous study motivation (Sierens et al., 2009). These types of high-quality motivation are themselves found to be related to positive feelings, deep learning and positive learning outcomes. Lack of fulfilment or deprivation of basic needs may result in controlled study motivation or even lack of motivation (Stroet et al., 2013). These motivational drives are linked to surface learning, negative feelings, negative learning outcomes and drop-out.

Teaching language through content

Familiarity with characteristics of academic/professional language, style and text structure and the ability to learn new vocabulary and jargon is a basic skill required for success at higher education level (e.g. Hattie, 2008). Many otherwise competent students lack the reading, writing, listening and speaking skills required in an academic environment, putting their performance at risk.



Building a powerful learning environment in which language proficiency and content are taught simultaneously is necessary to provide optimal chances to talented students (Majer & Meestringa, 2011). As language serves as a gateway to the (processing of) content, they are strongly connected. Teachers can actively play a role in stimulating student's learning process in both content and language by making specific choices in their instructions and teaching methods. To recognize powerful instruction that is content-based but with an explicit language learning objective, Majer and Meestringa (2011) set out three basic features: create a meaningful context, stimulate interaction and provide students support. All three of them are represented in the CHAMELEON model, because of their clear link to the other theoretical approaches.

The practical teaching suggestions of Majer and Meestringa are inspired by *Content-Based Approach* of Snow and Brinton (1997) and Ecchevaria, Vogt and Short (2008).

DEVELOPMENT OF THE CHAMELEON MODEL

We started with an exploration of existing literature on each of the theoretical frameworks mentioned above. We primarily searched for handbooks, seminal work and meta-analyses. Based on this exploration we constructed an overview of didactic suggestions for each of the models separately. We combined the resulting suggestions across the frameworks, grouped them thematically and tallied how many frameworks proposed specific suggestions. This resulted in an initial thematic matrix on didactic suggestion. Via deliberation the authors of the paper demarcated four central themes. These themes became the pillars of the CHAMELEON-model: set the bar high, create a meaningful context, provide adequate support and focus on action and interaction (See Figure 2). Given the focus on integration of theoretical frameworks, we immediately opted for themes that overarched the specific theoretical frameworks. As a result there is no separate theme or pillar for motivation, UDL, language support or learning. Everything is interwoven.

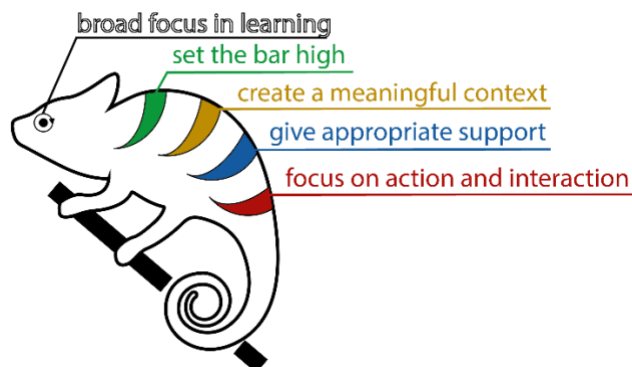


Figure 2: Focus and pillars of the CHAMELEON-model

To make the model sufficiently concrete and usable for teachers, we selected twelve prominent didactic suggestions from the initial matrix as clarification of the overarching pillars. This selection also happened on the basis of deliberation and seeking feedback from internal and external experts. The aim was to reach a consensus everybody involved felt comfortable with. The resulting twelve suggestions are listed in Table 1. It should be noted that these suggestions are by no means exhaustive. Moreover, each suggestion can still take shape by means of multiple instructional methods or applications. The idea is to provide teachers with a cross-section of what is possible, not with a straitjacket. At this point the name 'CHAMELEON-model' was also decided on. The idea is that, like a real chameleon, the model also has a permanent body of four pillars and twelve underlying suggestions. However, also in parallel with the actual animal, this body can 'adapt' according to the aims, needs and contexts of specific teachers. Teachers who want enhance the accessibility of their learning environment can use similar suggestions to those who are aiming at inciting motivation in students. Teachers who are looking for inspiration on how to work with large classrooms in a first-year course-module, benefit from the same ideas as their colleagues who work in a masterclass or a blended learning environment.



Table 1: Didactic suggestions in the CHAMELEON-model according to the pillars

Set the bar high	High expectations	Communication	Trajectories and differentiation
Create a meaningful context	Value and relevance	Providing information through various channels	Transfer
Provide appropriate support	Feedback	Modelling and examples	Scaffolding
Focus on action and interaction	Common goals and individual accountability	Question and answers	Alternation of provision and processing of information

To clarify the model and to inspire teachers we wrote a ten page white paper in Dutch, explaining the idea behind the model, the four pillars and the underlying didactic suggestions. When asked about the model we provided interested people (teachers, researchers, coordinators, ...) with a copy of this paper in exchange for feedback. We also started using the model in professional development activities, as a model for innovation and curriculum development and in research-projects (For example in the learning power-project, described elsewhere in the proceedings). In addition, we also presented the model on various national and international conferences. The feedback received from these sources, were discussed. This resulted in small changes to the model, such as rephrasing of suggestions.

However, by using the model in professional development activities and curriculum innovation, we noticed that teacher were not always aware of the didactic quality of their learning environment, its' strongpoints and points of improvement. This sometimes impeded them from choosing a relevant focus for innovation. Teachers were in need of some sort of a diagnostic tool to help them provide direction for their innovations. We therefore decided to develop (and validate) a self-report questionnaire for students, allowing them to assess the didactic quality of their learning environments according to the CHAMELEON-model.



DEVELOPMENT, VALIDATION AND EMPIRICAL RESEARCH ON THE CHAMELEON SELF-REPORT QUESTIONNAIRE

Development of a self-report questionnaire on the CHAMELEON-model

We opted to construct a self-report questionnaire on the basis of scales from existing questionnaires rather than to design a new survey from scratch. Not only did we perceive this to be the most efficient way, but we also anticipated that this approach would help us design a valid and reliable instrument in a short period of time. For similar reasons, we decided to only take into account entire scales instead of separate items.

Table 2: Consulted questionnaires

Questionnaire	Reference
Students' Evaluations of Educational Quality (SEEQ)	(Marsh et al., 2009)
Course Experience Questionnaire (CEQ)	(Ramsden, 1991)
Exemplary Teacher Course Questionnaire (ETCQ)	(Kember & Leung, 2008)
Experiences of Teaching and Learning Questionnaire (ETLQ)	(Entwistle & McCune, 2004)
Teacher As Social Context Questionnaire (TASCQ)	(Belmont, Skinner, Wellborn, & Connell, 1988)
What Is Happening In this Class? (WIHIC)	(Dorman, 2003)
Teaching Strategy Questionnaire (TSQ)	(Donche, 2005)

We therefore explored existing, widely used and validated questionnaires. Table 2 provides an overview on the questionnaires we consulted. We inventoried items from relevant scales. Scales had to be valid and reliable and had to be freely available in addition to be substantively relevant, in order to be selected. If multiple alternatives for a didactic suggestion existed, a discussion ensued until a consensus was reached. Table 3 presents the scales and the instruments they were drawn from. In a next step we translated all items to Dutch and adapted wording to fit the context of a course-module in a professional bachelor course. Language and phrasing were checked by two external reviewers. The resulting instrument consists out of 48 items, measuring ten out of twelve didactic suggestions in the CHAMELEON-model. Students answer items using a five-point Likert scale ranging from 'Totally disagree' tot 'Totally agree'.



Table 3: Scales and instruments used in the CHAMELEON-questionnaire

Pillar	Scale	Questionnaire	# items
<i>Set the bar high</i>	Goals & communication	CEQ	5
	Differentiation	TSQ	4
	Learning at own pace	TSQ	5
<i>Create a meaningful context</i>	Relevance	TASCQ	5
	Activation of prior knowledge	TSQ	6
<i>Provide appropriate support</i>	Feedback	ETLQ	5
	Support	TASCQ	4
<i>Focus on action and interaction</i>	Cooperative learning	TSQ	5
	Active learning	ETCQ	5

Validation and empirical research on the CHAMELEON self-report questionnaire

Participants

We piloted and validated the questionnaire in a sample of 195 first year students who were enrolled in a course-module on applied didactics. This accounts for 60% of the first year student-population. The applied didactics course-module has 23 variants according to the content domains students can choose from. Students choose two content domains when they enrol in the teacher education program, but not all content domains have a separate variant in applied didactics. Therefore, depending on their curriculum, students filled in one or two questionnaires. This resulted in a total of 319 submitted questionnaires.

Data-gathering

Data gathering took place in the context of the Learning Power project (Readers interested in the project are referred to elsewhere in the proceedings). The inventory was administered electronically. Students participated voluntarily and had the opportunity to fill in the questionnaire in their own time. In addition we organized a guided session at the higher education institution for students who experienced problems or lacked the opportunity to fill in the questionnaire at home.



Data analysis

We investigated construct validity of the questionnaire using confirmatory factor-analysis (Research question 2). In a first step we explored the validity of the separate scales. We assessed the fit using robust maximum likelihood estimation. Quality of the model was evaluated using Comparative Fit Index (CFI) and Root Mean Squared of Approximation (RMSEA). We applied commonly used cut-off point for acceptable and good models (Table 4; (Hu & Bentler, 1999)). If needed, we optimized models based on modification indices.

Table 4: Cut-off points model fit indices according to Hu & Bentler (1999)

Fit index	Cut-off good model fit	Cut-off acceptable model fit
CFI	>.950	>.900
RMSEA	.05>	.08>

We explored reliability by computing Cronbach's alpha as a measure of internal consistency (Cohen, 1988). We employed a value of at least .80 as a measure of good reliability and a value of .60 and higher as an indication of an acceptable quality.

Some variants of the applied didactics course-module have few students enrolled. This may potentially result in inaccurate estimates and lack of statistical power. We therefore decided to only incorporate variants that had at least twenty students enrolled. Seven variants (See Table 5) were incorporated, amounting to 259 cases.

Table 5: Variants of applied didactics and number of students enrolled

Variant	# of students	Variant	# of students
Biology	19	Physical education	85
English language	34	Project general	29
History	27	topics	
Islamic religion	31	Diet and care	34

Relations between the scales in the questionnaire (Research question 3) were explored using correlational analyses. We investigated differences between variants by means of ANOVAs and Bonferonni post-hoc tests. Besides significance we also consulted R^2 measures of effect-size (Cohen, 1988).

Results

Results as shown in Table 6 show that all scales demonstrated a good model-fit, given that all CFI-values are above .950 and all RMSEA values are below .05. All



scales also show at least adequate reliability, with scores of .60 or above. Based on these results we continued with substantive analyses.

Table 6: Results of the confirmatory factor analyses and reliability analyses

Pillar	Scale	CFI	RMSEA	α
<i>Set the bar high</i>	Goals & communication	.999	.017	.71
	Differentiation	.999	.012	.74
	Learning at own pace	.980	.040	.66
<i>Create a meaningful context</i>	Relevance	.998	.020	.70
	Activation of prior knowledge	.990	.028	.73
<i>Provide appropriate support</i>	Feedback	.997	.024	.79
	Support	.973	.010	.77
<i>Focus on action and interaction</i>	Cooperative learning	.999	.010	.63
	Active learning	.969	.059	.64

Correlation analyses (Table 7) demonstrate that all scales in the instrument are significantly and positively related. The strength of the correlation varies from (almost) moderate (.28) to strong (.70), indicating that scales measure related, sometimes similar, but different concepts.

Table 7: correlations on scales in the CHAMELEON-questionnaire

	Goal	Diff	Lop	Prior	Rele	Fb	Supp	Act	Coop
<i>Goal</i>	1								
<i>Diff</i>	.57	1							
<i>Lop</i>	.44	.50	1						
<i>Prior</i>	.52	.56	.60	1					
<i>Rele</i>	.62	.32	.47	.57	1				
<i>Fb</i>	.70	.60	.57	.72	.58	1			
<i>Supp</i>	.61	.44	.48	.52	.67	.63	1		
<i>Act</i>	.44	.44	.47	.57	.41	.55	.51	1	
<i>Coop</i>	.41	.47	.50	.55	.28	.54	.34	.50	1

When looking at the descriptive statistics (Table 9), an overall positive perception of the didactic quality of the learning environment for applied didactics can be noticed. More in-depth analyses (Table 8), however, demonstrate significant differences



between variants of the course-module on all scales in the instrument. Effect-sizes point to moderate ($\eta^2=.10$ for Learning at own pace) to strong effect-sizes ($\eta^2=.26$ for Cooperative learning), indicated that up to 21% of the differences in scores in cooperative learning are explained by the course-module variants. Inspection of the descriptive statistics (Table 9 and Figure 2) for the scales shows that highest and lowest scoring course-module variants also tend to differ according to the scales in the instrument.

Table 8: Results of MANOVA with variants as predictor and scales in the CHAMELEON-questionnaire as dependents.

Dependent variable	F	df	Sign	η^2
<i>Goals & communication</i>	3.86	6	.001	.13
<i>Differentiation</i>	3.91	6	.001	.13
<i>Learning at own pace</i>	2.86	6	.011	.10
<i>Activation of prior knowledge</i>	4.38	6	>.001	.14
<i>Relevance</i>	5.08	6	>.001	.16
<i>Feedback</i>	5.15	6	>.001	.16
<i>Support</i>	3.35	6	.004	.11
<i>Active learning</i>	4.60	6	>.001.	.15
<i>Cooperative learning</i>	7.08	6	>.001	.21

Table 9: Means according to variants

	Goal	Diff	Lop	Prior	Rele	Fb	Supp	Act	Coop
<i>Bio</i>	3.68	3.57	3.11	3.67	3.82	3.78	3.83	3.71	3.68
<i>Eng</i>	3.08	3.18	3.12	3.18	3.19	3.05	3.17	3.39	2.89
<i>Hist</i>	4.00	3.96	3.55	3.81	4.25	3.97	3.97	3.83	3.35
<i>Isl</i>	3.58	3.42	3.64	3.74	3.66	3.69	3.87	3.77	3.51
<i>Pe</i>	3.37	3.29	3.20	3.35	3.58	3.52	3.39	3.46	3.19
<i>Pgt</i>	3.39	3.72	3.52	3.71	3.67	3.68	3.63	3.80	3.73
<i>Dc</i>	3.40	3.38	3.26	3.44	3.65	3.32	3.46	3.18	3.01
<i>Total</i>	3.43	3.43	3.48	3.30	3.63	3.52	3.53	3.53	3.23

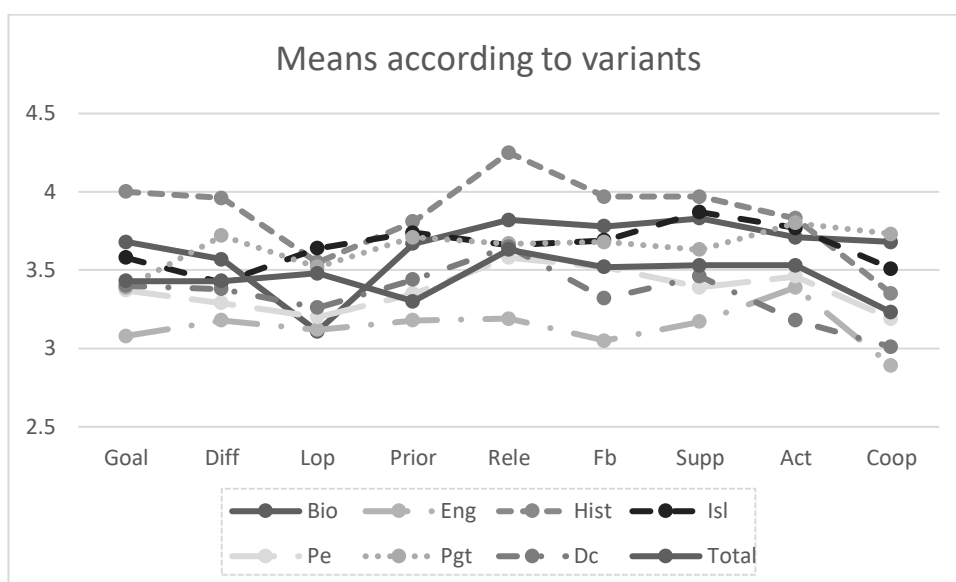


Figure 3: visual representation of means according to variants

CONCLUSIONS

In the current paper we discussed the development of a didactic support model for gaining a broad focus in teaching, called the CHAMELEON-model. The model integrates and synthesizes didactic suggestions from universal design for learning, self-determination theory, visible learning and sheltered instruction. The four pillars and 12 didactic suggestions were derived from the intersection of these models. The model was further operationalized in a self-report questionnaire. Scales from existing, high quality instruments were translated and adapted to measure students' perceptions on the didactic quality of their learning environment according to the model. Initial analyses demonstrate good construct validity and adequate reliability. Scales in the instrument show moderate to strong correlations, as would be expected. Significant differences between variants of the applied didactics course-model seem to denote that the instrument is sufficiently sensitive to pick up differences in students' perceptions across learning environments.

Although it is too early to conclude whether the model is successful or not, initial reception by teachers and coordinators is promising. Teachers appreciate the simple and straightforward way in which the model is structured. Interested parties both within and outside the university college value the bottom-up approach in designing



the problem and the fact that users have the possibility to provide feedback. Initial use of the model, for instance in research and development projects such as the learning power project also demonstrate shortcomings in the current model. For instance, the topic of assessment is underexposed in the model, despite being an important topic in contemporary higher education (Dochy, Segers, Gijbels, & Struyven, 2007). Use of the model also shows that the third pillar on 'providing student support' should devote more attention to providing socio-emotional guidance in addition to cognitive and meta-cognitive support.

Future research will firstly focus on administering the self-report questionnaire to larger samples of students with the aim of further investigating validity and reliability of the questionnaire. For instance up till now little is known about the stability of the instrument or the measurement invariance across gender (Vandenberg & Lance, 2000) or time (Coertjens, Donche, De Maeyer, Vanthournout, & Van Petegem, 2012). Secondly, attention will be devoted to investigating the link between students' perceptions of didactic quality and various learning outcomes, especially outcomes that are an indication of a broad focus in learning. Finally, it also seems feasible to use the instrument to gather data on students' perceptions in a quasi-experimental design as a way of looking into the effect of innovations or instructional methods.

REFERENCES

- Belmont, M., Skinner, E., Wellborn, J., & Connell, J. (1988). *Teacher as social context: A measure of student perceptions of teacher provision of involvement, structure, and autonomy support*. Rochester: University of Rochester Press.
- Coertjens, L., Donche, V., De Maeyer, S., Vanthournout, G., & Van Petegem, P. (2012). Longitudinal measurement invariance of Likert-type learning strategy scales : are we using the same ruler at each wave? *Journal of Psychoeducational Assessment*, 30, 577-587.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences (2nd ed.)*. Oxford: Routledge.
- Cornford, I. (2002). Learning-to-learn strategies as a basis for effective lifelong learning. *International journal of Lifelong Education*, 21, 357-368.
- Deci, E., & Ryan, R. (2000). The "what" and "why" of goal pursuits: human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227-268.



- Dochy, F., Segers, M., Gijbels, D., & Struyven, K. (2007). Breaking down barriers between teaching, learning, and assessment: Assessment engineering. In D. Boud & N. Falchikov (Eds.), *Rethinking assessment for future learning*. London: RoutledgeFalmer.
- Donche, V. (2005). *Leren, onderwijzen en leren onderwijzen: Onderzoek naar opvattingen en handelingen van studenten en docenten [Learning, teaching and learning how to teach: Research into the conceptions and behavior of students and teachers]*. Gent: Academia Press.
- Dorman, J. (2003). Cross-national validation of the what is happening in this class? (WIHIC) questionnaire using confirmatory factor analysis. *learning environment research*, 6. doi: <https://doi.org/10.1023/A:1027355123577>
- Ecchevarria, J., Vogt, M.E., & Short, D.J. (2008). *Making Content Comprehensible for English Language Learners: the SIOP-model*. Boston, MA: Allyn & Bacon.
- Entwistle, N., & McCune, V. (2004). The conceptual bases of study strategy inventories. *Educational Psychology Review*, 16, 325-345.
- European Union. (1995). *Teaching and learning: Towards the learning society (White paper on education and training)*. Retrieved from http://europa.eu/documentation/official-docs/white-papers/index_en.htm
- Gijbels, D., Raemdonck, I., & Vervecken, D. (2010). Influencing work-related learning: The role of job characteristics and self-directed learning orientation in part-time vocational education. *Vocations and Learning*, 3, 239-255.
- Hattie, J. (2008). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. New York: Routledge.
- Heikkilä, Annamari, Niemivirta, Markku, Nieminen, Juha, & Lonka, K. (2011). Interrelations among university students' approaches to learning, regulation of learning, and cognitive and attributional strategies: A person oriented approach. *Higher Education*, 61, 513-529.
- Hu, L., & Bentler, P. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6, 1-55.
- Kember, D., & Leung, D. (2008). Establishing the validity and reliability of course evaluation questionnaires. *Assessment & Evaluation in Higher Education*, 33, 341-353.
- Kyndt, E., Janssens, I., Coertjens, L., Gijbels, D., Donche, V., & Van Petegem, P. (2014). Vocational education students' generic working life competencies:



- developing a self-assessment instrument. *Vocation and Learning*, 7, 365-392.
- Majer, M., & Meestringa, T. (2011). *Handboek taalgericht vakonderwijs*. Bussum: Coutinho.
- Marsh, H., Muthén, B., Asparouhov, T., Lüdtke, O., Robitzsch, A., Morin, A., & Trautwein, U. (2009). Exploratory structural equation modeling, integrating CFA and EFA: Application to students' evaluations of university teaching. *Structural Equation Modeling: A Multidisciplinary Journal*, 16, 439-476.
- Nelson, L.L. (2013). *Design and deliver. Planning and Teaching using Universal Design for Learning*. Baltimore: Brookes Publishing.
- OECD. (2001). *Knowledge management in the learning society*. Paris: OECD publications.
- Ramsden, P. (1991). A performance indicator of teaching quality in higher education: The course experience questionnaire. *Studies in Higher Education*, 16, 129-150.
- Sierens, E., Vansteenkiste, M., Goossens, L., Soenens, B., & Dochy, F. (2009). The synergistic relationship of perceived autonomy support and structure in the prediction of self-regulated learning. *British Journal of Educational Psychology*, 79, 57-68.
- Snow, M.A. , & Brinton, D. (1997). *The Content-Based Classroom*. White Plains NY: Addison Wesley.
- Stroet, K., Opdenakker, M.C., & Minnaert, A. (2013). Effects of need supportive teaching on early adolescents' motivation and engagement: A review of the literature. *Educational Research Review*, 9, 65-87.
- Vandenberg, R., & Lance, C. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research *Organizational Research Methods*, 3, 4-70.



TOWARDS DIALOGIC FEEDBACK CULTURE IN HIGHER EDUCATION

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ABSTRACT

This paper is a reflection of a strategic project on feedback system enhancement carried out at Metropolia University of Applied Sciences in Finland during the years 2015-2017. It is a retrospective of a pedagogical development project aiming at documenting the work completed and sharing the best practices. I believe that many of you can find an echo in this story. This paper describes the learning track taken and the lessons learned.

BACKGROUND

Metropolia University of Applied Sciences (later Metropolia) is a multidisciplinary university of applied sciences (UAS) celebrating its 10th birthday this year. Metropolia started in 2008 as a merger of two former UAS with a long history in education. Metropolia is the largest UAS in Finland educating students in the fields of technology, social services, health care, business, and culture and arts. Over 16700 students and 1000 staff members form a learning community in three cities of the Helsinki metropolitan area.

Educational development at Metropolia is strongly based on its strategy and the pedagogical policies. The strategy of the years 2013-2016 was based on megatrends, vision, strategic goals and values. It was implemented through strategic goals, which were divided into action plans and further into strategic actions. The strategic actions were carried out by strategic teams and specific project groups. The strategic teams included teaching staff members and specialist from different disciplines of Metropolia. They worked part-time accomplishing institutional wide developmental tasks.



The quality policy of Metropolia is based on the cycle of continuous development (PDCA). The distributed quality system brings quality assurance as a part of everyone's daily responsibility. The principal of developmental evaluation makes a rich feedback culture essential.

BEFORE THE YEAR 2015

In 2014 a major curriculum reform was established aiming at enhancing a student-centered learning culture and collaborative teaching and learning practices. Based on the pedagogical principles of the new curricula, a need for feedback system enhancement was observed to better support the objectives of the new curricula. To promote the pedagogical vision and goals of the reform, a strategic project on enhancing the teaching and learning feedback system was initiated.

Enhancing the feedback system in teaching and learning then became one of the strategic actions for the years 2015-2016. The aim of the project was to enhance feedback practices in teaching and learning and to create a feedback system to support the pedagogical vision of the new curricula.

In the organisation model at that time, pedagogical development was the responsibility of the strategic teaching and learning development team led by the pedagogical director. The task of the team was the strategic pedagogical development at Metropolia. The aim and the operational philosophy of the team were to develop learning and teaching together with the members of the community. The team operated based on the shared pedagogical policies being co-operation, creative expertise, open and international networks as well as continuous development: quality, evaluation and feedback. The team consisted of teaching staff members of different disciplines, educational developers, students and specialists from different functions. For the years 2015-2016, the team defined two main focus areas being: enhancing the teaching and learning feedback system and collaborative teaching in teams. This paper describes the path of the prior.

THE YEAR 2015

The project group for enhancing the feedback system (later feedback group) included five of the members of the strategic team and a member of educational development services. The role of the strategic team was to lead and enrich the work by reflective discussions and co-creative working methods.



The starting point

The feedback group started its work in March 2015 by a preliminary debate of the strategic team. The primary commission given to the feedback group was to enhance the student feedback system. Straight from the beginning, it was clear that there were plenty of hopes and wishes as well as a diversity of needs and views. Various solutions to various challenges were presented. The wishes were connected to educational development, development of pedagogical competence of the teaching staff, enhancing the student learning as well as to organisational and managerial aspects together with work controlling aims. Quite surprisingly many of the comments were technical and connected to IT-systems. The discussion was therefore about processes, working methods, tools, IT-systems, managerial tasks, and control.

In the feedback group kick-off a week later, the group decided to discuss first the question of why and for what purposes a feedback system was needed. This was seen as a crucial decision point for the direction to which the development work was headed to. The purpose and the approach of a feedback system can be either towards a control-based evaluation or towards a development-based evaluation. This, of course, has an effect on the concrete actions and methods used. It was then much about feedback culture development and dialogue in the community.

To this end, the feedback group defined the aim for the project to be: to create a feedback system where all parties of the learning community, students, teaching staff members and educational leaders would get information on learning and teaching, development of skills and abilities and professional growth during the learning process. The intent was that feedback would be constructive, meaningful, transparent and especially usable for educational development. This meant interaction and dialogue in the feedback practices. In conclusion, the mind-set was from feedback to feedforward.

Feedback discourse in higher education

The discourse of feedback is current and on-going in the higher education sector. At the same time, it can be said that the feedback discussion has been present during the last 20 years quite similarly. Even if the digitalisation has touched feedback practices, the problems considering feedback processes have remained the same.

The feedback discourse is also strongly connected to the time after the Bologna process. Higher education institutions have been instructed to measure the quality of the education, therefore they have started to develop the quality systems and the quality assurance. Student feedback and especially student feedback surveys have traditionally been an important part of the higher education quality systems.



Especially course feedback has been an important measure of the quality of the education.

Still, the use of student feedback survey results is not simple. It is well known fact that collecting feedback is not a straight quality measure but more focus and effort should be put on how the feedback results are put into educational development actions and how they are followed and evaluated.

Quantitative analyses are typically used to analyse the data in spite of low response rates and distortion of the results. In many cases, it is not about a random sample. Results are in many cases compared with others even if degree programmes are very different in sizes and activity of the respondents vary considerably.

Secondly, the quality of the surveys is challenging. It is a question of which measure is used. Student surveys are not necessarily based on educational research and are not therefore always scientifically proven. This is why student surveys are under a constant development. Bad results are also many times explained by bad questions. Many of the student surveys are actually only satisfaction surveys, which is not many times the aim of the higher education. Hence, higher education institutions need measures for high-quality learning. This kind of measure is recently developed at the University of Helsinki (Parpala, 2010; Parpala & Lindblom-Ylänne, 2012).

In bringing a lot of good, quality systems and a certain quality thinking have side effects too. Feedback is collected a lot which brings feedback invasion for all. Feedback is collected without a clear connection to development actions. In many cases there are not a lot of evidence on the connection of feedback to the educational quality enhancements. Quality assurance typically trusts much on student feedback and quantitative analyses which in many cases suffer from reliability as was presented earlier. In addition, course feedback is sometimes used in finding solutions to managerial or pedagogical competence problems for which there exist many more advanced methods.

Feedback discourse is as well a value discussion and is often considered personal. Sometimes feedback is connected to fear and criticism. The unclear aims of feedback may cause questions of the possible consequences feedback may have.

The meaning of the concept feedback

For the reasons above, the feedback group decided to define the concept of feedback holistically aiming at a renewal of the corporate culture, more precisely to the dialogic feedback culture.



The actors of the feedback system were defined to be students, teaching staff, educational leaders, management, working life and alumnae. The varying roles of the actors present the fact that the needs for the feedback system were different depending on the point of view of the actor. That is why there was no unambiguous solution but the phenomenon was needed to be tackled from different angles.

In their first meeting, the feedback group created a proposal for the purpose of the feedback system. It was named as feedback system actors' map. It was then presented to the strategic team who developed it further. The response was positive and supportive.

The next focal point of the process was engaging students, teaching staff and other members of the community. For the project to be successful, it was important to find out the opinion of the community on the principles of the feedback group. Workshops for discussing the principles and preliminary ideas of the feedback group was planned for fall 2015.

In the work shop with the student union, the meaning of feedback and feedback system was discussed. The view of the students agreed with the view of the feedback group. Interaction and dialogue was seen important for the students.

Benchmarking others

International and internal benchmarking were started in late spring 2015. The feedback group saw that it was important to have a look at what is happening in feedback development in the higher education field. A workshop was also prepared for the national educational development days to widen the view of the feedback group and to get comments and coaching for the ideas. Two more in-depth international benchmarks were carried out with Glasgow Caledonian University (Feedback for Further Learning) and KTH Royal Institute of Technology (Learning Experience Questionnaire, LEQ).

The LEQ-questionnaire and its teacher peer feedback process were tested with two teacher groups as sharing the same educational developmental aim than the philosophy of the feedback group. This feedback process was later included in the proposal of the new feedback system as a collaborative tool to help teachers to develop course feedback into the next phase of the course syllabus.

In addition discussions with some of the Finnish universities and universities of applied sciences were carried out in benchmarking their feedback processes and testing the idea of the feedback group. The feedback from them was positive and many of these institutions found the idea relevant.



The feedback group continued the co-operation with Helsinki University and the HowULearn-survey (<http://blogs.helsinki.fi/howulearn/en/>). HowULearn is a research-based questionnaire and feedback for students on their experiences and opinions on studying, teaching and learning (Parpala & Lindblom-Ylänne, 2012). Students get personalised feedback on their learning to help their studying. It is also a tool for degree programmes and educational leaders for educational development.

The former version of HowULearn has been in use in Metropolia since 2012 in some of the degree programmes. The learning-centered approach and validity for measuring learning fitted well with the aim of the feedback project.

High-quality learning was one of the keywords of the feedback group's work and the notion of feedback was then defined broadly. The work was focused towards feedback culture development and enhancement of interaction and dialogue between the community members. For that reason, the typical way of enhancing feedback systems, developing student surveys was not put in the focus.

Involving through workshops

Fall 2015 started directly with the workshops in the departments. The aim of the workshops was to involve the staff members to discuss the ideas of feedback enhancement and to find out if they agreed on the philosophy behind the work. It was important to find out what kind of feedback culture they wanted to support.

In the workshops the participants worked in groups giving their points of view on the following questions:

- For what purposes is feedback system needed?
- What kind of a feedback culture would you like to support?
- From the viewpoint of your discipline, what aspects are important to be taken into account in the development of the feedback system?
- What are your best feedback practices?

Workshops were organised in all of the departments of Metropolia. The results of the workshops were verbal and picture illustrations of the feedback culture the community wanted to support. It was clearly realised that the staff members of the community wanted to have dialogic, open and developmental feedback culture.

The workshop results were also analysed thematically creating a three-dimensional feedback orientation map. The most of the views were student-centered and only a few presentations were directly teacher-centered. Some of the presentations



illustrated a more holistic view where the learning-centered view was present and where feedback thinking was presented as a joint developmental dialogue between the students and staff. (Koponen & Holvikivi, 2016).

The results of the workshops gave rise to the Feedback Principles. Four principles were created to illustrate the feedback culture of Metropolia. In addition, the principles were opened once again for public commenting to make sure that the feedback group had interpreted the material correctly.

Because the feedback culture development is a change process, the feedback group saw that enhancing the feedback culture required such tools as the Feedback Principles to support the learning of new ways of working. That is why it was seen crucial that the new and shared Feedback Principles formed a backbone of the new feedback culture. Feedback Principles became later a part of the new feedback system.

The best practices and peer support

The third concrete action in fall 2015 was the feedback pilots in the degree programmes. The goal of the pilots was actually not to create anything new but more towards highlighting the best feedback practices. These pilots handled issues like weekly reflective self-evaluations, feedback afternoons and course development discussion forums with students. It was evident that lots of good and dialogic practices were in use nevertheless there existed a typical challenge of sharing good practices in the community. The best practices found were presented in every case where the feedback enhancement work was presented.

Finally, the last concrete action of the project in 2015 was the collegial peer feedback pilots for the teaching staff. The pilot was planned together with another higher education institution. The idea of the collegial peer feedback was that the teachers would have a possibility to get feedback from their peer colleagues. What was new in the idea was that many times the only feedback that the teachers got was the student feedback which is a different point of view and not always the best source to do pedagogical development.

In the concept, teachers from different disciplines formed peer groups which participated in each other's teaching sessions, familiarised themselves with the curriculum and the course syllabus and then gave feedback through a reflective discussion model.



Unfortunately, there was too few teachers interested in the practice and the pilot was not implemented. Nonetheless, the plans for this action may be implemented again when the time is more suitable for it.

The last months of the year 2015 brought the information of organisational change intentions. In the end of the year, the knowledge on the new organisation was ready.

THE YEAR 2016

The year 2016 started with the knowledge of the changes in the organisation. It meant simultaneously that the strategic team together with the feedback group was disbanded. The strategic team and the feedback group got six months' time to finish the job. The knowledge of ending the work affected the activity of the groups.

Old and new

The spring term 2016 was focused on compiling the work of the feedback group to form a proposal for the new feedback system as a result of the project. As mentioned already, the knowledge of ending the work already before the final schedule had an effect on participation activity.

By request of the new management, the project plan was delivered to them. The feedback group had also a possibility of discussing the work completed with the new management.

Just before the summer, the feedback group returned a proposal for a new feedback system. The most central idea of the proposal was the dialogic feedback culture development and holistic and systemic approach to feedback. The new feedback system included collaboratively constructed tools and methods to support dialogue and interaction having a strong developmental evaluation approach as a base. The proposal included the idea that learning new is a change process and requires, therefore, tools and methods to be successful. The new feedback system was approved by the pedagogical director in late fall 2016.

To be able to implement the work of the feedback group, a group of educational experts formed a new feedback group to start the implementation after summer 2016.

HowULearn?

In 2016 an important phase of the new feedback system started when the more in-depth learning about HowULearn started (<http://blogs.helsinki.fi/howulearn/en/>).



It was decided to run a pilot of HowULearn for all the 1.-3. year bachelor students. It was a big decision touching over 10 000 students. The process included a data collection by the survey but more importantly, it included a feedback session for the students and staff to foster the developmental dialog between them.

The process started by meeting all the degree programmes and informing the staff members about the meaning of HowULearn because it was seen important in activating the staff members to motivate the students into the process. To get enough responses, staff members were asked to organise a time slot for the students to respond to the survey, for example at the end of a teaching session.

The data was collected electronically in November-December 2016. The response rate alternated much between different programmes. In addition, some of the degree programmes left out certain student groups while they could not be separated in the data analysis. The results were analysed using statistical analysis at the beginning of the year 2017.

Finding and presenting the best practices

The feedback pilots in the degree programmes continued also in 2016 when the information technology students sketched a mobile application solution to the needs of fostering dialogue between students and teaching staff in higher education. The course used project-based approach to learning where the students worked during an intensive period of time resulting in a concept of a mobile application. In the beginning, the students gained only an idea of dialogic feedback and a question of how a mobile application could help to reach the aim of the dialogue. With that in mind, they started their development process. Two groups end up with a ready idea and a sample of a mobile application. One of the groups interested in continuing the work after the actual course.

In the year 2016, the feedback project was presented in several instances as Taito 2016-conference (Koponen & Holvikivi, 2016), national Peda Forum-conference (<https://www.jyu.fi/koulutus/pedaforum2016>) and in the Finnish UAS Journal (Koponen, Kokko, Perkiö, Savander-Ranne, Toivanen & Utrio, 2016).

In November 2016 Metropolia took part in the international audit by the Finnish Education Evaluation Centre. The implementation of the feedback system was then totally unfinished but was presented as an ongoing educational development task. In its report (Pirie, Abebe, Jukic, Nurkka, Ristimäki, Kolhinen & Aurén, 2017), the audit group gave positive feedback on the feedback system development carried out. It also raised a concern on how the implementation of it in the degree programme level will be fulfilled.



The last task of the spring 2016 was a self-evaluation of the work of the original feedback group. The group evaluated as a success the fact of being daring to take a new look at the feedback practices. The concern the group presented was the implementation the ideas of the group in the teaching and learning practices.

As a strategic action, “Enhancing the teaching and learning feedback system” ended 31.12.2016.

THE YEAR 2017

Even though the project as a strategic action ended in 2016, the implementation on the feedback system continued within a strategic action “Enhancing quality and feedback culture”.

Developmental dialogues

The year 2017 started by analysing the HowULearn data using statistical analysis. For every degree programme, all five parts of the HowULearn (educational development, approaches to learning, study progress, study exhaustion and work-life skills) were analysed.

A feedback session for students and staff members was organised. Based on their responses, students got personalised feedback on their approaches to learning and guidance on how to enhance the studying. Degree programmes got important information on students’ experiences in teaching-learning environments. The session brought good joint discussion and reflection among students and teaching staff. The quality of the dialogue changed much between the sessions, it was seen that some of the programmes had stronger tendency to reflection and for development of ideas.

The degree programmes reflected their experience and thoughts through a shared document where they made action plans based on the results. Based on the feedback sessions, it was suggested that the degree programmes would share their best practices on how they activate and involve students into educational development.

After the feedback sessions, degree programmes got the results for more in-depth use of educational development to support educational leadership and pedagogical decision making.

The pilot process was evaluated firstly by a self-reflection of the key organisers. Then a feedback questionnaire was sent out to all the staff members involved in the process. In the end, a structured evaluation discussion was organised for selected



members of the process. Based on the evaluation, a plan for the next phase including a resource plan was completed.

The results of the pilot were summarised as follows:

Benefits:

- Student-centered approach – HowULearn gives understanding and feedback to students about the quality on their learning.
- Learning-centered approach – The aim of the process is to enhance learning, which supports the strategic goal of “High-quality learning”
- Reliability – HowULearn is based on educational research and is a valid measure for measuring learning.
- Supports pedagogical leadership – Gives such information for the degree programmes and the pedagogical leaders which is not available anywhere else.
- Significance – The process was seen significant as participants experienced it being well planned and implemented. The feedback for the students was seen as useful.

Development ideas:

- Communication and informing – Still more information and communication with the whole community is needed about the meaning and the aims of the process. It is important to understand that it is not solely about a student survey but more a development process.
- Joint co-creation and development actions with the students – The developmental approach varied between different stakeholders. Joint educational development approach together with students and staff should be enhanced.
- Feedback sessions – Face to face feedback sessions and dialogue are important for the students to be able to discuss about learning and studying.
- Integration of HowULearn to the curricula – The survey and feedback session should be integrated as a natural part of the curricula so that self-development and reflection would be written in the learning outcomes of the degree programmes.
- Analysis and automatization – What kind of reports of the results are provided for different stakeholders should be planned more in-depth. The process should be automated (questionnaire and analysis).



Workshops and forums

The second main activity of the year 2017 was the workshop roadshow organised for all the staff members. The aim of the workshops was that every staff member had then heard about the new feedback system and the feedback principles as well as reflected the meaning of the feedback principles through their own work. The workshops were tailor-made for the needs and phase of educational development of every degree programme. The workshops generated in-depth discussions about feedback and widened the view of different pedagogical approaches existing.

To support the enhancement of quality and feedback culture, an online forum for pedagogical discussion on the internet was launched. One hour session once a month was seen as an agile way for the participants to join the dialogue. The session had a theme and 3-4 guests of active pedagogical developers of their own teaching in a studio for leading the discussion. Participants could participate online. The studio method was a new approach for the organisers and a pedagogical manuscript was made to start the discussion.

Unfortunately, the forums suffered a low number of participants and were stopped after the spring term. The reason for the low turnout might be the lack of time of the staff members or the unsuitable time slot when it was organised. The same format was tested for degree programme leaders.

A pedagogical discussion is anyway an important issue to be alive so the method of implementing it, must be reflected. How to catch people's interest and motivate them in educational development work at the time of resource cuts, rush, and overload.

The strategic project of "Enhancing quality and feedback culture" was ended at the end of the year 2017. Several project proposals were suggested to continue the work.

CONCLUSIONS

Educational development is about learning new and giving up of something old at the same time. It is a change process that challenges people's conceptions and forces them to shift somewhere uncomfortable. Learning has happened when the uncomfortable start to be comfortable. When everything is ready, you must start all over again.

In the digital era, educational development still needs face to face discussion and shared dialogue together with all the members of the learning community. In other words, time spent together. It requires strong support from leaders and commitment of everyone in taking part to the shared development actions.



Feedback culture development is worth of investing even though the results may be visible after a long time. This challenges the evaluation of development actions which is carried out many times in short time periods.

Learning new needs feedback. Feedback needs new learning.

REFERENCES

- Koponen, J. & Holvikivi, J. (2016). Oppimisen palautekulttuuri yhteisen kehittämisen keskiössä (in Finnish). In J. Tuomi, S. Ketola & L. Nuutinen (Eds.), *Proceedings of the Taito 2016 Oppimisen ydintä etsimässä Conference*. Tampereen ammattikorkeakoulun julkaisuja.
- Koponen, J., Kokko, T., Perkiö, A., Savander-Ranne, C., Toivanen, T. & Utrio, M. (2016). Dialogic feedback culture as a base for enhancing working life skills in higher education. *UAS Journal. EAPRIL Special Issue 2016*.
- Parpala, A. (2010). *Exploring the experiences and conceptions of good teaching in higher education: Development of a questionnaire for assessing students' approaches to learning and experiences of the teaching-learning environment*. Helsingin yliopisto: Kasvatustieteellisiä tutkimuksia 230.
- Parpala, A., & Lindblom-Ylänne, S. (2012). Using a research instrument for developing quality at the university. *Quality in Higher Education*, 18(3), 313-328.
- Pirie, I., Abebe, R., Jukic, M., Nurkka, A., Ristimäki, K., Kolhinen, J. & Aurén, H. (2017). *Audit of Metropolia University of Applied Sciences*. Finnish Education Evaluation Centre Publications 5:2017.



DEVELOPING DESIGN PRINCIPLES FOR SECONDARY VOCATIONAL TRAJECTORIES PROCESS TECHNOLOGY

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ABSTRACT

There is a large demand for operators, engineers and technicians in the process industry. The process industry, whether producing chemicals, hardware or food, is becoming increasingly complex due to new technology and the demand for more efficient production processes and faster product innovation. The goal of this design-based research is to provide design principles for a new flexible and responsive curriculum for process technology in secondary vocational education. This curriculum will be developed in co-creation with professionals from the local East Netherlands process industry and with teachers from secondary and higher vocational education. The curriculum should be attuned to the current developments in the field of process technology and cater to the needs of a diverse group of students in initial and post-initial tracks. This leads to the following research question: "Which design principles are involved in creating a learning environment between VET institutes and the process industry for the curriculum of process technology?" A literature study, questionnaire and focus groups with 38 respondents have been used mapping the (perception of) the problem, describing the relevant context and assessing the needs of local industry and vocational institutes.

Keywords: vocational education, technology, design research, design principles, curriculum process industry



INTRODUCTION, CONTEXT AND RESEARCH GOALS

Introduction

In the Netherlands, institutes for vocational education and training (VET) derive their legitimacy for a part from educating personnel that is needed by the local industry (Nieuwenhuis, Coenen, Fouarge, Harms, & Oosterling, 2012; Van Bijsterveldt-Vliegthart, 2011). Currently there are sectors in which the supply and demand of qualified labourers is not synchronized, resulting in surpluses or deficiencies of labourers with certain qualifications (Bussemaker, 2015). In order to alleviate this imbalance, a new policy was implemented in 2015, stating that institutes for Vocational Education and Training (VET) are made responsible for the balance between education and the labour market. For instance, the educational institutes are expected to anticipate the need for personnel of the industry and should make sure that 70% of the pupils have found a job within a year of graduating (Bussemaker, 2015).

Today there is a large demand for process technologists²⁴ and technicians and students with a degree in the field of process technology have a high chance finding a job (UWV & SBB, 2016). However, insufficient students choose for a vocational track in process technology in order getting a job. On top of this, the field of process industry is becoming increasingly complex due to new technology and the demand for more efficient production processes and faster product innovation. On the one hand, it is likely that many jobs will be obsolete because of developments like automation and mechanisation. On the other hand, new technologies are increasingly knowledge-intensive and require new technological skills for the concepts of 'Industry 4.0' (Nieuwenhuis et al., 2012; Van der Meer, 2015; Zitter & Hoeve, 2011; Guerreiro, Lins, Sun, & Schmitt, 2018)). Industrie 4.0 requires employees having a broader range of skills who are trained and qualified for their new roles on human-job transition called "Work 4.0" (Guerreiro et al., 2018). The task of education then, is to prepare students to participate in a labour market in which jobs are flexible and diverse and for which new skills have to be learned continuously (Van der Meer, 2015). This requires an adaptive and responsive curriculum to the rapidly changing reality on the work floor, hybridization of curricula is needed (Ritzen, De Vries, & Van Wijk, 2015; Zitter & Hoeve, 2011; 2012; 2016). Also other tasks of VET are required by the government: (1) everyone can participate in society, (2) updating the skills of people already partaking in the labour market and (3) 'general education' in

²⁴ A process technician/operator is responsible for planning, analyzing, and controlling the production from the acquisition of raw materials through the production and distribution of products to customers in a variety of process industries. These industries are chemical, food and beverage, oil exploration and production, pharmaceuticals, power generation, pulp and paper, refining, waste water treatment etc.



basic skills such as algebra, Dutch language skills (Nieuwenhuis et al., 2012; Van der Meer, 2015) and academic skills (Van der Meer, 2015).

In order to accomplish this, VET institutes need to cooperate with the (local) industry and businesses and other (local) VET parties (Ritzen et al., 2015; Smulders, Hoeve, & Van der Meer, 2013) towards a balanced and coherent curriculum that perpetually meets both the qualitative and quantitative demand of both the labour market and the government.

A collective learning process between vocational education and the workplace together generate and develop new products, processes or services (in this case, a curriculum), is called boundary crossing (Akkerman & Bakker, 2011; 2012). Professionals from VET institutes and industry need to cross over into each other's professional realities and learn from each other's realities (Akkerman & Bakker, 2011; Nieuwenhuis et al., 2012; Ritzen et al., 2015).

Context

To facilitate the co-creation process the cooperative society *Praktijkcentrum Procestechnologie Oost Nederland* (PCPT) has been established, comprised of 20 companies in need of process technologists and technicians and 3 educational institutes that educate process technologists. The question is how these partners can develop a consistent curriculum together, as little is known about how combinations of learning and working are shaped in the daily practice of VET institutes and the work place (Nieuwenhuis et al., 2012).

Research goals and questions

The goal of the current research is to develop design guidelines for a consistent curriculum for process technology that will be co-created by the local VET and industry, using the techniques and principles of design research. A literature study, context analysis, needs assessment will be conducted, which will lead to a set of design guidelines.

This study covers the research on the design and development of learning environments in co-creation by the local process industry, VET institutions and UAS design principals. The main research question is: what are the underlying design principles of an initial or a post-initial curriculum for process technology in vocational education, in which new and complex skills can be taught to students from diverse backgrounds in learning environments in the school and in the work place?



All the above leads to the following main research question for the current research: “Which design principles are involved in creating a learning environment between VET institutes and the process industry for the curriculum of process technology?”

The main research question is further divided into the following 4 sub-questions:

1. How does literature define ‘boundary crossing’ and ‘hybrid learning environment’ regarding design principles for process technology trajectories in VET institutions?
2. Which are the needs and expectations of the practitioners, teachers, trainers, and students?
3. What is the context of the process technology curriculum?
4. Taking into account the answers from 1- 3 which are the design principles?

METHOD

This current research is the first phase of an educational design research described by McKenney and Reeves (2012). Firstly a literature review is conducted to define the sociocultural practices and forms of collaboration of VET institutions and regional enterprises representing the local process industry in designing a curriculum. Secondly a context analysis is conducted analysing the mechanisms for collaboration and learning. Thirdly a needs assessment comprising beliefs, attitudes, feelings, needs, and wishes of the partners has been performed. From the literature review, the contextual analysis and the needs assessment, design principles will be derived. These activities that will be conducted during the current research. The goals and methods of these activities are displayed in Table 1.

Table 1: *Goals and methods applied during the literature search, context analysis and needs assessment*

Phase	Goal	Method
Literature search	Analysing boundary crossing and learning in activity systems and development of hybrid learning trajectories	Searching scientific journals for vocational education
Context analysis	Analysing the regional process industry and vocational education.	Document analysis.
Needs assessment	Analysing the needs of the PCPT partners, teachers and students with regard to the curriculum to be designed.	Focus group interviews with PCPT partners,



teachers and
students.

Participants

For the focus group interviews representatives of the schools and enterprises are involved. Total N=38; teachers n=5, students n=24 and practitioners n=9. These group members represent both the schools and the industry that are part of the PCTP cooperation: together they create the learning environment for process technology.

Instrumentation

Between 4 focus group interviews, each with 2 to 4 respondents. These focus group interviews will have a semi-structured character and will each have the duration of approximately an hour and a half. The students will have an open questionnaire.

Procedure

The participants are invited via e-mail to participate in the focus group interviews. The participants will be selected by the researcher and the director of PCPT. In this e-mail, the purpose and context of the research project are described, as well as the procedure of the focus group interviews. It will be pointed out that these conversations will be recorded verbatim. The researchers attend and moderate all the focus group interviews. At the the start of each session, the participants agree on recording the interview, verbatim transcription thereof and anonymization. The respondents will be explicitly asked about personal experiences of success in practice and about personal beliefs related to the work in the process industry. Interaction between the participants is encouraged.

Data analysis

The transcribed version of the focus group interviews will be analysed according to the Qualitative Analysis Guide of Leuven (QUAGOL) which is developed by Dierckx de Casterlé, Gastmans, Bryon, and Denier (2012) and is based on the principles of *open coding*. The steps involved are depicted in Table 2, see next page.

Table 2: *The steps of qualitative analysis of QUAGOL (Dierckx de Casterlé et al., 2012)*



Phase	Step	Goal
Preparation of coding process (pencil and paper work)	1. Thorough rereading of the interviews.	Gain a holistic understanding of the respondents' experiences.
	2. Narrative interview report.	Create an abstract of the key storylines of the interviews.
	3. Create conceptual interview scheme.	Replace concrete experiences with concepts.
	4. Fitting-test of the conceptual interview scheme.	Testing the appropriateness of the scheme in iterative dialogue with the interview data.
	5. Constant comparison process.	Forwards-backwards movement between within-case and across-case analysis.
Actual coding process	6. Draw up a list of concepts.	A common list of concepts as preliminary codes.
	7. Coding process.	Linking all relevant interview fragments to the appropriate codes.
	8. Analysis of concepts.	Describing the concepts in terms of their meaning, dimensions and characteristics.
	9. Extraction of the essential structure.	Create a conceptual framework or story-line.
	10. Description of the results.	Describing the essential findings.

LITERATURE SEARCH

In Dutch VET, learning takes place in school as well as in work (Nieuwenhuis et al., 2012; Poortman, 2007; Ritzen et al., 2015; Van der Meer, 2015). Designing a learning arrangement is a collaboration between school and workplace employers (Zitter, Hoeve, & de Bruijn, 2016). The purpose and rationale of arrangements developed by school employers differ from workplace policies. Where school arrangements usually prefer enhancing students' theoretical insights, disciplinary knowledge and reflection, workplace learning arrangements prefer developing job related skills and the development of a career and vocational identity (Zitter et al., 2016). The challenge is to create balance and consistency between the learning arrangements (Albashiry, 2015; Van den Akker, 2013; Zitter & Hoeve, 2012; Zitter et al., 2016), which may be found in combining elements from the work context and school context into a new vocational practice explored in between these established practices (Zitter et al., 2016). A complex challenge as the actors involved in



developing these learning arrangements (VET institutes and the industry) come from distinct practices with different aims (learning as preparation for work and learning as effective task execution respectively) (Akkerman & Bakker, 2011; Nieuwenhuis & Van Woerkom, 2007). This balance and consistency can only be found when VET institutes and industry (as stakeholders) are willing and able to explore each other's practice and break routines that are no longer relevant to the current situation (Akkerman & Bakker, 2011; Albashiry, 2015; Ritzen et al., 2015). In other words, learning has to take place between the stakeholders. The model of *expansive learning* of Engeström (2001, 2009) and *boundary crossing* of Akkerman and Bakker (2011) will be used as a lens through which this process of learning between two practices (in this case VET institutes and the workplace) are analysed. Furthermore, the concept of *curriculum hybridization* will be used to explore how a VET curriculum can be developed that combine school and work practices. Finally, these theories will be used to frame the research questions for the current research.

Expansive learning

Engeström (2001, 2009) views learning as expansion of an activity system that is connected to other activity systems. An activity system is a system with its own rules, routines and procedures that consists of a community of people which work together towards realizing services or products (the outcome of the system). Activity systems (the two large triangles in Figure 1, each one representing a single activity system), consist of 6 components which can be used to map tensions and discrepancies within the system:

- 1: The subject (the actor).
- 2: The object (the result of the activity).
- 3: Community (other actors within the activity system).
- 4: Rules (culture, legislation, social infrastructure).
- 5: Instruments (tools and concepts that dictate how an actor performs the activity).
- 6: Division of labour (who works with whom and towards what end).

In the context of the current research project, there are two activity systems (the VET institute and the industry) that interact via so-called *shared objects*: parts of a VET curriculum for process technology (for instance portfolios, instruments for assessment and qualification files) (Zitter et al., 2016). These shared objects are part of interacting activity systems and satisfy the informational needs of these systems. The shared objects should be adaptive to the needs and constraints of several parties yet rigid enough to maintain a common identity across activity systems (Zitter et al., 2016).

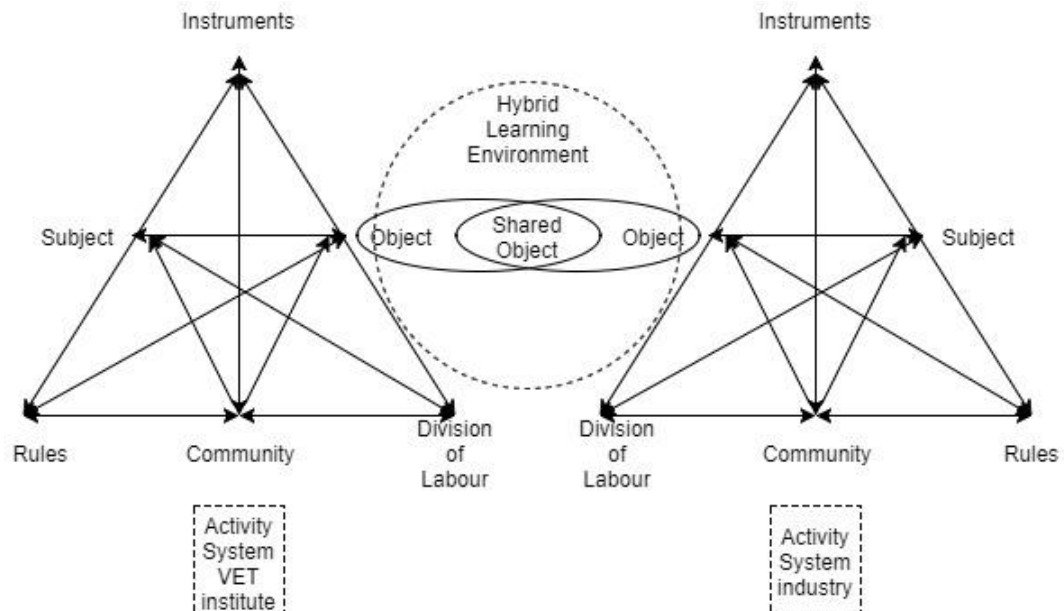


Figure 1. Interaction between the activity systems of VET institutes and Process Industry.

Learning activities involved in boundary crossing

The process that takes place when people move back and forth between two or more different activity systems, is called *boundary crossing* (Akkerman & Bakker, 2011). According to Akkerman and Bakker (2011: 133) “A boundary can be seen as a sociocultural difference leading to discontinuity in action or interaction”. Crossing these boundaries has the potential to diminish frictions between activity systems by helping professionals in these systems to find ways to communicate and act (Akkerman & Bakker, 2012). The four learning mechanisms involved in boundary crossing can help diminish these frictions by *identification*, *coordination*, *reflection* and *transformation* (Akkerman & Bakker, 2011; 2012):



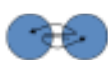
Identification entails professionals to observe how the core identity of their activity system is different from and similar to the other activity system. This in turn can lead to new insights with regard to problems and issues in the activity systems and the way in which different actors can learn from each other and help each other.



Coordination involves facilitating cooperation between activity systems by developing objects and procedures in order to tune activities and enhance the effectivity. This can lead to effortless movement between



different activity systems. Cooperation processes become visible to the degree in which communication connections are established between activity systems.



Reflection processes enable professionals to see their own and other's perspectives and 'look through each other's eyes', leading to both definition and exchange of perspectives.



Transformation finally, can lead to changes in practices and potentially to a new, boundary activity system (Akkerman & Bakker, 2011; Williams, 2014). Effective transformation can occur as an outcome of the previous three mechanisms (identification, coordination and reflection) (Flynn, Pillay, & Watters, 2016).

Designing a learning environment at the boundary of two activity systems

The boundary crossing mechanism of transformation can lead to the establishment of a third activity system around shared objects at the border of two or more activity systems, creating a *boundary system* that ties together the original activity systems (Engeström, 2001, 2009; Williams, 2014), using the boundary crossing mechanism of transformation (Zitter & Hoeve, 2016). This tying together of elements from various activity systems is considered beneficial for the quality and consistency of VET curricula (Akkerman & Bakker, 2012; Zitter & Hoeve, 2016; Zitter et al., 2016). The current research aims to establish design guidelines for a *learning environment* for the VET curriculum of process technology that crosses the boundary of school and industry systems. In this context, a learning environment is defined as: (1) the physical setting in which a learner or community of learners performs activities, including all the tools, documents and other artefacts to be found in that setting; (2) the sociocultural setting for such activities (Zitter & Hoeve, 2016: 1). A learning environment, consisting of a learning arrangement for learning in school and an arrangement for learning at the workplace, can be considered as crossing the boundary of workplace and school activity systems.

A process of *hybridization* combines elements of different contexts into a new boundary system. This hybridization can be further operationalized by using two dimensions: (1) the *acquisition-participation* dimension and the (2) *constructed-realistic* dimension. The first dimension ranges from the acquisition of knowledge, in which knowledge is considered something that can be acquired and shared, to participation in which learning is considered as becoming a member of a professional community. The second dimension provides insight into how realistic the learning tasks are; constructed meaning that the task is reconstructed from the reality of professional practice as a lower fidelity "copy". Realistic learning tasks are high fidelity, closely mirroring the real professional context and might take place at the



actual workplace setting. By combining these dimensions, four quadrants can be mapped, as depicted in Figure 2.

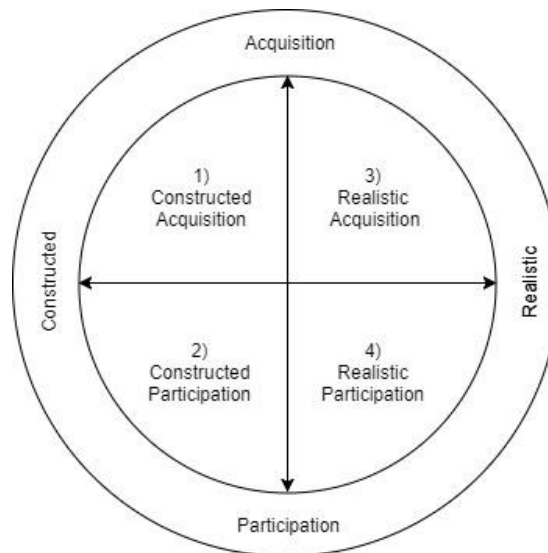


Figure 2. The hybrid VET-curriculum model (Zitter & Hoeve, 2012).

Formal, school-based learning is generally constructed (quadrant 1 and 2). This can either focus more on *acquisition* of knowledge and skills (for example in the form of classic lectures) or on *participation* in a professional community (for instance via group assignments). Workplace learning usually takes place in realistic settings (quadrants 3 and 4) with quadrant 4 representing learning by doing whereas in quadrant 3 implicit knowledge is made more explicit, for example by means of explanation or thinking aloud by professionals. For the current research, this model provides a framework to chart the needs and wishes of VET institutes and the industry concerning the learning activities of the students of process technology in the learning arrangement to be redesigned.

NEEDS OF THE PRACTITIONERS, TEACHERS AND STUDENTS

The needs assessment has been carried out in the period April 2017 to August 2017 on behalf of the Working Group Blended Learning of PCPT. All data are collected in an online communication platform (www.masselingacademy.nl).

Practitioners

The practitioners need new operators! They participate in the Practice Centre for Process Technology, because they are concerned that they may not be able to meet



the replacement demand for their staff. Practitioner: *"Many older operators will leave taking with them their knowledge and skills within a few years, and what will we get in return?"* According to the respondents of the technology companies, the managers have a false impression of the students (level 4) who are following a training course in the field of process technology. The practitioners like to join the new target group. An important wish of them is to ensure that middle management staff members make sufficient time available to ensure the connection between new and old. Today's young operator wants to be respected as a well-trained employee and has the ambition to gain experience in a dynamic, high technology work environment and to be inspired by the company to do challenging and innovative work. Student: *"I am well educated and therefore want to be deployed as such within the companies, so don't let me stick stickers and get coffee because I'm just coming to see. I am looking for dynamic work in which I can do my thing."* These young employees are willing to develop and learn continuously. Many managers assess the perceptions of these young employees based on their own traditional technological frame of reference and authoritarian worldview, which means that they do not understand the needs of young employees. Practitioner: *"Young people want to work, but focus mainly on the issues around them. They are insufficiently trained and do not want to take that extra step without extra reward. By the way, they are allergic to hierarchy and think they know everything."* In short, it is difficult for managers to build a relationship with these young employees. The talents of young employees are underestimated, as a result of which they do not have the opportunity to maximize learning from their work experiences as a reflective practitioner. They want to share knowledge and reflect on the work together with colleagues. Student: *"I am eager to learn and want to constantly improve and innovate. I notice that older colleagues are often held back by entrenched ideas and working methods. And if you don't be careful, you'll slide into this current. Sorry, but I'm really from a different generation or perhaps from another planet."* In order to bridge the gap between companies and schools, contacts between them must be intensified. To do this, practitioners must respond to the informal learning style of the young employee and open up to sharing knowledge. Practitioner: *"Knowledge sharing is important for professionals such as the aforementioned operators. They are constantly looking for more professional content. We do want to share generic knowledge. We also think that this is important. Company-specific knowledge naturally remains within the company's walls. But there is so much to share...."* Besides the physical meetings, companies need an online platform to share knowledge. Practitioner: *"A kind of forum would help. Sharing content between one another would also be good, as well as more physical contact between specialists in the operator field "*. Knowledge sharing should not only focus on developing competencies, but must also be based on the talents and needs of the young employees. Practitioner: *"We do a lot of workplace learning and use a fair amount of e-learning. We also carry out a lot of assessments and testing. All on our own initiative and energy. We must. And it makes our company interesting for people to work "*.



Teachers

Teachers want to adapt the design of the curriculum process technology to meet the demand and supply of operators in the region, creating a balance in the quantity (students) and quality (of training). Teachers want to encourage companies to provide internships. Another important aspect is the collaboration between the MBO teachers of the AOC and the ROC of Twente. Teacher: *"We want to design a training structure that is interesting for companies. This means that we want to guard against segmented units that do not cooperate with each other"*. Not all teachers experience a discrepancy between school and work and find that the jobs of graduates of VET institutions fit seamlessly with the demands of the process industry. The discrepancy is caused by a false perception of the operator-job in process technology, insufficient experience in the field of technology and prejudices. Teacher: *"The image students have of jobs in process technology is insufficiently realistic. Students inform each other about technical jobs from a negative viewpoint and from their internship experiences they influence each other in a negative way"*. Together with the practitioners from the companies, the teachers want to develop a vision for the process technology training courses. They also believe that together with the companies and schools, a 'pilot plant' could be developed. In such a pilot plant, students can practice different processes.

Teacher: *"We assume equal participation of companies and educational institutions. We also want companies to deploy their resources in education, so that training can work with advanced techniques"*. Also in the labour market, teachers note a discrepancy in the perception of the profession, salary, training requirements and expectations about the way in which schools and companies communicate with each other. Teachers want more teacher placements, better promotion of training and improvement of process simulations. Teachers: *"The image of process technology must be displayed in a modern manner (made 'hip'). Teachers need to work towards a positive image and want a better recognition of technology education. This means that primary school pupils must be well informed about the profession of the process technician. Working visits, excursions, posters and the use of social media can also help to improve the image"*. To this end, a training structure must be designed that connects prospective students and different companies. This would make it easier to absorb fluctuations in the labour market, but this does mean that a clear vision of the labour market needs to be formulated. This requires strong cooperation between schools and companies.

Teacher: *"A lot has been done without coordination, while the schools can develop a curriculum together with the companies, but also could organise short training courses together and make contact with each other for this purpose. This requires interest in each other"*.



Students

The current operator 2.0 training programme has general learning content, designed rather unspecific in the curriculum. The programme does not challenge the students enough to specialise. The learning content is not sufficiently in line with work practice. During the internship, students can bring the theory in relation to the work activities they perform. The teaching content of the school is in line with the practical skills that students can be expected to have during their internships. Some students do not want to work in process technology. They experience insufficient variety of work, they do not want to do shifts and are not given the opportunity to work with younger colleagues. Others think that the high wages, the responsibility they get and the technology itself are incentives to work in process technology. Student: *"During the training course, I was often told that the working world looks good and that I have a lot of possibilities. After all, they are begging for more operators. When I am in a company, the world looks very different and less beautiful. Lots of traditional ideas, power struggles and political games, I am treated like a little child, I am not listened to, and I can only practice my profession once I have proved my worth. I think that this is downright nonsense, wrong and far from appropriate".*

A group of students wants to move on to higher professional education (5th qualification level) seeking further professional development. Training can be improved by boosting the professional image of process technology and promote positive recognition of the profession. In short, students want more variety in training, more challenges, more atmosphere and conviviality and good opportunities for further training and development.

CONTEXT ANALYSIS

Young people know little about working in process technology and their career choices are not focused on employment in that sector. The companies in process technology want to cooperate with vocational training. To this end, they have developed the process technology practice centre (PCPT) together with vocational training. The aim of the practice centre is to improve the alignment of the further (MBO) and higher (HBO) vocational education programmes with the needs from the business community. And also to promote and facilitate the cooperation between companies and education on the joint development of educational programmes. To this end, companies want to provide practice training and participate in exploratory programmes for prospective students. In addition, the companies are also willing to:

- make adequate equipment available,
- be involved in drawing up curricula,
- provide in-company training,



- to make better use of traineeships to raise student quality to a higher level, and
- to develop interesting learning projects.

The cooperation in the PCPT should lead to a clear training structure that contributes to keeping employees sustainably employable in process technology by focusing on lifelong learning. The biggest problem for companies is the quantitative and qualitative demand for operators. They want to train more young students. This concerns the following student competencies:

- autonomous entrepreneurship, ability to reflect;
- contributing to an innovation-oriented learning team;
- multifunctional and flexible employability;
- conceptual understanding of the production environment;
- mastery of applied electromechanical control;
- relating digital representation to physical components;
- timely and correct reporting of faults;
- having a thoughtful attitude and being able to act proactively;
- ability to carry out regular non-specialist maintenance of the production line (components);
- skilled in applying knowledge of materials and goods;
- good communication skills with colleagues and the R&D department;
- ability to adapt quickly to new products, production resources and processes.

Vocational education must therefore contribute to sustainable, demand-driven and future-proof educational curricula. It is all about a balanced interaction between theory and practice. Within the PCPT, production environments and installations of the participating companies are made available to vocational education for practical training. The wish is to develop blended learning training models with an optimal mix between theoretical education, digital learning environments and practice. If the installations cannot be used due to safety regulations, digital (virtual reality) or demo simulations are used.

The partner companies indicate that they have a need for students with additional competencies at an MBO-plus or associate degree (AD) level. In the PCPT, MBO (further) and higher professional education partners develop MBO-plus modules as building blocks for a dual apprenticeship AD training course for operators.

The PCPT wants to support students in their career orientation and guidance in order to promote the flow of students to study programmes in process technology. PCPT wants to participate in up-grading and retraining for lateral entrants; especially for (unemployed) young people who are seen as potential employees.



Each year, PCPT wants to train about 50 qualified young operators. For students this means:

- A challenging training course with a broad basis, the required depth and didactics and methodology adapted to their learning styles with guaranteed internship placement and great chances of finding a job.
- The attractive mix of independent learning, contact education and practical training with coaching by teachers and, in the real work situation, by practice trainers.
- Good connection to higher professional education through a choice connecting curriculum.
- Company-specific matching of components/modules.
- The possibility to qualify for a challenging educational curriculum for the ambitious talented students, top-level path, or part-time Associate Degree.

DESIGN PRINCIPLES

The most important components of the needs assessment can be summarized in the following 5 topics:

- The discrepancy with regard to the mutual paradigms between the young operator/student and the (participating) schools & enterprises needs more interconnection in the field of learning and development focussing on students' learning and development processes.
- There is a strong need for cooperation between vocational education and enterprises in the process industry. They should be able to find each other easily and share content/knowledge (based on social learning).
- The connection between schools for vocational education and companies as PCPT-members should take place both online and in actual practices sharing their needs, their design of educational arrangements (tracks) for their internships' students, and from a perspective of a lifelong learning for their process operators and also sharing their experiences for instance as best practices stimulating the learning process of all the PCPT-members.
- Given the specific requirements it is desirable to design and develop a new digital platform within PCPT. This digital platform presents content and brings together different groups of user's teachers and practitioners (producers) and student's process technology (consumers).
- The platform connect, inspire, put to work and support people, companies, vocational education and must be widely deployed within PCPT.

Overall, respondents want to design an online platform. The platform is intended to enable the connection with young people who intend to choose or follow training in



process technology. The platform facilitates contact between teachers and students. In addition, the platform stimulates making use of practice facilities that inspire and stimulate teachers and students. The final design principles of the digital platform are depicted in Figure 3:

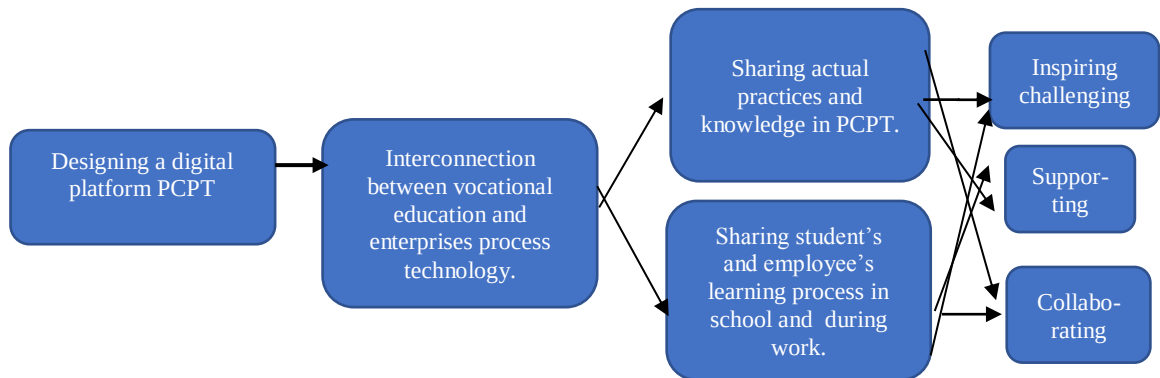


Figure 3. Design principles of the digital platform

Design principles for literature research:

- Apply boundary crossing on the collaboration and design between school and companies and give meaning to the learning mechanisms identification, coordination, reflection and transformation.
- Determine jointly which shared objects will be developed.
- Determine the sociocultural praxis of each activity system and identify obstacles and stimuli.
- Use the hybrid educational concept of Zitter and Hoeve (2011, 2012, 2016) for the design of the learning environments.
- Based on boundary crossing PCPT is a shared and new activity system.

The final design principles of PCPT as a new activity system based on the literature research are depicted in Figure 4.

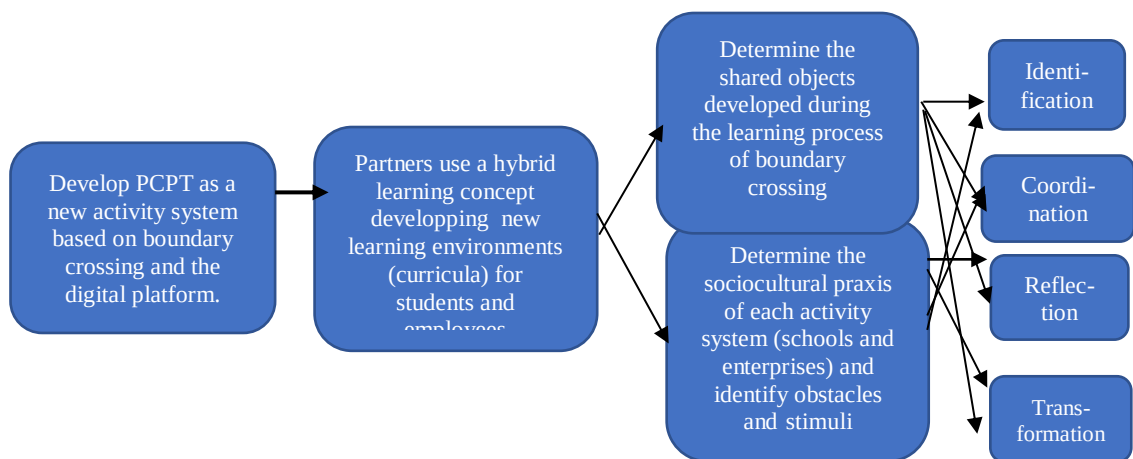


Figure 4. Design principles of the literature research

Design principles needs:

- Prepare young employees based on realistic competency profiles for their work and take care to connect the competencies with the working practice.
- Ensure that practitioners respond to the learning needs of young employees and use the principles of informal learning theory to effectively guide them in developing their talents and learning needs.
- Design an online social blended learning platform managed by PCPT (school for vocational education and business process technology). A blended learning environment is an environment that combines face-to-face instruction and practice with instruction through technology (ICT). Blended learning implies within PCPT a combination of live instruction and distance education. The distance learning environment, is independent of time and place, and the educational content is shared online between students, teachers and process operators (enterprises).
- Create an up to date appealing image of the work of a process operator for the prospective students.
- The implementation of the curriculum is based on equal participation of companies and educational institutions.

The final design principles of a blended learning environment based on the needs of students, teachers and employees working in the process industry are depicted in Figure 5.

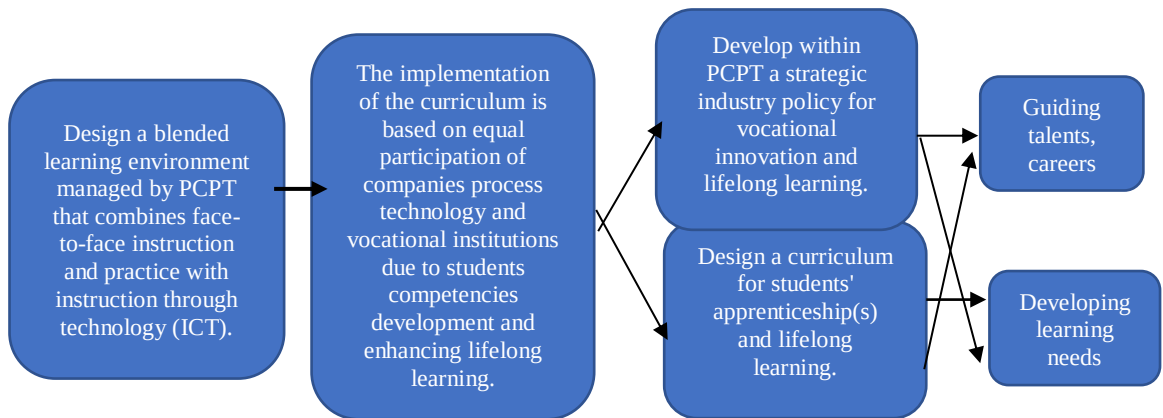


Figure 5. Design principles blended learning environment

Design principles of the context analysis:

- Apply a learning line based on learning while working – working while learning, pillar of the PCPT with participation of adolescents and adults.
- In the design of the curriculum, make sure that the training courses are aimed at continuing vocational training for students, teachers, employees and lateral entrants, effectively supporting company staff continuity.
- Develop for the further (MBO) and higher (HBO) vocational education partners MBO-plus modules as building blocks for a dual-apprenticeship AD training course for operators.
- Make use of a blended learning training environment for students who want to learn throughout their lives.
- From within the PCPT a clear strategic manufacturing industry policy on educational innovation, development of practice centres and lifelong learning should be developed.

The final design principles of of the context analysis are depicted in Figure 6.

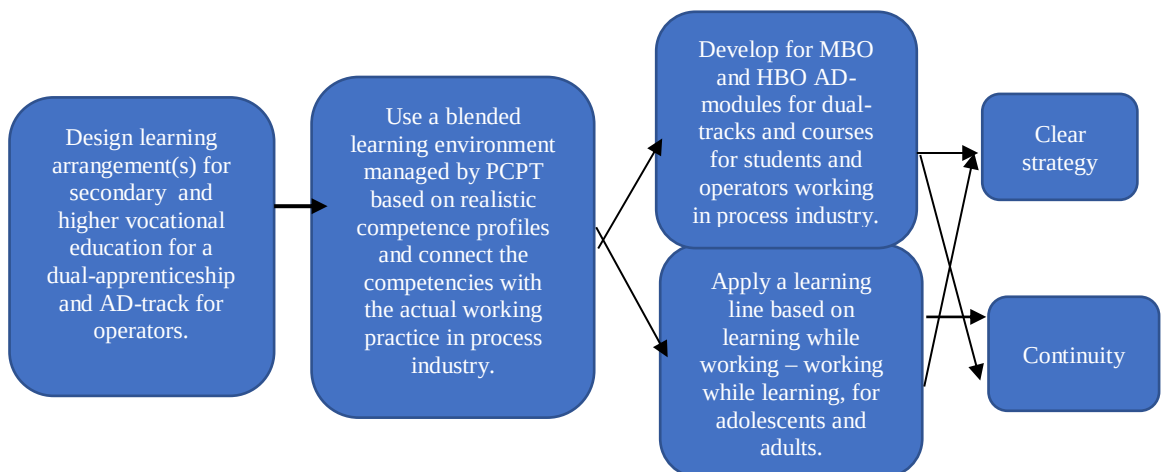




Figure 6: Design principles of the context analysis

CONCLUSION AND DISCUSSION

The main goal of this design-based research has been the development of guidelines for designing learning environments for students and employees working in the process industry. The most important guidelines were:

- Designing a digital interactive platform for the PCPT-participants.
- Develop PCPT as a new activity system based on boundary crossing and using the digital platform.
- Design a blended learning environment managed by PCPT that combines face-to-face instruction and practice with instruction through distance learning technology (ICT).
- Design learning arrangement(s) for secondary and higher vocational education for a dual-apprenticeship and AD-track for operators.

Based on the main design principles the researchers, teachers and practitioners participating in PCPT as well as in this current research are able to develop a prototype, in a systematic way by using boundary crossing, developing a hybrid curriculum for students in process technology. Teachers meanwhile have to learn using methods based on design research. In order to do this they collaborate in this study with professionals from the local industry to integrate their knowledge and skills as shared objects in the hybrid learning environment.

Acknowledgments

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REFERENCES

- Akkerman, S. F., & Bakker, A. (2011). Boundary Crossing and Boundary Objects. *Review of Educational Research*, 81(2), 132-196.
doi:10.3102/0034654311404435
- Akkerman, S. F., & Bakker, A. (2012). Crossing Boundaries Between School and Work During Apprenticeships. *Vocations and Learning*, 5(2), 153-173.
doi:10.1007/s12186-011-9073-6
- Albashiry, N. N. (2015). *Professionalization of curriculum design practices in technical vocational colleges. Curriculum leadership and collaboration*. (Doctor), University of Twente, Enschede, The Netherlands. Retrieved from <http://doc.utwente.nl/96806/>



- Bakker, A., & Akkerman, S. (in press). The learning potential of boundary crossing in the vocational curriculum. In L. Unwin & D. Guile (Eds.), *Handbook on Vocational Education*: Wiley.
- Bussemaker, M. (2015). *Staatscourant*. Koninkrijk der Nederlanden.
- Dierckx de Casterlé, B., Gastmans, C., Bryon, E., & Denier, Y. (2012). QUAGOL: A guide for qualitative data analysis. *International Journal of Nursing Studies*, 49, 360-371.
- Engeström, Y. (2001). Expansive Learning at Work: Toward an activity theoretical reconceptualization. *Journal of Education and Work*, 14(1), 133-156. doi:10.1080/13639080020028747
- Engeström, Y. (2009). Expansive learning: toward an activity-theoretical reconceptualization. In K. Illeris (Ed.), *Contemporary theories of learning: learning theorists... in their own words*. Oxon: Routledge.
- Flynn, M. C., Pillay, H., & Watters, J. (2016). Industry-school partnerships: boundary crossing to enable school to work transitions. *Journal of Education and Work*, 29(3), 309-331.
- Guerreiro B.V., Lins R.G., Sun J., Schmitt R. (2018). Definition of Smart Retrofitting: First Steps for a Company to Deploy Aspects of Industry 4.0. In: Hamrol A., Ciszak O., Legutko S., Jurczyk M. (eds) *Advances in Manufacturing. Lecture Notes in Mechanical Engineering*. Springer, Cham.
- McKenney, S. E., Nieveen, N., & Van den Akker, J. (2006). Design research from a curriculum perspective. In J. Van den Akker, K. Gravemeijer, S. McKenney, & N. Nieveen (Eds.), *Educational Design Research*: Taylor & Francis Ltd.
- McKenney, S. E., & Reeves, T. C. (2012). *Conducting Educational Design Research*. Abingdon: Routledge.
- Nieuwenhuis, L., Coenen, J., Fouarge, D., Harms, T., & Oosterling, M. (2012). *De creatie van publieke waarde in het middelbaar beroepsonderwijs: PROO Review studie* [The creation of public value in Vocational Education: a PROO review study].
- Nieuwenhuis, L., & Van Woerkom, M. (2007). Goal Rationalities as a Framework for Evaluating the Learning Potential of the Workplace. *Human Resource Development Review*, 6(1), 64-83. doi:10.1177/1534484306296432
- Poortman, C. L. (2007). *Workplace Learning Processes in Senior Secondary Vocational Education*. (PhD thesis), University of Twente, Enschede.
- Ritzen, H., De Vries, H., & Van Wijk, E. (2015). *Co-creation: designing a hybrid curriculum in vocational education within a 'design and media' track*. Proceedings 10th EAPRIL Conference 2015 Luxembourg, Luxembourg University Belval.
- Smulders, H., Hoeve, A., & Van der Meer, M. (2013). *Krachten bundelen voor vakmanschap: over co-makenschap tussen onderwijs en bedrijfsleven* [Joining forces for craftsmanship: about co-makenschap between education and the industry]: ECBO.



- UWV, & SBB. (2016). *Basiscijfers Jeugd december 2016: informatie over de arbeidsmarkt, het onderwijs en stages en leerbanen in de regio Twente* [Statistics Youth December 2016: information about the labor market, education, internships and apprenticeship in the Twente region]. Retrieved from Zoetermeer:
- Van Bijsterveldt-Vliegenthart, M. (2011). *Actieplan MBO 'Focus op Vakmanschap 2011-2015'* [Plan for action VET 'Focus on craftsmanship 2011-2015']. Den Haag.
- Van den Akker, J. (2013). Curricular Development Research as a Specimen of Educational Design Research. In T. Plomp & N. Nieveen (Eds.), *Educational Design Research*. Enschede: SLO.
- Van der Meer, M. (2015). *Het MBO naar 2025: twee verhaallijnen. Een achtergronddocument voor een verkenning van de toekomst* [VET towards 2025: two storylines. A background to an exploration of the future]. Woerden: MBO Raad.
- Williams, J. (2014). Teacher Educator Professional Learning in the Third Space. *Journal of Teacher Education*, 65(4), 315-326. doi:10.1177/0022487114533128
- Zitter, I., & Hoeve, A. (2011). *Ontwikkelmodel voor Hybride leeromgevingen in het Beroepsonderwijs analyse 2.1* [Design model for hybrid learning environments in VET, analysis 2.1]: Expertisecentrum Beroepsonderwijs.
- Zitter, I., & Hoeve, A. (2012). Hybrid Learning Environments: Merging Learning and Work Processes to Facilitate Knowledge Integration and Transitions. *OECD Education Working Papers*(81). doi:10.1787/5k97785xwdvf-en
- Zitter, I., & Hoeve, A. (2016). *On the right track: a school-work-boundary analysis of an industry-school-partnership in the railway industry*. Paper presented at the EARLI SIG 14, Regensburg, Germany.
- Zitter, I., Hoeve, A., & de Bruijn, E. (2016). A Design Perspective on the School-Work Boundary: A Hybrid Curriculum Model. *Vocations and Learning*, 9(1), 111-131. doi:10.1007/s12186-016-9150-y

EFFECTIVE STRATEGIES TO ENCOURAGE STUDENT RESEARCH IN THEIR DESIGN

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ABSTRACT

Learning how to learn is very important when we are talking about the techniques that make our learning more effective, you can learn anything if you have a goal that requires it. Also you can learn faster by structuring the information with taking some time to organize can increase effectiveness,

In this paper, I propose a new technique to encourage the student's research through their design project to make their learning more effective and to integrate design in research and practice with Following a research through design approach, the designers produce to make the best design solutions which will allow interaction designers to make research contributions based on their strength in solving the problems to formalize this design,

The paper focuses on two studies in order to reach its aims:-

- 1. First is the theoretical part: which is discuss the following points:*

Introduction to research

The definition of research

The purpose of research/ research through design

The major steps in conducting research

- 2- Second is the applied part:-*

This part applies what the students learn from their researches in new practical and effective way. I will take ID 342 (Landscape Design) course - Go Green project and for designing landscape in different historical ages that I have taught in Prince Sultan University- as a case study to illustrate the idea, also i will describe the factors that made the process or the implementation of the project successful and challenging, Thereafter, the study ends with important conclusions

1INTRODUCTION

Learning how to learn is a key to success in life but the understanding and using multiple learning strategies are also important in learning how to learn. There are several things you can do to help your learning more readily by using multiple strategies to learn difficult material such as: How to read textbook material, time management, Preparing written summaries, Effective studying, How to prepare for tests/exams, and How to do assignments or project that would be effective for students.

AN OVERVIEW OF THE ISSUE OF CONSERN

Based on my long experience in teaching for practical courses in Architecture Engineering and Interior Design Departments for many years, I appreciate the importance of both classroom and field educational experiences. Some students are unable to make transition from theory to practice with effectiveness. While In the process of integrate both theory and practice into the same course will help students to be more closely to the practical value than learning theoretical concepts which also it will prepare students to become professional practitioners in their field. And it will help me as instructor to update the course content based on practice experiences.

The case study was designed to suggest new learning techniques to enhance the academic performance by applying the student learn in researches through their courses in new practical and effective way, and it will includes the theoretical part for how to research and then transfer these theory to practice field.

INTRODUCTION TO RESEARCH

Research as a **Noun**:

Careful study that is done to find and report new knowledge about something
The activity of getting information about a subject

Research as a **Verb**:

To study (something) carefully
To collect information about or for (something)

THE DEFINITION OF RESEARCH

There are different definitions of research presented by many authors and can be defiened as:

A broad definition of research is given by Martyn Shuttleworth – “In the broadest sense of the word, the definition of research includes any gathering of data,

information and facts for the advancement of knowledge.¹<https://en.wikipedia.org/wiki/Research> - cite note-Shuttleworth-4
 Research comprises "creative and systematic work undertaken to increase the stock of knowledge, including knowledge of humans, culture and society, and the use of this stock of knowledge to devise new applications." ²
 Another definition of research is given by John W. Creswell, who states that "Research is a process of steps used to collect and analyze information to increase our understanding of a topic or issue". It consists of three steps: pose a question, collect data to answer the question, and present an answer to the question.³
 All of these definitions have the basic meaning that the research in general is the way of thinking to find the answers of some questions, and it is used to solve problems, confirm the facts, and support or develop theories.

THE PURPOSE OF RESEARCH, RESEARCH THROUGH DESIGN

The primary purposes of research are Documentation, discovery, interpretation, or the research and development (R&D) of methods and systems for the advancement of human knowledge⁴

and whereas the Design Is a process which develops the knowledge gained, and it operates in theoretical and practical realms through analytic and synthetic elements: In the analytic phases of design focuses on finding and discovery, while in the synthetic phases of design focuses on invention, the Movement between the theoretical and practical realms happens from what they have learned in the world of practice, convert them to abstract ideas or theories, and then translate those theories⁵.

Therefore **Research as Design** is a process of discovery, exploration and confirmation in its goals and in its context of use

There are a number of stages for learning, each of which involves a number of aspects. It would be nice in teaching if everything of students had to learn came

¹ - Shuttleworth, Martyn (2008). "Definition of Research". Explorable. Explorable.com. Retrieved 14 August 2011.

² - Shuttleworth, Martyn (2008). "Definition of Research". Explorable. Explorable.com. Retrieved 14 August 2011.

³ - Creswell, J. W. (2008). *Educational Research: Planning, conducting, and evaluating quantitative and qualitative research* (3rd ed.). Upper Saddle River: Pearson.

⁴ - <https://en.wikipedia.org/wiki/Research>

⁵ - Sara L. Beckman Michael Barry, (2007): 'Innovation as a Learning Process': *Embedding Design Thinking*, by The Regents of the University of California, p27, Vol. 50, No. 1

easily and useful, and that what i based on for my paper to Find the new way to make the learning material of my course easy to understand for my students

I'm the instructor of Landscape Design course (ID342) which using a general overview of the theory of landscape architecture and introduces interior design students to the processes of planning and design of environmental interiors.

In this course the students will understand the importance of integrating interior space with the natural surrounds, and they will apply landscape design for interior spaces or exterior spaces with the Consideration of the environmental factors and social concerns

I developed the creativity skills among the students in this course by asking them to apply what they had been learned in the theoretical part through their course to design landscape in certain area in courtyard at thier university which would be presented in GO Green event as a one of the course requirement.

The purpose of Go Green event is to raise awareness for how plants help our environment. One the day of the event, people who will attend they will learn just how much plants affect the weather, the environment, and our overall health. It is a day to celebrate the natural environment around us, which includes types of gardens, flowers and trees landscape elements and other natural elements.

The requirements for the Go Green project were based on four phases, the students were grouped in three different projects and they submitted their work as soft and hard copies and applied their work in practical and effective way.

The requirements of the project were to:

- **Research and collect data**, drawings and principles of designing Landscape through different historical ages.
- **Design the landscape** on the chosen area.
- **Implement and exhibit** the students' work.
- **Evaluate** the students' work

For this course the total number of the students were 20 students, the students should work together in groups, each group would be from 6 to 7 students, with 3 different projects for designing the landscape area project, and they all should develop positive attitude in work environment.

The student were asked to choose one of the landscape design in different historical ages, research for choose the concept of the landscape Design, Characteristics of the landscape, Types of the garden in different case, Hardscape& Softscape for each landscape design , Analyze Case studies and write the Conclusion

Then they are required to design their chosen landscape design in specific area in the university and exhibit their work in real project in Go Green event,

STEPS FOLLOWED IN CONDUCTING RESERACH THROUGH DESIGN IN REAL PROJECT

The major steps in conducting research project based on a certain structural process. The students were followed major steps in order to improve the practice in the course. These steps were:

- Identification of research problem
- Conceptual framework
- Specify the methodology
- Data collection
- Analyzing the data:
- Reporting and evaluating
- Communicating the research findings

Step1: Identification of research problem: The first stage of research process was involved the students in translating the situation into specific research objectives, and it was included several steps, these steps were: Identify the situation and its problems, write the research objectives, determine the analysis, and write the specific research questions.

The students understood their problem in translating the theoretical of landscape design to practice, they worked in three teamwork and wrote the research objectives for each project, also determined the analysis for each group, and wrote some the research questions

Step 2: Conceptual framework and Set the hypotheses: it is an analytical tool used to organize ideas in order to achieve all the projects requirements for the landscape design projects which have been chosen and then apply that in the practice

Step 3: Specify the methodology: it is theoretical analysis of the methods applied for the methods and principles associated with knowledge.

The students offered the theoretical underpinning for understanding which method they used and can be applied to specific landscape design

Step 4: Data collection: it is s the process of gathering and measuring information to answer suggested questions for evaluating the outcomes.

The students collected the information from the landscape resources and details that required for the design.

Step 5: Analyzing the data: it is a process of transforming, and modeling data after discovering the useful information to sugges the conclusions.

The students collected all the data related to the landscape, and transformed these information to useful suggesting conclusions for supporting decision-making in designing the ladnscape in specific area.

The final projects were presented the students' projects in two different ways, one of them was the project's designs as soft and hard copies. The second part presented by construct and applied for the student's ideas for different landscape design in real exhibition that has been presented in Go Green event.

Step 6: Reporting and evaluating: it is a process for evaluate the quality of the students' work; the students were evaluated based on criteria suggested by the instructor and provided the students with the visitors' feedback which will improve their projects

Step 7: Communicating the research findings: it is the process communication that prepare the students' to become professional practitioners in their field and also help the instructor to update the course content based on practice experiences.

GO GREEN EXHIBITION AND WORKSOPS

(Real projects for Landscape design)- done by students

The following part will describe the students' work for real projects that explains three different historical ages in designing the landscape: (Islamic Garden, French Garden, and Japanese Garden) which applied for Go Green project during different phases

The different phases applied for Go green event as follows:

Phase 1: Research and collect data, drawings and principles of designing Landscape through different historical ages. (The students chose Islamic, French, and Japanese Garden)

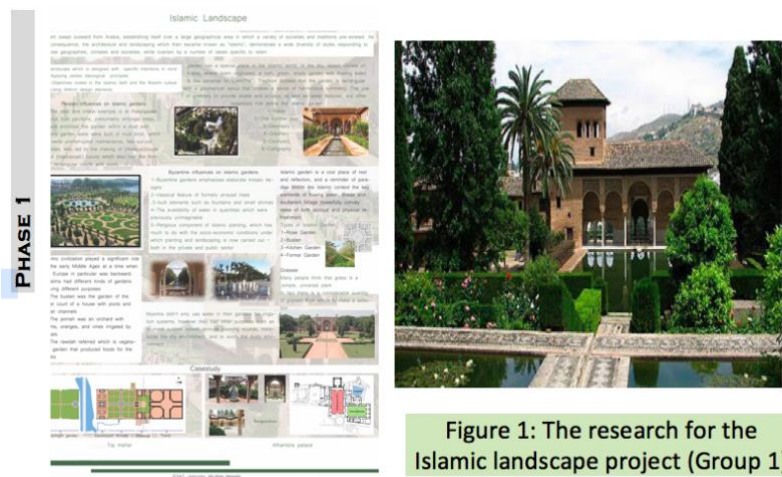


Figure 1: The research for the Islamic landscape project (Group 1)

Landscape French Style

The French formal garden is a style of garden based on symmetry and the principle of imposing order over nature. The style was widely copied by other courts of Europe which was inspired by the Italian Renaissance garden. Italian Renaissance was characterized by planting beds created in geometric shapes, fountains and cascades, stairways & ramps.

French Style Features



French style colour scheme



Famous French Gardens

Vaux-le-Vicomte



Gardens of Versailles



Figure 2: The research for the French landscape project (Group 2)

Japanese Garden

Japanese gardens are traditional gardens that create miniature idealized landscapes, often in a highly abstract and stylized way. The garden design in Japan is strongly connected to the philosophy and religion of the country.

Plants

Evergreen trees



Hedges



Groundcover



Deciduous tree



Aesthetic Principles

- ☐ Miniaturization
- ☐ Concaviment
- ☐ "Borrowed" Space
- ☐ Asymmetry

Elements



Type of Gardens



Figure 3: The research for the Japanese landscape

Phase 2: Design the landscape design through different historical ages



Figure 4: Design the landscape for **ISLAMIC GARDEN** (Group 1)



Figure 5: Design the landscape for **FRENCH GARDEN** (Group



Phase 3: Implement and exhibit the students' work in the university courtyard which includes:

Suggested layout for the chosen area

Models for the chosen gardens

Exhibition for the students' projects

Workshops presented by students for Green designs

Food court which produced greenly healthy food for the participants and visitors

Different designs for brochures, invitation and logo for the event

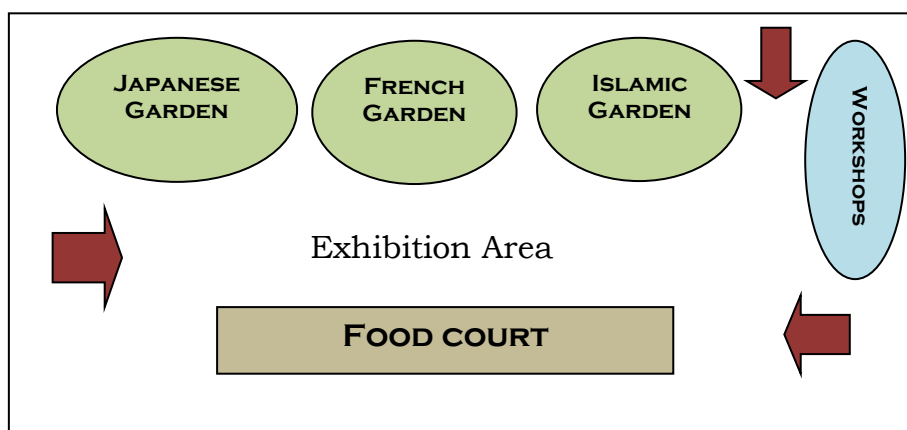


Figure 7: The Suggested Layout for real Exhibitio



Figure 8: Preparing the chosen area for real Exhibition



Figure 9: Picture for Go Green Event and real Exhibition



Figure 10: Pictures for suggested Islamic garden corner in Go Green Event



Figure 11: Pictures for suggested French garden corner in Go Green Event



Figure12: Pictures for suggested Japanese garden corner in Go Green Event

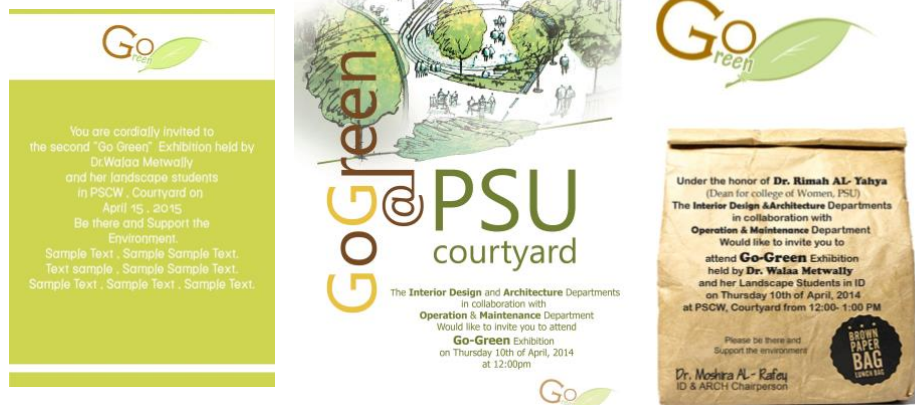


Figure 13: Pictures for the invitation of the event and its logo design- done by students

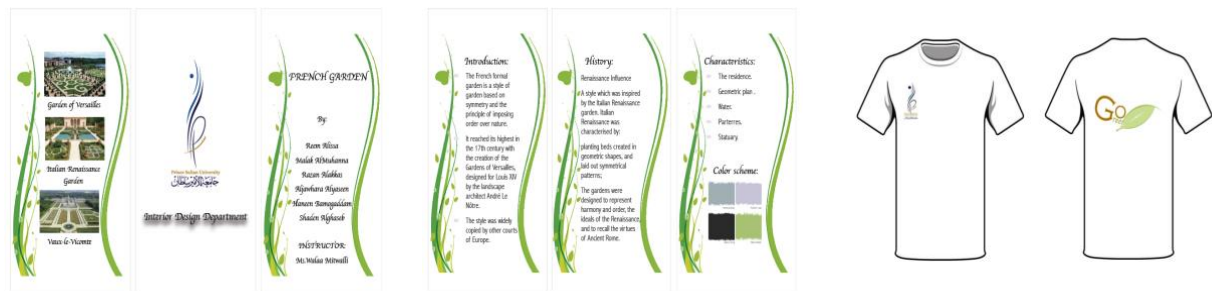


Figure 14: Pictures for some students' designs (brochures, T-shirt)

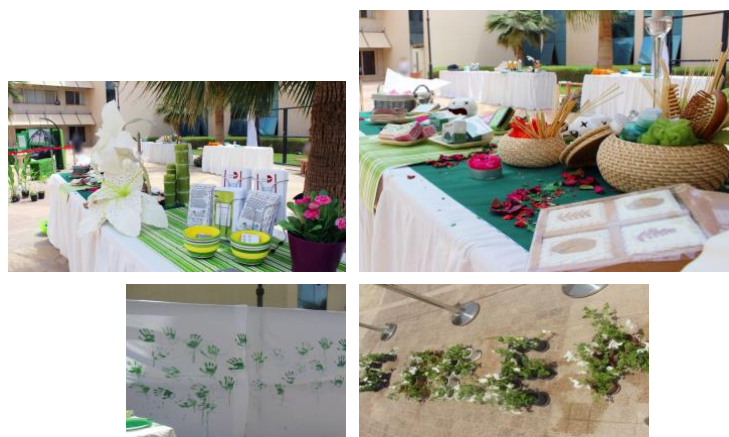


Figure 15: Pictures workshops area for Green design presented by students



Figure 16: Pictures for the food court of Go Green Event

THE FACTORS FOR THE PROJECT IMPLEMENTATION

There are many factors that made the process or the implementation of the case study successful, and every single factor is important to consider for each project, as follow:

Good planning, which includes detailed planning of all the process stages, task timeliness as designed in the project.

The project management described how the project was managed, the challenges faced used to deliver the project successfully.

Clear understanding for the team work Members for their responsibility (roles and duty) in their project and all the achievements will be measured and graded by the course instructor

Efficient Communications management process between the team work and their instructor to communicate the right message at the right time in the project to achieve the goals

Management Budget support which including funding to support the implementation of the project to Apply their ideas in real project.

Also there are many factors that made the process or the implementation of the project challenging such as:

- Communication between students each other and their instructor
- Saving and control the time by providing the students with week by week task
- Many students in each group, which required working together in one project with respecting their views.
- The student should cooperate with each other as a one team to present their final project in the Exhibition
- Work requirements which include choosing and designing one of the landscape histories, and understanding the practice reality of the end of the project.

- What the project is expected to deliver in the end (creating a real sense of the final project)
- Solving issues, many problems such as budget, additional stress and demands on the time of team members, particularly near the end of the project

BRIEF CONCLUSION

The main conclusions from the applied case study that could help improve educational practice and learning are:

- The Relation of theory to practice in Education can be effective by applying what the students learn in real project in order to achieve excellence in their professional practice through both classroom and practice learning experiences, while the students will be able to maximize learning through observing, reflecting, sharing, and applying course material in classroom and practice settings to become professional practitioners in their practice field.
- Providing the best learning environment for students by integrating the theoretical learning in practical field rather than typical courses in the curriculum using critical thinking, motivation and team work in their project which will be make their learning more effective.
- The instructor has opportunities for updating course content based on practice experiences and exposure to new challenges.

REFERENCES

- Baryan C. Ard Cleggk. (2006) **''Innovative Assessment in higher Education''**, Dedding: |First published Routledge.
- Berg, Bruce L., 2009, **‘Qualitative Research Methods for the Social Sciences’**. Seventh Edition. Boston MA: Pearson Education Inc.
- Creswell, J. W. (2008). **‘Educational Research’’**: Planning, conducting, and evaluating quantitative and qualitative research (3rd ed.). Upper Saddle River: Pearson.
- Sara L. Beckman Michael Barry, (2 0 0 7): **‘Innovation as a Learning Process’**: Embedding Design Thinking, by The Regents of the University of California, p27, V o l. 5 0, N o . 1
- Staff, Investopedia (2003). **"Research And Development - R&D"**.Investopedia.

Shuttleworth, Martyn (2008). "**Definition of Research**". Explorable.
Explorable.com. Retrieved 14 August 2011.

<https://en.wikipedia.org/wiki/Research>

Naresh K. Malhotra. (2004). ''**Marketing Resrach**'' An Applied Orientation.
Fourth edition, perarson- prentice Hall

Zikmund, Babin, Carr and Griffen. (2010). ''**Busines research methods**'',
International Edition, Eighth edition, South-Western. Engage learning

BETWIXT AND BETWEEN - BUILDING MOBILE TEACHER IDENTITY

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ABSTRACT

Authenticity, collaboration and personalization, which characterize mobile pedagogy, require a new approach to learning as well as a new type of teacher identity specific to mobile context. However, heretofore research on mobile teacher identity has been elusive. The present research aims at triggering interest in mobile identity building by exploring how mobile teacher identity develops during teacher training.

This study is part of a research following the trajectory of 22 vocational teacher students participating in a pilot training with a special focus on mobile pedagogy. The paper discusses the results of the second study in a longitudinal qualitative research of 1.5 years including three studies. The study material was collected by a form containing three open-ended questions and a chart concerning the development stage of the teacher students. The data was analyzed by two researcher using content analysis.

The data analysis revealed that integration of mobility into teaching seems to represent a conceptual gateway for further development of mobile teacher identity. Students had entered a “liminal space” characterized by varying ways of action and feelings from prostration and frustration in front of an overwhelming task of integrating mobile dimension into teaching to active experimentation and joy of learning new ways to teach through mobile technology. Based on the findings the students were categorized into five groups each occupying a different position on the trajectory towards mobile teacher identity. These identified groups were called Desperates, Beginners, Sceptics, Technologically oriented and Experimenters.

The study showed that integration of the mobile dimension into teacher identity is a troublesome process. Students occupy different positions within the liminal space and proceed through it at their own pace. They need support to overcome emotional stress and to achieve the technical and

pedagogical aims of the training. However, the study also showed that even during a short period it is possible to come near to crossing the threshold of becoming a qualified mobile teacher.

INTRODUCTION

During the past decades, research on teachers' professional identity has emerged as a prominent research area. However, the concept of teacher identity has proved to be hard to define unambiguously. (Beijaard, Meijer & Verloop, 2004; Beauchamp & Thomas, 2009.) Generally, teachers' professional identity can be defined through the core beliefs one has about teaching and being a teacher (Walkington, 2005). It represents teacher's beliefs and views of good teaching. Research seems to agree on two common notions concerning teacher identity (Beauchamp & Thomas, 2009). First, identity is seen as a dynamic, lifelong learning process. This process intertwines two important questions. The first concerns the present status based on teacher's history: Who am I as a teacher at the moment? (Beijaard et al., 2009; Vähäsantanen, 2013). The second question covers the future prospects by asking: Who do I wish to become? (Beijaard et al., 2004; Eteläpelto & Vähäsantanen, 2006). Second, teachers' professional identity is influenced by both internal and external factors such as emotions and working life experiences respectively (Rodgers & Scott, 2008; Beauchamp & Thomas, 2009).

In their extensive analysis of research on teacher identity Beijaard, Meijer and Verloop (2004) identify additionally two common features. According to them teacher identity is multifaceted and consists of several sub-identities. The sub-identities reflect the contexts and relationships in different times and phases of teacher's career. A fragmented identity or a serious imbalance between sub-identities can lead to tensions in teacher identity (Pillen, Beijaard & de Brok, 2013) and may influence the motivation, efficacy, commitment and work satisfaction of a teacher (Day & Kington, 2008). Further, according to Beijaard et al. (2004) teacher identity includes a notion of agency meaning that teachers must actively pursue professional development.

The proliferation of online learning tools and applications in everyday life has created a natural demand for integrating digital learning tools and applications into teaching and learning environments. The new context of learning requires rethinking the traditional beliefs of teaching (Richardson & Alsup, 2015) as online and mobile teaching is significantly different from face-to-face teaching (Palloff & Pratt, 1999).

Mobile learning is a teaching method, which by using multimedia applications facilitates learning through wireless mobile devices without limits presented by location or time (Chee, Yahaya, Ibrahim & Noor Hassan, 2017). Authenticity, collaboration and personalisation characterise mobile learning pedagogy (Kearney, Schuck, Burden & Aubusson, 2012). The integration of new features into teaching affects teachers' way of teaching as well as the development of their professional identity (Henderson & Bradey, 2008; Richardson & Alsup, 2015).

The context of this study is vocational teacher training at the School of Vocational Teacher Education at Tampere University of Applied Sciences in Finland. Passing the training is obligatory for vocational teachers and expected of teachers in all universities of Applied Sciences in Finland. The training is 1.5 year long and it is provided as part-time studies. While Finnish secondary level vocational training is undergoing a radical reform concerning the structure and organization of studies, vocational teachers at all levels of education are at the same time facing increasing demands for digitalization of teaching.

The purpose of this article is to shed light on the development of mobile teacher identity, which has until recently remained an under-researched area of professional identity. It is important to gain more understanding concerning the issues shaping mobile teacher identity as professional identity has been found to influence the way teachers implement online and mobile teaching. Further, the affordances of mobile tools may reciprocally influence the pedagogical choices teachers make as well as the development of teacher's professional identity. In this article, we aim to examine the question: How does mobile teacher identity develop during vocational teacher training?

BETWIXT AND BETWEEN TWO IDENTITIES

Determining teacher identity as an ongoing, dynamic process shaped by internal and external influences, underpins the idea that teacher identity cannot be provided by teacher training as ready-made and in a universal form that all teachers should fit in (Søreide, 2006). However, teacher training programs are considered to be of vital importance in encouraging student teachers to enter the first and perhaps the most important stage of their development towards teacher identity. During teacher training students start to build their professional identity through narratives (Ricoeur, 1992) constructed in interactions with meaningful others, experiences and the surrounding world (Heikkinen, 2002). This process often includes tensions and disharmony between the educational context, learning communities and prior experiences (Izadinia, 2013).

Students entering vocational teacher training in Finland must have at least three years of work experience in an occupational field outside teaching. They often have a strong position in the community of practise in their prior field of expertise and are, therefore, susceptible to experience additional tensions between their long professional history and the new position as novice teacher student. These career change students need to reconcile between their expert and novice identities (Williams, 2013) through continuous negotiations while building their new professional identity.

Teacher training is expected to help vocational teacher students to find their way and legitimise their participation in the community of teaching, and to learn how to transform their occupational knowledge and skills to fit into teaching. While experience and knowledge from a prior occupation gives a vocational teacher credibility, a feeling of strong professional connection with an occupational community outside teaching may also hinder the development of the teacher identity. On the other hand, combining the membership in teachers' professional community and in a prior occupational community seems to give new vocational teachers the best possible feeling of legitimacy as teachers. (Fejes & Köpsen, 2014.)

The process of transition from being a student to becoming a teacher can often be troublesome and tension prone (Pillen et al., 2013), and lead to a space where students feel as being "betwixt and between" (Turner, 1981, p. 159 in Wood, 2012). Turner refers to this phase of transition as a "liminal phase" situated between the current status and the future status, (1981, 159, in Wood, 2012), bridging "what is" and "what can or will be" (Turner, 1981, 159 in Cook-Salter, 2006). Such a process of transition leads to a profound change in the worldview of an individual undergoing the transition (Cook-Sather, 2006).

The concept of liminality was first used in anthropology to refer to rites of passage within tribal sociocultural systems (Cook-Sather, 2006). The root of the word liminality is in Latin word *limen* or threshold referring to the metaphoric crossing of borders or thresholds (Cook-Sather & Alter, 2011). In the context of education Land and Mayer (2003, 2005) introduced threshold concepts to interpret the troublesome learning and transfiguration of identity. Threshold concepts refer to “portals” leading to a new way of thinking, understanding or interpreting something. According to Land and Mayer (2005) threshold concepts can also lead to transfiguration of identity through a process which is complex and during which a learner often enters a liminal or “in-between” state characterized by mimicry of the new status and emotions of doubt or even anxiety.

In the context of teacher training, liminality refers to the transition of an individual across the threshold from being a teacher student to becoming a qualified teacher (Wood, 2012). While Turner’s space of liminality existed instead of the regular life of the “initiates”, in the Finnish vocational teacher training teacher students study part-time and continue their normal work and life parallel to the training. The liminal space created by teacher training exist, thus, in addition to the normal time and space where the students live and move, not instead of it. Therefore, any transformations that the liminal space, vocational teacher training, aims to effect must take place both during and in between training. (Cook-Sather, 2006.)

In their study of liminality in the context of mobile project work, Borg and Soderlund (2015) refer to triggering events during a liminal position in an organization as important elements in initiating a change in an individual’s thinking concerning work. In the context of teacher training, triggering events translate into transition processes initiated in teacher students through interaction with meaningful others, important learning experiences, or work practice experiences (cf. Heikkinen, 2002). While participating in discourses with others teacher students take a specific subject position (Søreide, 2006) through which they experience the world, including the triggering events, from a certain perspective. In an ideal situation, this position will align with the views, values, beliefs and attitudes of teachers’ professional community supporting the professional identity building process of the student and assisting a prompt crossing of the threshold to becoming a qualified teacher. By adopting a position, which is in contradiction with the expectations of the future reference group, development of the professional identity of a teacher student can be delayed or even prevented, and the stay in the liminal space prolonged. (Søreide, 2007.)

METHODOLOGY

This qualitative study is part of a longitudinal research of 1.5 years including three separate studies. The research focused on 22 students of vocational teacher training between January 2016 and May 2017. The original group consisted of 13 men and 9 female students. Their ages ranged from 28 to 53 years. All of them had more than three years of work experience in some other branch than teaching. The majority of them had additionally more than one year of teaching experience, only two had practically no experience in teaching before starting the training.

This paper focuses on discussing the results of the second data collection. However, a brief overview of the results of the first study concerning students' references of mobile teaching is presented to give a background for the discussion of the second data concerning the process of building mobile teacher identity.

The first narrative data was collected before teacher training started with a life-story –type of narrative. Twenty-one students gave permission to use their narratives as research data. After 10 months, second data was collected from the group by a questionnaire including three open-ended questions and a graph. The first two questions concerned respondents' view of an ideal mobile teacher and their own aims in becoming a mobile teacher. The third question and a graph, explored students' view of their current phase of development.

The data was, initially analyzed by two researchers independently, using content analysis. After the first analysis, the results were compared and discussed to achieve consensus on the findings. The findings were clustered into five groups based on the approach, emotions, skills, type of actions, attitude and understanding of mobile teaching and learning expressed in the texts. The positions of the groups characterize the phase of development of their professional identity. These groups were called: Desperates, Beginners, Sceptics, Technology-oriented, and Experimenters.

RESULTS

The results of the first study of our longitudinal research showed that despite the fact that the majority of the students had at least some experience in teaching, they had a very limited or even non-existing understanding of the

meaning of mobile teaching. Mostly they referred to mobile teaching by lists of mobile devices known by them or programs they had used in teaching. However, the overall attitude towards mobile teaching of the student cohort was very positive which was to be expected as they had applied to a training specifically focusing on mobile teaching.

During the first ten months of teacher training all students were exposed to mobile learning in the learning environment of teacher training. The possibility to learn and experience different mobile tools as part of the learning environment was considered by many students as an important source of inspiration to learn and experiment more. By the time the second study material was collected, most students had started their practical training in authentic teaching environments. Students did their practical training either in their own place of work in vocational institutions or during specifically organized training events in local schools. The practical training period was frequently mentioned as an important space for experimenting and learning to use mobile technology. Each teacher student reflected their current understanding of mobile teaching from their own perspective based on their background and on the knowledge and skills acquired during teacher training.

Although the texts were mostly positive and future-oriented, their contents reflected also different positions that the students had adopted concerning their view of the current status of development. The positions could be divided into five different types: Desperates, Beginners, Sceptics, Technologically oriented and Experimenters. The positions range from a group of students struggling to keep up with the pace of learning in the training program to those enjoying their new skills in mobile teaching and pedagogy and progressing determinedly towards a mobile teacher identity.

In Figure 1, the positions of the identified groups are shown in relation to technological and pedagogical skills of using mobile technology in teaching. At the same time, the position shows the phase that the members of each group occupy in regard to the trajectory towards mobile teacher identity.

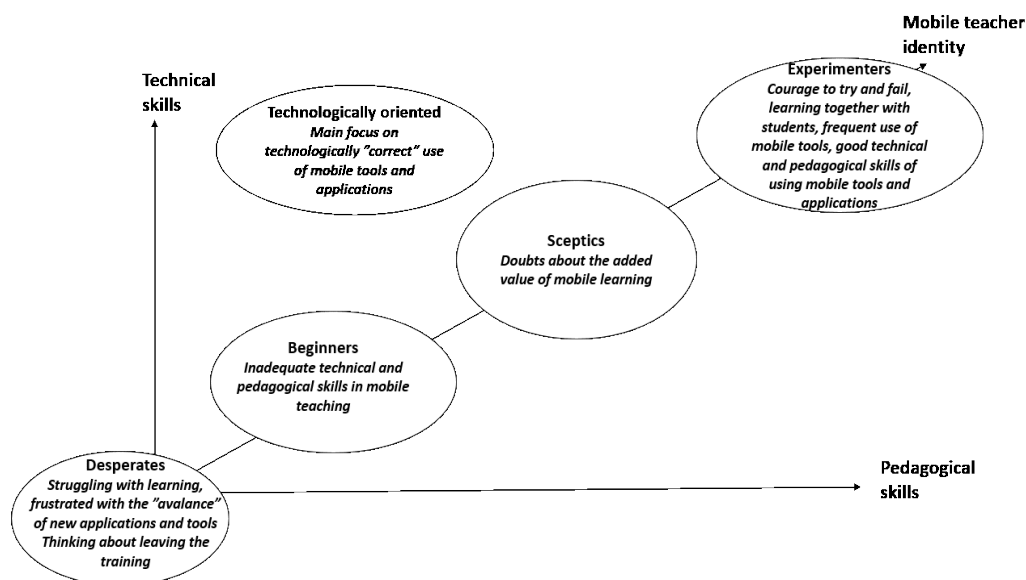


Figure 1. Positions of teacher student groups in the liminal space (N=21)

The group that was at the very beginning of their development towards mobile teacher identity were the Desperates. These two students had drifted into a position of prostration and felt unable to bestir themselves into positive action leading away from stagnation. They were full of anxiety and frustration in front of the overwhelming task of learning too many new skills within a restricted period of time. They were concerned about their ability to keep up with the pace of the training as well as their ability to learn to use all the different devices and applications introduced. Dropping out of the group was a clear threat for these two students.

"At this point I feel that I have to learn too much too quickly", M1.

They expressed their dissatisfaction with the contents and implementation of teacher training and expected more hands-on guidance in using mobile devices during the training.

"The timeline is too short. Applying the new knowledge on mobile teaching into practice requires a lot of time and patience from a teacher student. If one credit is 20 work hours, the credits will be exceeded or even doubled. I need time and guidance to get a grip on the mobile learning environments" F1

Their texts were short and they contained only casual references to pedagogy. Their main concern was gaining the necessary technical skills in using mobile technology. They did not elaborate their understanding of an ideal mobile teacher through practical issues involved in mobile teaching, and their understanding of mobile technology focused on the use of mobile tools at a general level.

“An ideal mobile teacher is able to use different mobile tools in their teaching. They must be able to understand the challenges of mobile teaching and see the practical needs (when applying mobile teaching)”, M1

The *Beginners* were students showing hesitation and caution in the adoption of mobile teaching practices. Through mobile teaching, these six teacher students were looking for ways to make their teaching more versatile and interesting. Although they seemed to have little experience in using mobile technology in teaching, they mentioned that during the training they had got new ideas how to use it. However, at the same time they expressed hesitation concerning their skills, how to be able to find new mobile tools and how to use them in practice.

“I would like to find different possibilities (of mobile teaching) and to experiment their application with my students.” F3

Some of the texts reflect slight concern about the challenges caused by technology and their own skills in resolving these problems:

“As it is inevitable that sometimes equipment or programs have technical problems the ideal mobile teacher should always have an option B at hand, too.”F2

The basic attitude towards mobile learning reflected in the texts of the *Beginners* was neutral and realistic. They seemed to have a positive undertone in their story expressing an undisturbed belief in their own ability to learn the necessary practical skills of using mobile technology.

The *Sceptics* seemed to have progressed well ahead of the *Beginners* in their development of professional identity. The *Sceptics* were the biggest group containing seven students. Their position was characterized by reflection.

Typically, these teacher students were contemplating on the “added value” that mobile teaching might bring into learning.

“I need more time to get oriented in the use of new programs and applications and to reflect which of them (new mobile applications) suit best into my own teaching..., so that they would give as much as possible added value to teaching and guidance and that students would find them useful and meaningful” , F4.

They emphasized the pedagogy of mobile learning and discussed in depth the benefits of using mobile technology in teaching. They were concerned of how to find a suitable balance between mobile teaching and other teaching methods.

“I want to be above all a teacher who does not use technology just for the sake of technology. I wish to be a teacher whose lectures are versatile and interesting both for the student and for myself”, F5.

The Sceptics felt that they had already progressed quite a while along their trajectory towards mobile teacher identity but realized that a lot remains to be done before they will achieve their goal. However, they were apprehensive about their personal time management and the amount of time that finding new tools and applications takes.

“I do realize that mobile and digital tools could be used much more (in teaching) but finding and applying good tools requires a lot of time... I also need to assess my own time management in relation to my (high) goals”, M2

These students were feeling hesitant about the true value of mobile technology for learning, but they felt cautiously optimistic about it and willing to learn more. Their view of mobile technology was narrow focusing mostly on didactic issues. They gave mobile technology a supportive role recognizing it as a tool for making their teaching more interesting.

Four students were identified as *Technologically oriented*. They approached mobile teaching from the point of view of technology. The position of Technologically oriented students was characterized by self-efficacy in technology. They were searching for the “correct way” of using mobile technology and were feeling confident in finding the solution through a series

of technology-based decisions. Issues related to technical implementation and support in mobile teaching such as clear structure of online learning materials, addressing students only with short and concise messages, setting clear rules for studying on the net and mastering copyright rules, were discussed frequently in their texts.

“(An ideal mobile teacher) builds clear learning units and divides them into suitable sections, so that mobile learning is possible...(They will) switch (from traditional communication) to using short and concise messages, which will be transmitted through mobile applications”, M9

Three students in the study cohort were identified as *Experimenters*. They discussed the characteristics of a mobile teacher and what is needed to become one. They mentioned courage to try and fail and openness to new ideas as the main features required of becoming a mobile teacher.

“In mobile teaching one needs ability to throw oneself into new situations and to have courage to encounter the new”, F8

These teacher students considered it very important to work together with their own students and to involve them into their learning process. Their approach to teaching is clearly student-centered.

“I try out openly and eagerly different tools together with my students”, F7

The Experimenters felt reasonably confident with their technical and pedagogical skills in mobile teaching. They were excited about the numerous experiments that they had already made on various mobile tools and applications and were ready to continue developing their skills together with their students. The Experimenters saw clearly the benefits of mobile teaching.

“...Mobile approach to teaching is working and meaningful. Mobile learning is not bound to certain equipment or programs.” F8

They saw mobile teaching in an extended context including the connection between educational use of mobile technology and the skills needed by their own students in their future professional life. They used expressions and

concepts typical for education with confidence and in a way that conveys a full understanding of the meanings of these concepts.

DISCUSSION

The results of the study show that the development of professional identities of the teacher students progress at different paces and at slightly different directions. All the students had entered a space, which could be described according to Tuner (1981) as being “betwixt and between”. They were undergoing a process, which would or already had changed their way of thinking and understanding of the concept of mobile teaching. This process, if successful, will ultimately lead to a transfiguration of their professional identity (Land & Mayer, 2005). Each group occupied a different position in the trajectory towards mobile teacher identity. This position determined their attitude towards mobile teaching (Søreide, 2006).

The Desperates struggled with their learning and were trapped in an identity of a student. As is typical for a liminal stage of development, they mimicked the voice of a teacher in their discussion of the characteristics of an ideal mobile teacher (Land & Mayer, 2005) but in the reflection concerning their current status of development lapsed back to the position of a student. Thus, in their development towards the identity of a qualified mobile teacher they were located at the very beginning of the trajectory or even partly outside it.

The Beginners and Sceptics had entered the liminal space of development towards mobile teacher identity (Wood, 2012). The *Sceptics* seemed to be positioned right at the hearth of the liminal space whereas the Beginners had only just entered the space. Both groups expressed feelings of hesitation, caution, and doubt, which are typical for the development process during the liminal stage (Land & Mayers, 2005). The position adopted by both groups towards mobile technology in teaching was professionally oriented. The members of each group were able to express a clear understanding of the essential features of a mobile teacher. However, for the Beginners the concept of mobile teaching manifested itself narrowly as a didactic tool for introducing learning materials and making teaching more versatile. The Sceptics, on the other hand, reflected and discussed the benefits and challenges of mobile technology both from technical and pedagogical points of view. They were looking for the “added value” of mobile teaching for the learning of their students, in other words, they were purposefully looking for new meanings and understanding of mobile teaching. This process, if

successful and continuous, will change deeply their view of teaching and affect profoundly their professional identity (cf. Cook-Salter, 2006).

The group of Technologically oriented students was characterized by advanced technical skills. Their position focused on the “correct” use of technology in teaching. The trajectory of these students was inclined to be focused excessively towards technical details and structural issues concerning mobile learning environments and ignoring a deeper understanding of pedagogical issues related to mobile teaching. Such a position, which does not fully align with the aims of the teacher training and the future professional community of teachers, might delay or even prevent the development of the teacher identity of these students (Søreide, 2007).

The Experimenters were at threshold of crossing the border between being a student and becoming a teacher. In their stories, the significant triggering events (Borg & Soderlund, 2015) in the successful development of mobile teacher identity were connected with learning experiences gained through practice. The emotions expressed by these students did not correspond with the feelings of frustration or doubt typical for liminal spaces (Land & Mayer, 2005; Pillen et al., 2013). They had already passed the phase of anxiety and reached a more balanced status in professional identity building. This was manifested in the data by expressions conveying high motivation, efficacy and commitment to their future development as teachers (Day & Kington, 2008).

CONCLUSIONS

Digital learning is today an integral part of higher education and it keeps developing at an increasing pace. There is an urgent need in education to explore the vast scale of digital phenomena, including new types of teacher identities, to be able to ensure development of pedagogically high quality teaching and learning environments.

The results of the study show that at any given moment during teacher training teacher students seem to occupy different types of liminal spaces reflecting their position in the development trajectory towards professional identity. These positions are characterized by certain types of actions, attitudes and emotions, and they affect the success, pace and direction of their identity development. Each position requires specific type of support from teacher educators to ensure undisturbed and safe development of teacher students’ professional identity during this tension prone but important phase. Identity development process includes today automatically also mobile teaching. Lack of support during this critical transformation phase in identity

building may result in discontinuing teacher students' interest in developing mobile teaching skills after the training. In some cases, it might even lead to abandoning mobile teaching altogether.

In addition to teacher students, also in-service teachers need support in their endeavors to integrate mobile learning into their teaching and in building a new mobile teacher identity to replace or at least to supplement their existing, traditional teacher identity. More research-based knowledge will help in developing education to meet the demands of the current student generation, and to support pre- and in-service teachers in becoming confident mobile teachers.

REFERENCES

- Beauchamp, C., & Thomas, L. Understanding teacher identity: an overview of issues in the literature and implications for teacher education. *Cambridge Journal of Education*. 39(2), 175-189. (2009).
- Beijaard, D., Meijer, P. C., & Verloop, N. Reconsidering research on teachers' professional identity. *Teaching and Teacher Education*, 107-128. (2004).
- Borg, E. & Soderlund, J. The nature and development of liminality competence: Narratives from a study of mobile project workers". *Journal of Workplace Learning*. 27 (3), 176-192. DOI: 10.1108/JWL-12-2013-0110. (2015).
- Chee, K.N., Yahaya, N., Ibrahim, N.H. & Noor Hassan, M. Review of Mobile Learning Trends 2010-2015: A Meta-Analysis. *Educational Technology & Society*. 20 (2), 113-126. (2017).
- Day, C.;& Kington, A. Identity, Well-Being and Effectiveness: The Emotional Contexts of Teaching. *Pedagogy, Culture and Society*. 16(1), 7-23. (2008).
- Day, C.;Kington, A.;Stobart, G.;& Sammons, P. The personal and professional selves of teachers: stable and unstable identities. *British Educational Research Journal*. 32(4), 601-616. (2006).
- Eteläpelto, A. & Vähäsantanen, K. Ammatillinen identiteetti persoonallisena ja sosiaalisena konstruktiona [Professional identity as a personal and social construction]. In A. Eteläpelto & J. Onnismäa (Eds.) *Ammatillisuus ja ammatillinen kasvu [Promoting professional growth]*. Aikuiskasvatuksen 46. vuosikirja. Helsinki: Kansanvalistusseura, 26–49. (2006).
- Heikkinen, H.L.T. Narratiivisuus – ei yksi vaan monta tarinaa [Narrativity – not one but many stories]. In H.L.T. Heikkinen & L.Syrjälä (Eds.) *Minussa elää monta tarinaa. Kirjoituksia opettajuudesta. [Inside me live many stories. Essays of teacherhood]*. Helsinki: Kansanvalistusseura, 184-187. (2002).

- Henderson, M. & Bradey, S. Shaping online teaching practices. The influence of professional and academic identities. *British Journal of Educational Technology*. 46(2), 381-390. (2008).
- Izadinia, M. A review of research on student teachers' professional identity. *British Educational Research Journal*. 39 (4), 694-713. (2013).
- Kearney, M., Schuck, S., Burden, K., & Aubusson, P. Viewing mobile learning from a pedagogical perspective. *Research in Learning Technology*, 20. doi:10.3402/rlt.v20i0.14406. (2012).
- Land, R. & Mayer, J.H.F. Threshold concepts and troublesome knowledge (2): Epistemological considerations and a conceptual framework for teaching and learning. *Higher Education*. 49, 373-388. DOI 10.1007/s10734-004-6779-5. (2005).
- Meyer, J.H.F. & Land, R. Threshold concepts and troublesome knowledge: Linkages to ways of thinking and practising within the disciplines, in Rust. C. (Ed) *Improving Student Learning: Improving Student Learning Theory and Practice – Ten Years On*. Oxford: Oxford Centre for Staff and Learning Development. Retrieved on 5 May, 2017, from: <https://www.ee.ucl.ac.uk/~mflanaga/ISL04-pp53-64-Land-et-al.pdf>. (2003).
- Palloff, R. M.; & Pratt, K. *Lessons from a cyberspace classroom: The realities of online teaching*. San Francisco: Jossey-Bass Publishers. (1999).
- Pillen, M., Beijaard, D., & den Brok, P. Tensions in beginning teachers' professional identity development, accompanying feelings and coping strategies. *European Journal of Teacher Education*. 36(3), 240-260. doi:10.1080/02619768.2012.696192. (2013).
- Ricoeur, P. *Oneself as Another*. Chicago: Chicago UP. (1992).
- Richardson, J. C.; & Alsup, J. From the Classroom to the Keyboard: How Seven Teachers Created Their Online Teacher identities. *International Review of Research in Open and Distributed learning*. 16(1), 142-166. (2015).
- Rodgers, C. & Scott, K. The development of the personal self and professional identity in learning to teach. In M.Cochran-Smith, S. Feiman-Nemser, D.J.McIntire & K.E.Demers (Eds.) *Handbook of research on teacher education: Enduring questions and changing contexts*, 732-755. New York: Routledge. (2008).
- Sørreide, G.E. Narrative construction of teacher identity: positioning and negotiation. *Teachers and Teaching: theory and practice*. 12 (5), 527-547. (2006).

- Søreide, G.E. Narrative construction of teacher identity. Doctoral dissertation. The University of Bergen. Retrieved on October 26, 2017, from: <https://bora.uib.no/handle/1956/2532>. (2007).
- Turner, V. Social dramas and stories about them. In W.J.T. Mitchell (Ed) *On narrative*. 137-164. Chicago, IL: University of Chicago Press. (1981).
- Walkington, J.. Becoming a teacher: encouraging development of teacher identity through reflective practice. *Asia-Pacific Journal of Teacher Education*. 33(1), 53–64. (2005)
- Wood, P. Blogs as liminal space: student teachers at the threshold. *Technology, Pedagogy and Education*. 21 (1), 85-99. DOI: 10.1080/1475939X.2012.659885. (2012).