The Future Makers
– Professional Teachers Promoting Pedagogical Change

Ryymin, E., Joyce, B. and Laurikainen, M. (eds.)

Index

Forewords

Education is global by its nature. We are all meeting the same transformative effects of technology, shifting the emphasis from content to skills and changing the paradigm from an industrial model to learner-driven, student-centered and engaging. There are also many similar challenges globally in terms of developing teachers' competence and networked expertise to apply educational innovations. Teachers need to be continuous learners, co-creators and change agents in their learning and working environment. In order to achieve professional development needed, the integration of teachers' theoretical, practical, self-regulative and sociocultural knowledge is essential.

In this collection of articles, the teachers, who have participated in the international teacher education programmes or teacher exchange of the School of Professional Teacher Education in HAMK, represent and reflect the ongoing pedagogical change together with their Finnish colleagues. The articles emphasize professional teachers as future makers and educational promoters and innovators in this paradigm shift.

The articles are free descriptions and theory-based reflections of international teachers' own pedagogical experiments, observations of professional growth and comments of the latest educational trends. To show appreciation for the authors' autonomy, approaches and voices, the editors wanted to offer the possibility for variety of writing styles, frameworks and also free forms of manuscript writing.

The cross-cultural dialogue and developing teachers' dialoguing skills play a crucial role in the School of Professional Teacher Education. As Senge (1990) says "People who dialogue can gain insight that could not be

achieved individually". Aligned with this principle the editors wanted to advance educational dialogue in this article collection. The article manuscripts have been written in a dialogue between international and Finnish teachers according to two different approaches: the international teachers have co-written the articles together with their Finnish colleagues, or the Finnish colleagues have written the comment section to their international colleagues' manuscripts. The detailed contributions of the authors are described at the beginning of the writings and in the article introduction.

I hope that the reader finds this approach inspiring, and contributes to the learning community by dialoguing, further developing the ideas and experimenting pedagogical change in practice.

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References

Senge, P. (1990/2006). The Fifth Discipline: The Art & Practice of The Learning Organization. New York: Doubleday.

Introduction of the articles

Essi Ryymin, Brian Joyce and Marja Laurikainen, Häme University of Applied Sciences (HAMK)

The authors of the articles are participants

In the article "Reasons for Finnish success in education – From learning and teaching aspects" Zhiwei Chen reflects Finnish system of education and the possible explanations for Finnish educational success. **Zhiwei Chen** finds interesting elements especially in teacher education and in a teacher's profession. Teachers in Finland are not just curriculum implementers, but researchers, innovators and creative problem-solvers. **Brian Joyce** has facilitated the manuscript writing.

Seija Mahlamäki-Kultanen's and **Carolina Corado**'s article "A reflection tool to enhance individual learning in the Finnish-Brazilian VET Teachers for the Future -Professional Certificate Programme" introduces Brazilian teacher students' experiences in Finland. The narratives of students consist of powerful experiences, emotions and many new questions. Seija Mahlamäki-Kultanen and Carolina Corado suggest, on the basis of analysis of students' reflections, a new tool for teacher educators to make the international training programmes even more individualized and personalized for international teaching professionals.

Regina Lucia Pelachim Lianda reflects her own professional development in the article "An apprenticeship of a teacher – A description of a teacher's professional development in a community of learning practitioners". The experimental growth in the new role of a teacher and the strive for a pedagogical paradigm shift has required the integration of theoretical, practical, self-regulative and sociocultural knowledge from the author.

Essi Ryymin has guided the writing process and contributed to Regina Pelachim Lianda's article in its theoretical background.

Andre Fernando Uebe Mansur and **Sanna Ruhalahti** have a pedagogical dialogue in their article named "An analysis about entrepreneurial learning frameworks in Brazil and Finland". Andre Uebe Mansur finds project-based learning benchmarked in Finland very useful in facilitating business studies in higher education in Brazil; Sanna Ruhalahti deepens the pedagogical approach with dialogical framework.

The article of **Fernando Santana Pacheco** "Starting with a tinkering workshop and going beyond" represents a pedagogical experiment of project-based learning and innovations the Brazilian author implemented in Finland together with Finnish pupils and colleagues. Both process and cultural elements in learning are reflected in the manuscript. The manuscript writing has been facilitated by **Brian Joyce**.

Pedro Barbosa de Souza Feitoza and **Jouni Enqvist** are dialoguing about philosophy of education and integration of sciences in the article "Integration and interdisciplinarity in education: examples observed in Finland". As a conclusion, they find that the integration of sciences is not something done only by specialized scientists or in pure academic universities. Instead, it is very stimulating when a teacher, in the classroom, makes use of a wide range of knowledge to solve a problem with students and in collaboration with other teachers.

Rodrigo Duran and **Marko Susimetsä** introduce game-based learning as an innovative learning and teaching method. Rodrigo Duran's article "A collaborative virtual classroom for game based-learning using immersive and free creative simulated universe in multiple scales" suggests that games can improve learning as an engaging and immersive learning tool. In his comment section Marko Susimetsä calls out for teachers to familiarise themselves with games that can support the broader personal growth of individuals, in addition to learning: their values and worldviews, as well as their attitudes towards other people and their worldviews.

Vicente Barros and **Martti Majuri** reflect the environmental education in the article "The environmental education in teacher training: experiences in Brazil and Finland". Vicente Barros benchmarks environmental education and reflects the needs for the development in Brazil from the point of view of sustainable development. Martti Majuri sees many new possibilities in educational co-operation between Finland and Brazil also in environmental sector.

Alexandre R.S. Correia presents his pedagogical experiments of implementing project-based learning in programming studies. The article "Brazilian students of programming courses improve their motivation when

placing them under student-centered learning and project-based learning approaches" opens the process and results of the case experiment. **Essi Ryymin** co-operated with Alexandre R.S. Correia in pedagogical experiment design and contributed to the manuscript writing process.

Ermek S. Paizov, **B.T. Kaiyrzhanov** write about "The experiences of the flipped classroom in Kazakhstan – Implementing video lessons in secondary school mathematics". Ermek S. Paizov and B.T. Kaiyrzhanov find many benefits in their pedagogical experiment in implementing the flipped classroom model, especially video lessons, in upper secondary school of Kazakhstan. **Marja Laurikainen** offers further aspects to the pedagogical thinking in her comment section.

The role of managers is crucial in pedagogical change. **Duman Sapakov** reflects in his article "The role of leadership in school" the several roles of today's school managers and pedagogical leaders. Duman Sapakov has been benchmarking Finnish school leadership, and introduces also the concept of distributed leadership and shared responsibilities in his article. He concludes that trust and autonomy enable responsibility. **Brian Joyce** has facilitated the manuscript writing process.

Reasons for Finnish success in education – From learning and teaching aspects

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Brian Joyce, Häme University of Applied Sciences (HAMK)

Based on the PISA results and industrial development data in Finland, we see that Finnish education has always played an important role in students and their talents' growth and development (Reinikainen 2012). From the teaching and learning behaviors in Finnish schools and universities, there are little pressures on students' learning from teachers or schools, but more freedom and learning autonomy by students themselves. This is the result and reflection of the high confidence by Finnish educational system on individual consciousness, which differs from the neo-liberalism advocated in other developed countries. Therefore, the general Finnish educational environment has shown its resistance in using the method of competition or standardized tests to examine students' learning performances or results. Moreover, teachers' teaching practices have also shown their autonomy and researching characters (Niemi, Toom & Kallioniemi 2012). According to the field research and interviews in Finland, we will find the reasons for Finnish success in education summarized as follows:

1. Students' self-learning and activities after school have achieved more

The traditional teaching way is focusing on the role and function played by teachers. This has formed the teacher-oriented classroom environment. However, in Finland, we can find that teachers teach less, but release more free time for students' participation in extracurricular activities, such as a variety of learning or recreational clubs. Consequently, the formal learning time in schools is shorter, as the Finnish pupils generally spend no more than 35 hours on school learning, and the other time in a day, usually in the afternoon has always been left to students, who can arrange their time according to their own interests and hobbies. If students have no interest in participating in extracurricular activities, they can choose to learn or play at home (Niemi et al. 2012).

Based on the data published by OECD in 2010, 7 – 14-year-old Finnish students have spent about 5,000 hours in the classroom, in contrast to Ita-

ly, Mexico and other countries with about 7,000 hours to 8,000 hours but with poorer PISA results. The one explanation why Finnish students have more excellent academic performance with less learning time at school may be that they are able to learn and experience more from the extra-curricular activities and interaction with their peers (Schatz, Popovic & Dervin 2015). This is also the practice and reflection of teaching principle as "learning by doing" from the childhood of Finnish people. Moreover, pressures and tasks from homework on students are not so great. It is believed that repetitive studies without intellectual thinking jobs and work does not bring on academic progress. Thus, most Finnish students can complete homework at school, especially on lower levels of comprehensive school, or no more than half an hour at home. The higher education in Finland has also called for practical and firsthand experiences in society and companies, such as the teaching arrangements in the Universities of Applied Sciences (Melin, Zuijdam, Good, Angelis, Enberg, Fikkers, & Zegel 2015). These principles, which give students sufficient freedom to develop their interests and emphasize practical experiences, may have on their half influenced the general educational activities and teaching practices at school in Finland.

2. The preparations by teachers can guarantee each student's individual development

The task for teachers in Finland does not only include their teaching activities in classroom, but also the preparation work. The preparations for lessons with colleagues, learning from each other and reflection on their own teaching every day have always been taken care of by Finnish teachers. According to the investigation teachers devote themselves in developing different categories and kinds of curricula, summarizing and evaluating students' performances comprehensively, taking part in planning physical and mental welfare courses for students' all around development (Niemi et al. 2012). Therefore, we can regard teachers in Finland as guides for students' learning and growth. Different from teaching attitudes in traditional forms, the teacher works in the Finnish educational environment has to be a versatile expert, who can always understand students' real requirements, deal with each student's problems, and even design respective learning plans for each individual in a class. Compared with teachers who are struggling with teaching only textbook contents, teachers in this form have more time and energy with training and developing students' capability outside classroom. Although it calls for highly qualified professional teaching and instructing skills and talents, the teaching results seem to be very positive with great success in Finnish schools.

3. The evaluation tools and methods with knowledge-oriented aims

From the worldwide views, examinations are the most direct and easiest way to measure the learning effects and performances by students. Especially after the "British Education Reform Act" in 1988, competitions and comparisons in examinations have been regarded as the main tools in evaluating educational qualities in schools. However, although the Finnish educational system have not adopted the standardized examinations form, the general performances by students reflected from the PISA data always show that the Finnish education has got a great success (Reinikainen 2012). In this way, we cannot just define the learning results with only on criteria as examinations, but there are also various factors, which are used to value the comprehensive quality of students. Based on the Finnish evaluation experience, we can see teachers daily and final evaluations have also played an important role in the whole assessment progress. From kindergarten to the higher educational institution, Finnish students have always received attention from their teachers during their learning at school (Melin et al. 2015). The combination of diagnostic, formative and summative assessment has been integrated by teachers in the learning process. It also implies that teachers have overall responsibility in designing and using assessment methods in their daily teaching activities.

After graduation, each student can get a general and comprehensive performance report recorded by teachers. From the report, each student can find the relative level of their academic achievements at school. In fact, from the investigation, we can find that Finnish teachers and schools do not oppose examinations as an only tool for evaluations. However, they would rather regard examinations and competitions as kinds of "methods" but not the ultimate goal of education and learning. Therefore, each student will not be told about their ranking in the class based on their examination results, but students could compare the results only with their former performances, in order motivate their progress from their own capabilities and willingness (Varjo, Simola, & Rinne 2013).

In this way, examinations' results are not linked to teachers' teaching achievements or treatment in schools. This kind of view on examinations can finally guarantee the knowledge learning effects by students. Therefore, the Finnish model with teachers' professional development and authorities with evaluations can always provide students with sufficient freedom and thinking space on their own learning behaviors and performances.

4. The equality in education with diversity

Nowadays, each Finnish comprehensive school has offered different language study, such as some comprehensive schools in the capital area even organize more than 40 kinds of languages classes. In addition, all students from immigrant families are arranged to learn in regular classes based on the inclusive principles. With this arrangement, it has effectively avoided the situation of social exclusion in Finland society.

For Finnish students, this kind of educational policy has provided them with a very diverse and global learning environment (Sahlberg 2012). Nowadays, the first and second generation immigrants have taken about 1/4 in the total population in some large cities. Based on the basic and general educational principle and theory, Finnish educational system can give sufficient consideration to the requirements of different groups of students (Sahlberg 2012). One practical method in fulfilling this is to add an assistant teacher in a class to make matters clear and try to realize demands and needs of students with different family backgrounds.

5. Teachers' academic and professional qualifications.

Teachers' performances are also the main factors for the success of the Finnish educational system. The basic qualifications' requirements to be a teacher in Finland consist of two parts: professional and academic knowledge and skills in teaching. In other words, it always requires the persons who want to be teachers in Finland to obtain a master's degree. In their studies at colleges and universities, they not only acquire knowledge and skills for educational science and research, but also use the knowledge and skills in their daily teaching work in practice in order to integrate their professions with their professional and academic knowledge.

Currently, teacher education and training has been brought into the higher educational system, which shows the importance and meaning of teachers' educational background in the educational process (Uusiautti & Määttä 2013). For example, students learning to become teachers in middle and high school after graduation have majors divided into various disciplines and subjects. This kind of subject-centered teacher education doesn't only offer students with knowledge in a particular subject, such as physics, math or language, etc., but also teaching knowledge with professional practices, such as teaching methods, tools, ethnics, etc. (Uusiautti & Määttä 2013).

During their learning period in universities, pedagogical science has always been associated with great importance for the teacher education qualifications. Therefore, the teacher training and education system in Finland seems to be strict and complex. Only if the persons fulfill all the

academic and professional knowledge and skills can they have the teaching qualifications and enable them to teach in schools.

This system differs from some others such as the American, English or Norwegian teacher training programs, which separate teacher training into an independent model and issue certificates for teaching qualifications after an intensive course in a short period. This kind of intensive training has its advantages, such as with great effectiveness and concentrated training resources (Uusiautti & Määttä 2013). However, this kind of training has a great pragmatic aim for a certificate like a "fast-food" educational process and it is always a lack of practical opportunities for students to exert their teaching knowledge in practice. In contrast, the Finnish teacher training system in character is much more systematic and complete with integrating the training into professional life in daily life.

In teaching practice, teachers have been given great autonomy in their teaching styles and methods, which enable them to develop their own teaching ways and creative thinking. Therefore, this autonomy does not mean indulgent teaching style, but a much heavier responsibility, which even requires teachers to improve educational effects and results independently and creatively, sometimes even trigger educational revolution in teaching methods and attitudes with the standpoint as a researcher.

Teachers can always get training in universities to carry out a problem-based project with a clear teaching destination and use modern technology in their teaching (Uusiautti & Määttä 2013). Thus, the teaching work by Finnish teachers has always been attached with researching character, which helps them discover a scientific and effective way to solve problems encountered in their daily work. It has also influenced students who can also learn to be creative and unconstrained with their learning tasks (Uusiautti & Määttä 2013). Therefore, for the modern views on teachers' work and role in the educational system, we should not just consider them as "craftsman" with teaching skills and professional knowledge, but they can also be creative and demonstrate initiative in their career with modifications and reformation.

Generally speaking, the features of the Finnish educational system have shown the autonomy and independence in teachers' work and students' learning. Authorities of self-learning and knowledge-oriented evaluation methods have offered students with learning freedom (Waldow, Takayama & Sung, 2014). The equality in education with diversity has guaranteed the educational opportunities obtained by various immigrants. Teachers' academic and professional qualification and elaborate preparations for classes have supported a high level of teaching effects offered to students. In this way, we can find Finnish success in education is not occasional, but has profound reasons and background, which deserves to be learnt by others.

References

Malinen, O. P., Väisänen, P., & Savolainen, H. (2012). Teacher education in Finland: a review of a national effort for preparing teachers for the future. Curriculum Journal, 23(4), 567–584.

Melin, G., Zuijdam, F., Good, B., Angelis, J., Enberg, J., Fikkers, D., & Zegel, S. (2015). Towards a future proof system for higher education and research in Finland. Publications of the Ministry on Education and Culture, Finland, 11. Helsinki: Ministry of Education and Culture.

Niemi, H. (2012). The societal factors contributing to education and schooling in Finland. In H. Niemi, A. Toom, & A. Kallioniemi (eds.) Miracle of Education: The principles and practices of teaching and learning in Finnish schools, 19–38. Rotterdam: Sense Publishers.

Niemi, H., Toom, A., & Kallioniemi, A. (2012). Miracle of Education: The principles and practices of teaching and learning in Finnish schools. Rotterdam: Sense Publishers.

Reinikainen, P. (2012). Amazing PISA results in Finnish comprehensive schools. In H. Niemi, A. Toom, & A. Kallioniemi (eds.) Miracle of Education: The principles and practices of teaching and learning in Finnish schools, 3–18. Rotterdam: Sense Publishers.

Sahlberg, P. (2012). A Model Lesson: Finland Shows Us What Equal Opportunity Looks Like. American Educator, 36(1), 20.

Schatz, M., Popovic, A., & Dervin, F. (2015). From PISA to national branding: exploring Finnish education. Discourse: Studies in the Cultural Politics of Education. Retrieved 28 September 2016 from http://dx.doi.org/10.1080/0159630 6.2015.1066311

Sellar, S., & Lingard, B. (2013). The OECD and global governance in education. Journal of Education Policy, 28(5), 710–725.

Uusiautti, S., & Määttä, K. (2013). Good teachers and good teacher educators: A glance at the current teacher education in Finland. Asian Journal of Education and e-Learning, 1(1).

Varjo, J., Simola, H., & Rinne, R. (2013). Finland's PISA results: An analysis of dynamics in education politics. In H.-D. Meyer & A. Benavot (eds.) PISA, power and policy. The emergence of global educational governance. Oxford: Symposium Books.

Waldow, F., Takayama, K., & Sung, Y. K. (2014). Rethinking the pattern of external policy referencing: media discourses over the 'Asian Tigers' PISA success in Australia, Germany and South Korea. Comparative Education, 50(3), 302–321.

A reflection tool to enhance individual learning in the Finnish-Brazilian VET Teachers for the Future -Professional Certificate Programme

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Keywords: international exchanges, teacher students' experiences, constructivist narrative perspective, professional growth, individual learning paths, reflection tool

1. Introduction

"A trip and travelling meant originally a discovery and inquiry in an environment, which people have had little knowledge and lots of beliefs" (Poikela & Poikela 2013).

Nowadays, Finland is a country familiar to many in its recognition for having a high reputation in the context of education. However, there are certainly many beliefs and artefacts to explore more deeply when it comes to an individual teacher, professor or professional in the field of education. The wide continuum of individual learning narratives of university students in international (European Union level) contexts is well described by Maria Paasonen (2006). She demonstrates how the narratives of postmodern students are polarized and how international periods intervene with periods of personal growth and changes in career prospects.

During the international exchange study periods, the post-modern individual sees life, learning, competence and experiences from a constructivist narrative perspective of establishing meanings and of career construction (Mahlamäki-Kultanen, Mahlamäki & Vähämäki 2007, 45).

Sagulin (2005) conducted a case study in one Finnish university on the learning results of international students. She divided learning results into five broad categories: language competence, cultural competence, personal growth, academic competence and work life competence. The students described their international study periods and the sites of learning, including those different from the formal courses provided for them. The students' approach to living in a foreign country was rather evenly scattered on a continuum, on the other end of which was the visitor living in the 'tribes' of foreign students and on the other the member of the local studying and working team (the assimilator). Besides formal courses, fostering cultural and personal growth as well as language competence proves to be

important for the individuals. According to the students, personal and cultural skills were better developed in informal contexts (social communication, trips and everyday situations) rather than in formal studies in the university, this was especially so with the acquisition of foreign languages.

The same phenomena seems to happen during teachers' international exchange periods (Riitaoja 2007; Mahlamäki-Kultanen, Mahlamäki & Vähämäki 2007, 45 – 46). According to Mahlamäki-Kultanen et al. (2007, 46), teachers learn best during on-the-job learning processes through participation. However, teachers' learning in international programmes in Finland is mainly studied using different evaluation studies or surveys to justify them as a useful learning method. However not so much in-depth research is done on the process or individual learners' experiences. In this article, we target our interest on constructing only the common frame of reference from individual learning narratives to inform the educational practice as a social innovation. Besides that, we present one practice test, an individual narrative, which is constructed based on the frame of reference developed in an abductive analysis.

2. Materials and methods

This study deals with teachers from Brazil studying in Finland during 2014 and 2015. The authors wanted to listen to the individual teachers in a Brazilian teacher education group in a pilot programme of The VET Teachers for the Future. The groups and the actual programme in which they studied was a target of extensive evaluation and development research because it has a high importance for both Brazilian partners as well as the programme organisers in Finland (see e.g. Mahlamäki-Kultanen et al. 2015; Ryymin et al. 2015). However, it was evident, that very much learning was going on in the participants' minds and lives surrounding the actual programme, contributing to learning and individual growth. Thirty participants and individuals were interviewed altogether. The individual conducted interviews with each participant at the end of the 5-month period of the two groups (N 2014 and N 2015) with the following rather openly made questions and their follow-up questions:

1. Name three people you would take back to Brazil to collaborate with and why?

2. What would you tell your colleagues/ managers/ students about your experience in Finland?

3. Name two major events/ experiences you have had during the 5 months that have changed your identity or the way you see your life.

4. One of your colleagues in Brazil, who knows you really well as a teacher, asks to observe you for 2 weeks in the classroom this coming spring / autumn depending on the participant cohort). What changes might they notice in the way you approach your lessons?

5. What other question would you like to be asked?

The interviews were guided as conversations between two people, whose roles change from a teacher-participant relationship to a more mutual model of future international colleague network type of a relationship (Rubin & Rubin 1995, 122). Only a few topics were covered in depth and the interviewer took turns and acknowledged what the other had said. Possible misunderstandings and ambiguities were clarified and many moments and memories during the periods reflected upon. All the interviews were videoed and the videos transcribed verbatim. Mahlamäki-Kultanen made the analysis and coding using the technical tools of NVivo8 Qualitative Data Analysis Software. The coding and analysis of data was broadly based on the "map" of Poikela & Poikela (2013, 12), aiming to generalize the stories, which told about a case (Huberman & Miles 1994, 434 referring to Rein & Schön 1977).

3. Results

As a result, Mahlamäki-Kultanen developed a set of concepts by clarifying reflection questions, based on Poikela and Poikela and the interview data. The questions are divided into five main concepts: 1. A group of teachers in Finland; 2. Everyday life; 3. History and perspectives for the future; 4. Constructing a common narrative; 5. Constructing individual narratives, as seen in Table 1.

Table 1.   A reflection tool to enhance learning in The VET Teachers for the Future -Programme

Concept	Clarifying definitions and reflective questions	Citations in the data
A group of teachers in Finland	A group of foreign, adult teacher-participants study and live partly together in a new country, in a new culture, in new kinds of schools and learning environments. The teacher-participants have to change perspectives from teachers to learners, which is often far from easy to teachers and professors. The group explores actions, listens, participates, does things and learns together.	"I think it happened on a series of presentations we did in the beginning… and we all was, uh, we did this first presentation of our ideas, so I was trying to connect our, uh, similarities of interest, and whatever, you know, expertise and so on, and then I realized… it was very important, you know, when we saw what they do and I realized that it was possible to at least conceive this learning community, in a way that could be done, and that's one I remember…

		I realize that it was possible to have a real learning community, the real community could be formed from this group, it was a possibility."
		"Yeah (*smiling*) of course, conflicts. A kind of disruptive process when you need to leave your old ideas. And begin to…"
Everyday life	Everyday life means local people's acts in schools as well as outside schools, in public and private life, e.g. 1) How and when do local people do things and perform acts in schools? 2) How does a society and community deal with education? 3) What do the people do in practice? 4) How do they interact?	B: "So you have been observing everywhere you have…" C: "I have, everywhere I went, yeah.." D: "My best experience here, it's not about education in this way, like a formal science. It was more in the way about it, one behaviour, Finnish behaviour, and about the silence, about the respect, themselves and the nature, and I think this is the best, the success of the education here to me is linked with this behavior." "But the way the teacher planned, the way the teacher addressed their (refers to students) needs, is quite different. So that's what I, the addressing is the point."
History and perspectives for the future	Refers to people's action and context in the history and in the future. E.g. 1) How and by whom was the educational system constructed? 2) What did the infrastructure look like before? 3) What legends about education and learning do the people share? 4) Are Finnish teacher autonomy, safety, school success, equality, welfare, functionality true in Finland? 5) How did they come into existence? 6) Are they there also in the future? 7) What are the people doing to construct the future educational system of Finland?	"Well, I would say that, umh, my experience here was very, uh, rich, complex, and, like, unpredicted in a way, because here I learned so many things I couldn't tell, you know, before, and it's just incredibly rich experience to be in contact with another system, educational system another coachers, society and especially Finland that is now kind of at a spotlight in a way. So, it's just something very rewarding to be able to have that experience." "Yeah, the school where I could notice the way the school was built, the way the teachers were working …"

		"Yeah. I have visited at least four or five different schools in different levels so I have seen that all the students, youngers or more major, they are, they want to be there (*stressing*). You know. They stay in the classrooms because they really like to do that kind of activity. You know."

"Another excellent experience that I have seen here is the freedom that the teacher has in terms of conduct the way the students will learn. It's very, you know, it's very easy to change the design of the classrooms, it's very easy to change to place where the class is taken place and it's, you know, there is no, there is no barriers that puts some limits on the way of the teaching and learn. So this kind of freedom and even trust, I've seen the students, they really trust that they are doing the best way, I think I have seen that the students, they know that the right place to be is exactly (*showing*) that one inside the classroom near to the teacher, near to the other colleagues and so on. Yeah. So." |
| Constructing a common narrative | Refers to communicative actions of the teacher training participants in all forms. The narrative is constantly constructed, made visible and accessible by expressions in digital and other formats, "digital postcards" to home and to peers. Sharing and interpreting experiences together, is often enhanced by the programme guides, teacher trainers. | "I'm sure the first one is the relationship with the other teachers from Brazil, I think it's so important have classes or seminars, because we have very different points of view, we come from very different places, we teach for very different context and kind of students, so this relationship with them, make me, uh made me grow up so fast, to understand what is the federal institute…"

"I think, I … that is a new thing you taught to me, the possibility of really, uh, being part or a, uh, a beginning of this learning community is a really more practical thing. Communication and networking for example, its a very … the real aspect of it is that…." |

Constructing individual narratives	**Refers to one's own professional identity formation. Own identity and pedagogical approaches are often tested initially in the form of new ideas aimed to the own context by digital tools, making comparisons with the peer learners and even colleagues in the home institution. Planning the final implementation of newly learned teaching methods in home country of origin and home institution starts. E.g. 1) What is the support from the peer group in Finland like, who supports you and whom do you support? 2) How does the peer support function on your own personal and professional growth? 3) Initial testing of ideas into one's own context by digital tools, making comparisons with the peers and planning the final implementation of newly learned teaching methods in home country of origin and home institution**	**"It's funny because I come to Finland to understand what is my own institute, so it's a was very important, so I think so if in this relationship the main point, the high point to this, that have marked me so much…."**

"Uh, NN. So, NN, I intend to work collaboratively, because we 3 are from the same course, not just of the same campus, not just the same area, but we teach the same students, so it's a very good opportunity to do something real."

"We have done a kind of research and we have discussed a lot of subjects, many new ways to be inside the classroom and to teach and how the students are going to learn. So I definitely believe that he will do a lot of activities with me. I mean one in each institution but we can together build a kind of network, strongly enough to, you know, to carry on this project for the future." |

The table is a suggestion for the future teacher educators to make this happen; to mentor the participants in their individual inquiry with the purpose of understanding and guiding their own individual learning and inquiry in the Finnish educational system and society and culture even more deeply.

4. Making use of the newly constructed reflection tool and future considerations

Two years have already passed from the first cohort's studies in Finland. Now that the long-term impacts are more visible, there is once again the need for reflection. Guided by the frame of reference presented in table 1, Carolina Corado, from the first pilot programme reflects in on her participation in the VET Teachers for the Future.

> *"The Brazilian group (in cohort 1 in 2014) comprised 27 teachers, 14 stayed in Hämeenlinna, at HAMK. In the beginning, there was no clue about how the course would run. There was only a common feeling that Finland was among the best countries in the world regarding its educational system. The comparisons between both countries were inevitable for all the group members. It was*

common sense that everything worked perfectly. The trains and buses were on time, the streets were clean and the people were thoughtful, polite and kind. The learning environment was different from the classrooms previously known. Apparently, there was more freedom in the learning environment. Freedom to move the furniture around, to choose the media used, and to access information, once tablets provided by HAMK were made available for all participants.

As soon as the visits started, it was clear to the group that education was the foundation of Finnish society. A teacher is proud to be a teacher, which made the group positively surprised, and the teachers are highly appreciated in society. In Seminaarin koulu, an elementary school in Hämeenlinna, teachers form different teams that plan and act together with autonomy. Regarding the students, simple acts that make a difference in daily life were, for example, going alone to the school or taking the tray back to the kitchen and separating the trash and utensils. The attention given to the students' needs is also remarkable in the schools. For example, in Kiipula, a vocational school, the students with physical and/or intellectual disabilities are provided with services that aim at improving their well-being and make it possible for them to have equal opportunities in their professional life. The Finnish adage "no one is left behind" can truly be seen there. Besides, it was noticed the students have their voices heard and taken into account in the schools; building a fruitful and collaborative environment.

The first two months were the hardest. Being a self-paced student was not an easy task and mastering one's own learning path was not in everybody's plan. The diversity of the group was also a challenge, although enriching. Learning together, with and from different professionals/fields, changed the experience completely. The focus was on how to learn and not in the content itself. The path was more important than the final destination and the outcome replaced non-functional paradigms that have been in practice far too long.

By the end of the five months, I had changed. The feeling before the Finnish experience was that the teacher missed some important things in the students' daily lives and the classrooms were not proper learning environments back home. There was an urgent need to change and involve the students in their own learning process, and being involved in it. Acting in a student-centered way, planning for and with the students and making the content meaningful for their lives are big challenges that must be surpassed daily."

5. Conclusions

Our eventual purpose is to give the future participants of the VET Techers for the Future® programme and teacher educators in our university tools to further develop their own understanding of the learning phenomena. The narrative study builds on previous research on internationalization, and students' and teachers' exchange periods abroad. It also gains considerable inspiration from the work of Esa and Sari Poikela conducted in Finnish Lapland in the context of restorative and educational tourism, 'Tarinamesta'. 'Tarina' means a story and the word ´mesta´ has its roots in the Russian language, describing a site, context and situation for storytelling (Poikela & Poikela 2013, 6). Their development and research as well as the frame of reference has guided this study to develop a tool to enhance participants learning. It was done using a more theory-driven approach, by analyzing the wide continuum of individual learning of professors studying in Finland in a teacher education programme.

The feedback from several important Brazilian stakeholders, as well as programme participants in formal surveys, has had an impact on the VET Teachers for the Future® programme development. It is important to keep our eyes open and watch the critical sites and moments for personal growth carefully in each of the future cohorts' daily lives.

References

Huberman, A.M. & Miles, M.B. (1994). Data Management and Analysis methods. In Denzin, N.K. & Lincoln, Y.S. (eds.) Handbook of Qualitative Research. Thousands Oaks: Sage Publications.

Mahlamäki-Kultanen, S., Joyce, B., Ryymin, E., Viskari, M. & Heikkilä, L. (2015). Brazilian VET teachers' strategies to transfer their learning in a Finnish-Brazilian teacher education programme. Journal of Finnish Universities of Applied Sciences, 3. Retrieved 28 September 2016 from https://arkisto.uasjournal.fi/uasjournal_2015-3/mahlamaki-kultanen.html

Mahlamäki-Kultanen, S., Mahlamäki, U. & Vähämäki, A. (2007). National report on the implementation of the Socrates and Leonardo da Vinci programmes in 2000–2006. Publications of the Ministry of Education, 36. Helsinki: Ministry of Education. Retrieved 28 September 2016 from http://www.minedu.fi/export/sites/default/OPM/Julkaisut/2007/liitteet/opm36.pdf?lang=fi

Paasonen, M. (2006). Liikkuva elämäntyyli. Korkeakouluharjoittelijoiden työelämätarinat kansainvälisyyden valossa. Master's thesis in Sociology, University of Helsinki.

Poikela, E. & Poikela, S. (eds.) (2012). Tarinamesta – opastaja ja matkalaisen kohtaamisen taito. Rovaniemi: Lapin yliopistokustannus. Retrieved 28 September 2016 from http://urn.fi/URN:NBN:fi:ula-201205031099

Riitaoja, A.-L. (2007). Opettajien kansainvälinen liikkuvuus. Hyöty ja vaikutukset peruskouluissa ja lukioissa sekä ammatillisissa ja korkea-asteen oppilaitoksissa. Occasional paper 1. Kansainvälisen henkilövaihdon keskus CIMO. Retrieved 28 September 2016 from Opettajien kansainvälinen liikkuvuus. Hyöty ja vaikutukset peruskouluissa ja lukioissa sekä ammatillisissa ja korkea-asteen oppilaitoksissa

Rubin, H. J. & Rubin, I.S. (1995). Qualitative Interviewing The Art of Hearing Data. Thousand Oaks: Sage Publications.

Ryymin, E., Corado, C., Joyce, B., Kokkomäki, J., Kunnari, I., Laurikainen, M., Lianda, R & Viskari, M. (2015). Finnish-Brazilian Learning Process as an Experimental Path towards Pedagogical Change. Paper presented in NOLAN, The 8th Nordic Latin American Research Network Conference, 11.–13.6.2015, Helsinki, Finland.

Sagulin, M. (2005). Yliopistojen kansainvälisen opiskelijavaihdon tuottama oppiminen. Master's thesis in Education, University of Jyväskylä.

An apprenticeship of a teacher – A description of a teacher's professional development in a community of learning practitioners

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Keywords: apprenticeship, teacher development, educational change, community of practice, student-centered methods

This article is an observation and reflection about the first author, Regina Lianda's, own professional development within The VET Teachers for the Future – Professional Certificate Programme. The key concept supporting analyzing the author's professional development is apprenticeship. Hence, the author is called the apprentice in this article. The theoretical background of the article leans on sociocultural activity, learning in interaction in sociocultural settings, and in communities of practice.

The theme apprenticeship has long been discussed, and often its methodologies are directed to students, younger professionals from different areas, but rarely for teachers with careers underway. However, in the apprenticeship process described in this article, teachers studying and enriching the knowledge collaboratively in a learning community, respecting the previous knowledge and experience of the practitioners, achieved successful outcomes from the point of view of the author.

At the end of the training programme and development process, the apprentice acquired professional self-confidence and motivation to face and manage educational change in her teaching. Furthermore, the first author was able to create new pedagogical practices and associate her research in a specific area of knowledge by re-designing the learning process with student-centered methodology, especially project-based pedagogy. On the basis of the experience and reflections of the author, the concept apprenticeship is redefined in the context of teacher development.

1. Apprenticeship as a conceptual tool in professional development

In this article the apprenticeship is used as a conceptual tool in analyzing the first author's own professional development within a Finnish-Brazilian VET Teachers for the Future Programme for vocational teachers, organized in HAMK, the School of Professional Teacher Education in 2014. The program's leading pedagogical principle was to co-develop new pedagogical competences, practices and knowledge in intense social co-operation of a community of learning practitioners.

This article is divided into three entities: 1) introduction, 2) training programme and its results – the case of the apprentice, and 3) conclusions and initiatives for future research. In the introduction the key concepts and theoretical framework are presented referring to the latest educational research as well as scientific classics of the study field. The second chapter describes the training program and the author's experiences and observations about her own professional development. The third chapter discusses the conclusions of the professional development of teachers in social interaction and presents some ideas for future research.

2. Defining the apprenticeship

The concept apprenticeship has long been discussed, and some definitions can be considered as Rich Environments for Active Learning (REALs). They provide learning activities that, instead of transferring knowledge to students, engage students in a continuous collaborative process of building and reshaping understanding as a natural consequence of their experiences and authentic interactions with the world (Forman & Pufall 1988; Fosnot 1989; Grabinger & Dunlap 1995). Consequently, learning to think critically, to analyse and synthesize information to solve technical, social, economic, political, and scientific problems, and to work productively in groups are crucial skills for successful and fulfilling participation in our modern, competitive society (Grabinger & Dunlap 1995).

In apprenticeship, skills and knowledge are acquired through a combination of structured learning opportunities in the workplace, participation in the production process and formal 'classroom' learning. Apprenticeship is defined as a contract between an employer and a young person combining on-the-job training, formal learning and productive work

One definition of apprenticeship that corresponds to contemporary ideals might be a structured programme of vocational preparation, sponsored by an employer, juxtaposing part-time education with on-the-job training and

work experience, leading to a recognised vocational qualification at craft or higher level, and taking at least two years to complete, after requisite general education (Ryan & Unwin 2001; Steinert & Slapcoff 2010).

2.1 Sociocultural turn in studying professional development

Professional development in the process of apprenticeship is strongly related to learning in sociocultural settings. In the book "Pedagogy and Practice - Culture and Identities", Rogoff (2008) observes sociocultural activity on three planes: 1) participatory appropriation, 2) guided participation, and 3) apprenticeship. He writes that Vygotsky's (1978) emphasis on the interrelated roles of the individual and the social world in microgenetic, ontogenetic, sociocultural, and phylogenetic development (see also Scribner 1985; Wertsch 1985) includes the individual and the environment together in successively broader time frames.

The sociocultural theories on learning are based on assumptions that learning comprises intentional, active, conscious, constructive and reciprocal activities embedded in social and cultural environments (e.g. Vygotsky 1978; Leont'ev, 1974; Resnick, Levine, & Teasley 1991; Engeström 1999). Knowledge does not exist in either a world of its own or individual minds but is an aspect of participation in cultural practices (Brown, Collins & Duguid 1989). Creating knowledge cannot be explained only as an individual's achievement.

Although the idea of collaborative learning has been strongly emerging in educational literature with the sociocultural turn in the past two decades, it is not new in the educational tradition. It relies on dialogue (e.g., Freire 1970; Senge 1990), which attempts to encourage people's active involvement in questioning and in creation of knowledge instead of the passive receiving of information. Dialogue at its best, enables people to find new insights which they would not have achieved on their own, creating richer understanding of the matters of problems at hand and involving the free flow of new ideas. According to Bereiter and Scardamalia (1987) collaborative learning entails that new knowledge is not simply assimilated but actively constructed through joint problem-solving.

It is important to consider also teachers' professional development as an interaction and participation process in their particular communities: in their networks of relationships and daily working practices (Ryymin 2008). For example Leithwood (1999) noticed, that teachers learn through quite informal means from their colleagues and from the opportunities to socially process new information.

2.2 The apprenticeship engaging culturally organized activities

The apprenticeship metaphor has at times been used to focus on expert-novice dyads; however, apprenticeship involves more than dyads. Apprenticeship relates to a small group in a community with a specialization of roles oriented toward the accomplishment of goals that relate the group to others outside the group. The small group may involve peers who serve as resources and challenges for each other in exploring an activity, along with experts (who, like peers, are still developing skills and understanding in the process of engaging in activities with others of varying experience). Apprenticeship as a concept goes far beyond expert-novice dyads; it focuses on a system of interpersonal involvements and arrangements in which people engage in culturally organized activity in which apprentices become more responsible participants (Rogoff 2008). Apprenticeship denotes programmes of learning that combine part-time formal education with training and experience at the workplace, and result in an externally recognized vocational qualification (Ryan 2011).

Also, according to Wenger (1998), knowledge creation and learning take place in communities of practice through complementary processes of participation, which means the daily, situated interactions and shared experiences of members of the community working towards common goals. Wenger introduces the concept of communities of practice (COP) and emphasizes the meaning of practices in the process of knowledge creation. However, the intellectual development of individuals is not the only thing to benefit their working lives. There is also a need to rebuild actively.

3. The case of the apprentice – previous experiences

In Brazil, where the apprentice has worked as a teacher of chemistry and technology since 1993 in different public (municipal, state and federal) and private schools. There is a great difference in terms of quality and infrastructure in all of them, which contradicts educational values in the apprentice's point of view. It was cited that the apprentice worked as a teacher because she worked simultaneously in many other jobs during most of her career. It occurs as a consequence of a profession not highly valued economically or socially.

As a teacher the apprentice worked in different schools and cities, from a great city (state capital of relevant economy) to a small touristic city, including private schools and public schools on the outskirts or not, of high quality or not. Despite difficulties, the professional of this area remains active adapting to different situations which improve her skills as a teacher, taking pride in positive outcomes, and considering the failures in learning.

Nowadays the apprentice lives and works in a medium-sized city, with exclusive dedication as a teacher. It is a region of great agricultural and industrial production, and an educational reference. The school where she works now is a traditional Federal Institution with many courses from different educational levels, such as technical (similar to vocational qualification in Finland), technical integrated to high school (vocational qualification integrated to upper secondary in Finland), distance education, under graduation at different modalities (bachelor, licentiate, technological degrees), post-graduation as a level of expertise.

She works in educational and research areas inside the institution, with students between 14 and 60 years old, as well as in educational administration. There have been many educational challenges in the region where she works as a teacher, related especially to student motivation, drop-out rates and social well-being.

4. New experiences in Finnish-Brazilian teacher training programme

In this chapter, the apprentice reflects on her experiences in The VET Teachers for the Future –Professional Certificate Programme in the framework of apprenticeship. How is it possible to promote apprenticeship of a teacher? How to encourage someone who has been teaching a long time with already ready-made education routines to observe, develop or even transform her own profession? Is there a need or motivation to be further developed professionally? In this case, the apprentice had her own driving questions, which were strongly related to the question on how to motivate unmotivated students and how get motivated as a teacher with growing societal, behavioural and cognitive challenges of students? One of the questions was also how to get inspired about the teaching work, again, after several years of service?

With her questions, and with many suspicions the apprentice started the programme. The use of English as a study language increased her distress at the beginning of the studies. However, the programme turned out to be a good experience. She especially found the appreciating attitude of the teacher trainers' and the dialogical learning community very supporting in transferring from the role of experienced teacher to a role of an open-minded apprentice of new teaching. The dialogue in a group of practitioners of learners from the different fields, with different backgrounds but joint goals, was a learning catalyst. The group was united by the interest and enthusiasm of improving their professionalism, for both themselves and for their country. The apprentice felt that the learning process was guided carefully but in a flexible way so that each individual and individuality became respected and followed step by step. She was guided to find, observe and learn new aspects to teaching in a respectful and encouraging

way. Teachers learned from each other and from their Finnish co-learners, teachers and partners, the knowledge was enriched collaboratively.

The apprentice's own personal learning process was focused especially on a student-centered approach and engaging learning methods, giving a sense of dialogical competence and new educational attitude in reality. She especially found the project-based learning meaningful and motivating methodology both for her students and for herself as a teacher: it allows freedom for students, but on the other hand it requires more responsibility and commitment from them, simultaneously developing a generation of critical and logical reasoning students. From the point of view of her own professional development she found several elements to support her lifelong growth as a teacher, for example a capability to find innovative learning solutions and capability to embrace change.

One of the biggest challenges in her apprenticeship was to be convinced to accept different types of assessment methods, totally divergent from the traditional methods she had been applying previously. It became clear that the work, study and learning in equal, dialogical and collaborative groups was very important and productive also from the point of view of assessment of learning and individualizing learning processes. These ideas are worth testing and applying back in Brazil in the apprentice's own learning context.

5. Conclusions and initiatives for future investigations

When reflecting on the apprenticeship process of a teacher in this article, it is important to understand that the prior knowledge and experience of the apprentice had also an influence on the learning process. The appreciation of this allowed the apprentice to feel confidence and trust in herself as a learner. Another relevant aspect was the social environment and collaborative spirit of other collegial apprentices inside the programme.

Being a scientist and chemist, the apprentice finds the reasoning and research results revealed in science meaning for the social aspect of learning. For example, according to Maida (2011) who cited Meltzoff et al. (2009), scientists of social neuroscience view encounters such as tutoring and mentoring as ways to enhance social interaction that is essential to learning. This is, in turn, supported by neural circuits linking perception and action for 'close coupling and attunement between self and other', and for synaptic plasticity (Meltzoff et al. 2009, 285; Maida 2011). It is meaningful to observe an individual's professional development in social interactions.

In this case, the apprentice experienced that the successful social sharing developed her professional intelligence. As a result of a dialogical learning process, the apprentice acquired confidence to face and make educational

changes in her teaching work, and she also got new ideas for her research area of chemistry. She had several ideas on how to develop student motivation and engagement, decrease the drop-out rates and empower her students in applying project-based learning in several courses. She reached a level of new motivation and enthusiasm for constant professional growth as a teacher (life-long learning).

It is good to realize that this writing has been done at the end of Finnish section of The VET Teachers for the Future -Programme. In the next phase, in Brazil, teachers further developed and examined their student-centered pedagogical practices back in their own institutions, local learning contexts and communities of practice. One interesting research theme in the future is the experiences of the teachers applying student-centered methods in practice. What are the elements that support educational change? What kinds of challenges do Brazilian teachers experience in their learning environment? In addition, it would be interesting to analyze the Brazilian and Finnish educators' joint educational initiatives.

As a conclusion on the reflection, it can be summed up that apprenticeship offers practical conceptual tools for analyzing and conceptualizing a teacher's professional growth from socio-constructive point of view. Furthermore, the authors discussed, how the concept of the apprenticeship could be further developed to fit better to the pedagogical professional growth of teachers? The authors suggest a cognitive and collaborative apprenticeship of teaching to be considered.

References

Bereiter, C. & Scardamalia, M. (1987). The psychology of written composition. Hilldale: Erlbaum.

Brown, J.S., Collins, A. & Duguid, P. (1989). Situated cognition and the culture of learning. Educational Researcher, 18(1), 32 – 42.

Engeström, Y. (1999). Innovative learning in work teams: Analyzing cycles of knowledge creation in practice. In Y. Engeström, R. Miettinen, & R-L. Punamäki (eds.) Perspectives on activity theory, 377 – 404. Cambridge: Cambridge University Press.

Forman, G. & Pufall, P.B. (1988). Constructivism in the Computer Age: A Reconstructive Epilogue. In G. & P.B. Pufall (eds.) Constructivism in the Computer Age. Hillsdale: Erlbaum.

Fosnot, C.T. (1989). Enquiring teachers, enquiring learners. New York: Teachers College Press.

Freire, P. (1970/1993). Pedagogy of the Oppressed. Penguin Books: London.

Grabinger, R.S. & Dunlap, J.C. (1995). Rich environments for active learning, a defi-
nition. ALT-J, 3(2), 5 – 34. Retrieved 28 September 2016 from http://www.re-
searchinlearningtechnology.net/index.php/rlt/article/view/9606

Leithwood, K. (1999). How School Managers Foster the Professional Growth of
Teachers "By Design". In B. Beairsto & P. Ruohotie (eds.) The Education of
Educators. Enabling Professional Growth for Teachers and Administrators,
53 – 80. Hämeenlinna: Research Centre for Vocational Education.

Leont'ev, A. (1974). The problem of activity in psychology. Soviet Psychology,
13(2)4 – 33.

Maida, C.A. (2011). Project-Based Learning: a critical pedagogy for the twenty-first
century, Policy Futures in Education, 9(6), 756 – 768. Retrieved 28 Septem-
ber 2016 from http://dx.doi.org/10.2304/pfie.2011.9.6.759

Meltzoff, A. N., Kuhl, P. K., Movellan, J., & Sejnowski, T. J. (2009). Foundations for
a new science of learning. Science, 325(5938), 284 – 288. Retrieved 28 Sep-
tember 2016 from http://dx.doi.org/10.1126/science.1175626

Resnick, L.B., Levine, J.M. & Teasley, D.D. (eds.) (1991). Perspectives on Socially
Shared Cognition. Washington D.C.: American Psychological Association.

Rogoff, B. (2008). Observing Sociocultural Activity on Three Planes: Participatory
Appropriation, Guided Participation, and Apprenticeship. In P. Murphy, K.
Hall, & P. Soler (eds.) Pedagogy and Practice – Culture and Identities. Los
Angeles: Sage.

Ryan, P. (2011). Apprenticeship: between theory and practice, school and workplace.
Leading House working paper 64. Retrieved 28 September 2016 from http://
repec.business.uzh.ch/RePEc/iso/leadinghouse/0064_lhwpaper.pdf

Ryan, P. & Unwin, L. (2001). Apprenticeship in the British "Training Market". Na-
tional Institute Economic Review 178(1), 99 – 114. Retrieved 28 September
2016 from http://dx.doi.org/10.1177/002795010117800114

Ryymin, E. (2008). Teachers' Intelligent Networks. Study of Relationship-based Pro-
fessional Development supported by Collaborative Learning Technologies.
Doctoral Dissertation. Acta Electronica Universitatis Tamperensis 751. Re-
trieved 28 September 2016 from http://urn.fi/urn:isbn:978-951-44-7414-9

Senge, P. M. (1990). The fifth dicipline: the art and practice of learning organization.
New York: Doubleday.

Scribner, S. (1985). Vygotsky's uses of history. In J. V. Wertsch (ed.) Culture, communication, and cognition: Vygotskian perspectives. Cambridge: Cambridge University Press, 119 – 145)

Steedman, H., Gospel, H. & Ryan, P. (1998). Apprenticeship: a Strategy for Growth. A Special Report published by the Centre for Economic Performance, London School of Economics and Political Science.

Steinert, Y. & Slapcoff, B. (2010). The Osler Fellowship: An Apprenticeship for Medical Educators. Academic Medicine, 85(7), 1242 – 1249.

Vygotsky, L. S. (1978). Mind and Society. Cambridge: MIT Press.

Wertsch, J. V. (1985). Vygotsky and the social formation of mind. Cambridge: Harvard University Press.

An analysis about entrepreneurial learning frameworks in Brazil and Finland

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Contributions by the authors: Andre Fernando Uebe Mansur has written the article manuscript. Sanna Ruhalahti has guided the pedagogical project and written the comment section to the article.

Keywords: entrepreneur learning, junior enterprise, entrepreneurship, student-centered approach, project based learning

1. Educational experiences in Finland

Brazil and Finland are very different countries in many aspects. Culture, education system, political context, and history are some aspects that can be highlighted. In 2014 the Brazilian and Finnish governments made a partnership through The VET Teachers for the Future -Professional Certificate Programme. This was tailored for teachers from different subject fields needing to learn how to combine theory and practice in their own expertise as well as pedagogically promote the development back in Brazil.

The Brazilian professionals were hosted in Häme University of Applied Sciences (HAMK) and Tampere University of Applied Sciences (TAMK), where it was possible to experience the entrepreneurial and educational reality in Finland and develop scientific research related to the projects. From the analysis it is possible to notice how these countries deal with the promotion of student entrepreneurial behavior. Apart from the field of analysis in the University of Applied Sciences it was possible to figure out a pedagogical overview about the pedagogical framework in Brazil and Finland. Principally if it considers that the applied models are designed and developed to expand the boundaries of learning process (Bednar et al. 1991, Dabbagh & Bannan-Ritland 2005).

Thus from this experiential opportunity this article aims to throw more light into discussion about entrepreneur pedagogical learning in Brazil and Finland. This analysis is interesting once Finland nowadays is one of the countries with the best results in PISA (Sarjala 2013). The authors present the concepts about the junior entrepreneur and an overview about Finnish and Brazilian education system. From those aspects it is possible to make

an initial comparative analysis and conclusions about the educational realities in entrepreneur learning.

2. Complex learning environment and Junior Enterprise

In Education, complex thinking refers to the need of focusing not only in the contents of a discipline, but also to the considerations of their context as a whole (including cultural and social conditions), as well as their life cycles like birth, ageing, adapter transformation and transdisciplinarity (Morin 1999). The adoption of these paradigms tend to promote a healthy educational process according to Meadows (2008) while usually in the world of educational contexts, teachers who have disseminated the theoretical concepts of complexity, classroom practices usually adopt a Cartesian linear pedagogy. (Brecailo 2007).

Complexity in education must be a practice. Some authors like Uebe Mansur (2012) and Enqvist & Aarnio (2004) bring in practical examples about the appliance of complex thinking and the dialogic learning approach concepts to promote a more interactive and entrepreneurial learning environment. In this context some learning environments like the Junior Enterprise offers an effective opportunity to apply complex thinking in the learning process.

The Junior Enterprise (Bakes & Lamb 2014) is a concept that comes from a movement originated in France in 1967 that spread around the world. It is characterized as a local non-profit organization. It is entirely managed by students that offer consulting services to the market in their field of studies. Research from the European Commission study concluded that students that lived a junior enterprise experience obtained full-time employment after graduation more quickly than their peers due to their better developed skills in adaptability, creativity, networking, and analysis" (Bakes & Lamb 2014). From this context it is possible to reflect on how Finland and Brazil are dealing with the student entrepreneur in the learning environment.

3. Learning entrepreneurship in Finland – collaborative real-life projects

The Finnish pedagogical framework is based on various concepts and policies as well as needs that define aspects like social statements of equality and cooperation. The future of the educational system is based on two goals: promoting and securing independence and democracy and building a welfare state that provides equal opportunities to all (Sarjala 2013).

Developing these statements was crucial with a changing process that happened in 2003 and 2004 and culminated in a special project for universi-

ties of applied sciences called "Participation of Finnish Universities of Applied Sciences in the European Higher Education Area" - ECTS Project (Arene 2007).

Starting in 2005, the ECTS credit system represented a profound change of paradigms in the education system, principally in the new concept of the student workload and the definitions of learning competences and outcomes. The development of curricula and learning principles founded on socio-constructivism, the learner-centred approach and the enhancement of the competences and innovations (European Commission 2009; Arene 2007). As a result the pedagogical models adopted to learning in Finland are extremely flexible and focused on learners' needs. In this article, the concepts of authentic learning and dialogue in learning are considered primordial to collaborative, democratic and the learner-centred approach (Enqvist & Aarnio 2003).

The author of this article has bench-marked some cases in the universities of applied sciences in Finland that implement flexible, entrepreneurial and learner-centred approach learning in Finland. These cases are ProAkatemia in Tampere University of Applied Sciences, TAMK (proakatemia.fi/en), and agribusiness and ICT Education in Häme University of Applied Sciences, HAMK (www.hamk.fi/english/Sivut/default.aspx). From the authors' point of view, it was very interesting that in the ProAkatemia and agribusiness studies the students do not have a previously established curricula course or disciplines. Instead, they form learning teams to offer consulting services to the market in their field of studies, and learn by doing by demand in a multi project-based learning approach. In the ICT Education the students from degree programme courses (Information Technology and Business Administration) can receive their final assessment based on a learning project related their study contents and competences. (Seppänen 2014.)

4. Studying entrepreneurship in Brazil – focus mainly on conceptual aspects

 The Brazilian pedagogical framework is based on the Universal Declaration of Human Rights (United Nations 1948) and the LDB (1996, 1997) - Lei das Diretrizes Básicas da Educação Nacional (Basic Guidelines law for National Education, in English). The goal and great challenge of Brazilian educational policies has been the illiteracy eradication and lifespan increase of free and compulsory education. (Cury & Ferreira 2010).

The Brazilian education system was not used as a tool for social development until the 1920s. The main goal of this system was social mobility; a way where people could rise in their social status, prestige and integration. Only in 1930 with the industrialisation process, an educational

system for education and the first universities in Brazil were established. From 1945 to 1960 the Brazilian economy experienced a national production increment process and it was essential for the establishment of basic education guidelines in 1961. From 1950 to 1960 an intensive program focused on the municipality promoted a significant decrease in illiteracy rates. (OEI 2002.)

From 1961 until 1997 a minimum curricula for Brazilian bachelor courses or the equivalent was mandatory where the quantity of disciplines and its credits needed to be offered to the students. The original idea from this concept was to create some student benefits like: a minimum of theoretical knowledge, and facilitation of student transfer among graduation institutions. After 1997 the minimum curricula concept was abolished for a new guideline giving more flexibility to institutions to organize the curricula course focusing on the diversity, innovation and professional adaptability (Brasil 1961; 1997; 2003).

Despite these educational improvements focusing on social development and inclusion, the economic educational aspects focusing on entrepreneurial education only became a reality in the 90s. And yet, the focus was much more on discussing conceptual aspects of the entrepreneur than applying learning models that promoted an entrepreneurial attitude in students (Dolabela 1999; Dorneals 2005). The curricula courses in Brazil are still tied to a Cartesian model and usually with a teacher-centred approach; supposedly for 36 years (1961 – 1997) under the minimum curriculum guidelines. As a result it is possible to figure a complex layer over a Cartesian core where the entrepreneurial academic practice shows like an extra label in the regular course curricula.

It means there is the existence of some structures as junior companies, business incubators, workshops models and other practices that attempt to promote interdisciplinarity without major changes in the Cartesian structure of disciplines but even tied into the rhythm of the Cartesian framework of a curricula course based on disciplines.

5. Conclusions and observations

 From the 1940s the development of the Brazilian and Finnish education framework had different paths. Despite that, both educational development realities came from social needs; the reality of Finnish educational development reflects a social need of self-statement, economic efficiency and welfare state in the European context. The education in Brazil was more focused on an educational system to promote a social equality and social inclusion.

In a different way Finland is trying a disruptive way to promote a complex learning environment and project-based learning with entrepreneurial processes using a learner-centred approach. With learning environments like ProAkatemia in TAMK and agribusiness in HAMK, it is possible to envisage a socio-constructivist pedagogical framework in its entirety. It is interesting to recognize that a complex environment enables a more natural development and application of dialogical-centred learning approaches like the pedagogical DIANA -model (Enqvist & Aarnio 2003; Uebe Mansur 2012).

Sanna Ruhalahti's comment

Andre Uebe is comparing in an interesting way the Finnish and Brazilian education systems based on the entrepreneur pedagogical framework. His focus is on the entrepreneurial education and its applied models in both countries.

He opens the term of complex thinking based on relevant sources and continues that complexity in education must be a practice. He writes that Enqvist & Aarnio (2004) bring in practical examples about the appliance of complex thinking and the dialogic learning approach concepts to promote a more interactive and entrepreneurial learning environment. According to Enqvist and Aarnio's (2004) definition, dialogue is based on equal co-construction of understanding. They further point out that dialogue is seen as a tool for co-construction of knowledge. Their definition for the dialogue is as follows: "Dialogue is based on equal co-construction of understanding. It is shares thinking and getting well acquainted with certain subject and activity." In this context some learning environments like the Junior Enterprise figures like an effective opportunity to apply complex thinking in the learning process. He highlights that learner-centered and dialogical based learning encourages complex thinking in the entrepreneurial learning environments. Furthermore, complex learning environment enables a more dynamic and authentic development.

In my comment, I would like to introduce some results from DIAMEE (Dialogical methodologies for entrepreneurs, see more: diameeproject. com) and DIALE (Deep learning though dialogue, see more: www3.hamk. fi/dialogi/diale/methods/index.html) which were funded by European Commission. During the DIALE project Aarnio (2012) developed 25 dialogical methods which were divided into five different dialogical areas. The latest project DIAMEE focused on transferring this methodological innovation to entrepreneurial education and coaching. Five partners from around Europe piloted methods and found potential applications for the use in the context of the entrepreneurial training and education. Dialogical learning, teaching and coaching enables the learner-centered manner in order to develop complex thinking. Designing deeper learning processes

brings the DIANA (Dialogical Authentic Netlearning Activity) model opportunities for dialogical, authentic learning and collaborative knowledge construction (Enqvist & Aarnio 2004).

In the VET Teachers for the Future -Programme Brazilian and Finnish teachers and developers have been dialoguing together a lot of current challenges of education. Also the Finnish developers are receivers in this process; the remarks, ideas and questions of our Brazilian partners have helped us to further develop our training models and we have created together new trials and experiences. It is important to realize that Finnish models are developed within our cultural context and the challenges in Brazil are different. In the future, it will be very interesting to share experiences of entrepreneurial education and outside of the cultural barriers think how teachers would become more "edupreneurial".

References

Arene ry. (2007). The Bologna Process and Finnish Universities of Applied Universities. Helsinki: Arene ry.

Bednar, A. K., Cunningham, D., Duffy, T. M., & Perry, J. D. (1991). Theory into practice: How do we link? In G. J. Anglin (ed.), Instructional Technology: Past, present and future. Englewood, CO: Libraries Unlimited.

Bakes, M. M & Lamb, K.S. (2014). International Experiential Learning in Engineering: a Case Study of Junior Enterprise in the United States. Indianapolis: ASEE International Forum.

Brasil (1961). Lei nº 9.394, de 20 de dezembro de 1996. Leis de Diretrizes Básicas da Educação [Basic Guidelines laws for Education]. Retrieved 28 September 2016 from http://www.planalto.gov.br/ccivil_03/leis/l4024.htm

Brasil (1997). Parecer CNES 776 de 03 de dezembro de 1997. Leis de Diretrizes Básicas da Educação [Basic Guidelines laws for Education]. Retrieved 28 September 2016 from http://portal.mec.gov.br/setec/arquivos/pdf/PCNE776_97.pdf

Brasil (1996). Lei nº 9.394, de 20 de dezembro de 1996. LDB - Lei das Diretrizes Básicas da Educação Nacional [Basic Guidelines laws for National Education]. Brasilia: Governo Federal. Retrieved 28 September 2016 from http://www.planalto.gov.br/ccivil_03/leis/L9394.htm

Brasil (2003). Parecer CNES 67 de 11 de março de 2003. Leis de Diretrizes Básicas da Educação [Basic Guidelines laws for Education]. Retrieved 28 September 2016 from http://portal.mec.gov.br/setec/arquivos/pdf/PCNE776_97.pdf

Brecailo, D. (2007) A Teoria da Complexidade e o Desenvolvimento do Pensamento Sistêmico na Formação dos Professores do Curso de Administração [The Theory of Complexity and the Development of Systemic The Equality and Cooperation in Training of Undergraduate Business Teachers]. Master Degree dissertation. Curitiba: PUC.

Cury, C.R.J. & Ferreira, L.A.M. (2010) Obrigatoriedade da educação das crianças e adolescentes: Uma questão de oferta ou de efetivo atendimento? [Mandatory education of children and adolescents: A matter of offer or effective service?] In Nuances: estudos sobre Educação. 17(18), 124 – 145.

Dabbagh, N. (2005). Pedagogical models for E-Learning: A theory-based design framework. International Journal of Technology in Teaching and Learning, 1(1), 25 – 44.

Dolabeal, F. (1999). Oficina do empreendedor [Entrepreneur workshop]. São Paulo: Editora de Cultura.

Dornelas, J. C. A (2005). Empreendedorismo: transformando ideias em negócios. [Entrepreneur: changing ideas in business]. Rio de Janeiro: Elsevier.

Enqvist, J. & Aarnio, H. (2003). DIANA -model – Dialogical Authentic Learning on the Net. (Full Paper). In D. Lassner & C. McNaught (eds.) Proceedings of ED-MEDIA 2003, World Conference on Educational Multimedia, Hypermedia & Telecommunication, 2090 – 2095.

Enqvist, J. & Aarnio, H. (2004). Crucial Dialogic Actions in Co-constructive Knowledge Creation in Online Learning Environment. In L. Cantoni & C. McLoughlin (eds.), Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2004, 2576 – 2583.

European Comission. (2009). ECTS User's Guide. Retrieved 28 September 2016 from http://ec.europa.eu/education/tools/docs/ects-guide_en.pdf

Meadows, D. H. (2008). Thinking in systems: a Primer. Vermont: Chelsea Green Publishing Company.

Morin, E. (1999). La tête bien faite [The Head Well Made]: Repenser la réforme. Réformer la pensée. Paris: Seuil.

OEI (2002) Sistema Educativo Nacional de Brasil [Brazilian Nacional Educative System]. Madrid: Organización de Estados Iberoamericanos. Retrieved 28 September 2016 from http://www.oei.es/quipu/brasil/historia.pdf

Ryymin, E. & Kunnari, I. (2015). Developing Networked Expertise for Educational Innovations – Brazilian Teachers in Finnish Learning Environment. Paper presented in International Conference of Education (LICE-2015), 9.–11.11.2015, London.

Sarjala, J. (2013). Equality and Cooperation: Finland's path to excellence. American Educator, Spring 2013, 32–37.

Seppänen, L. (2014). Degree Programme in Business Information Technology Yearbook 2013–2014. Hämeenlinna: Häme University of Applied Sciences (HAMK).

Uebe Mansur, A. F. (2012) Rede de Saberes Coletivos (ReSa): Um ambiente complexo para aprendizagem colaborativa em estágios supervisionados em cursos de Administração [Collective Knowledge Network (ReSa): An complex environment to collaborative learning in internships of Business undergraduate courses] Anais do VI ENCAD – Encontro de Administradores do Rio de Janeiro. Rio de Janeiro: CRA-RJ.

United Nations (1948). The Universal Declaration of Human Rights. New York: United Nations. Retrieved 28 September 2016 from http://www.un.org/en/universal-declaration-human-rights/

Starting with a tinkering workshop and going beyond

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Keywords: tinkering, workshop, student-centered approach, scribbling, STEM, co-operation

Attending The VET Teachers for The Future -Professional Certificate Programme for Brazilian teachers in Finland, and discussing constructivism and student-centered approaches, I personally had the interest in evaluating one of the tinkering activities. This paper is a short report of the developed activity and it also introduces some ideas for future work.

Papert (1980) has extended constructivism one step further to constructionism, stating that "learning is most effective when part of an activity the learner experiences as constructing a meaningful product." Making learning real, sharing the process and not only the final result in the form of a robot, poem, music composition, or cloth product is the main idea of constructionism. The Tinkering Studio at Exploratorium presented in this paper has produced some detailed material to explore tinkering, defined as "a mindset – a playful way to approach and solve problems through direct experience, experimentation, and discovery" (see more: http://tinkering.exploratorium.edu/).

1. The tinkering workshop participants and learning goals

I conducted the tinkering workshop together with my two Brazilian colleagues when I was studying at The VET Teachers for the Future -Programme in HAMK in 2014 in Finland. The participants of my workshop were 15 students from a 9th grade from Ahveniston koulu, Hämeenlinna. The students were both fluent in English and interested in tinkering. They had also previous experience in student-centered learning projects and learning by doing. The activity was conducted on December, 17th, 2014. I met students some days before, so they knew what they were going to do.

This tinkering workshop was not structured is a rigid and formal way. As a tinkering workshop, the idea is to give children freedom to experiment and discover. Anyway, although not stated formally, the learning objectives of the participants are a mixture between scientific objectives, artistic ones,

collaboration and resilience to discover. The scientific objectives were to learn 1) how to connect an electric circuit, 2) how to balance weight and center of mass and 3) how to test and prototype a product. The social goals were 1) how to help and ask for help, 2) how to deal with failure and 3) how to solve shared problems in collaboration and co-operation, by supporting each other.

From the Tinkering Studio website (above), we selected an activity with the following characteristics: 1) completed in no more than two hours, 2) using easy to find and cheap materials and 3) interesting and fun for secondary students. The choice was a scribbling machine, that is, an object that moves and draws its path, as shown in Photo 1. Building a machine like this is an interesting way to work at the intersection of art, science, and technology (STEAM). Learners can focus on the scientific and technological aspects, e.g. making the circuit work; balancing the machine, or the artistic ones, e.g. how to draw some specific pattern. Besides that, the organization of the space and the way the activity is conducted should encourage sharing of experiences between participants.

The activity guide from Exploratorium is very detailed. The materials for the scribbling machine workshop are recyclable containers, like yogurt cups, markers, batteries (AA), motors (standard DC motors used in toys), a piece of hot glue stick and masking tape. Students brought some containers from home and we also provided some. The other material was provided by us.

Photo 1.   A scribbling machine.

2. Guiding the tinkering workshop

As pointed out by the Exploratorium guideline for this activity, the environment has an important role. The classroom was just perfect, because it is comfortable, with good lighting and worktables, and students could

see the work of their colleagues. The classroom is a typical one I saw in many schools Finland (Photo 2); there were a possibility to move tables and chairs in a flexible way.

We started showing the students an example of a scribbling machine. We discussed what was basic in the machine: movement and drawing. After that, they were free to create their own machines with the available material. We teachers, two colleagues and I, acted as facilitators, showing them how to solve some problems when necessary. The main issue some of them faced was the balance of weight. For the movement of the machine, weight should not be distributed equally. Since some of the students wanted to follow some symmetry, the machine was so well balanced that it did not move.

The students made the first tests on their tables, checking the battery-motor connection and the stability of the structure (Photo 3). After that, we organized a larger space on the floor (Photo 4). There were seven machines drawing different patterns. Some needed more adjustments, and it was fun for everyone to compare the designs (Photo 5). We made also a video of the tinkering workshop (see in Youtube: https://www.youtube.com/watch?v=rplwyyrRtNA).

It was a very interesting opportunity to me as a Brazilian teacher, see joy in learning, and the connection between arts and engineering through free experimentation in a Finnish classroom. According to my experiences Finnish students are quite quiet at the beginning, especially when they need to speak in English and to a stranger, so that sometimes I do not know if they are really enjoying what they are doing. However, at the end of the tinkering workshop, almost all students expressed joy and they desired to keep their motors and other materials.

Photo 2.   Facilities at Ahveniston koulu, where we guided the tinkering workshop.

Photo 3.   First tests on a table.

Photo 4.   Machines starting to draw on a large sheet of paper on the floor.

Photo 5.   Students making some adjustments, and drawings already done.

3. Ideas for further activities

For some readers the tinkering workshop described in this article can be considered as a "low-tech". However, with more time available, the idea can be extended to a high-tech version. For example, one can introduce micro-controllers and programming. In Brazil, we are currently exploring physical computing using Scratch and Arduino and this is a project called Computing in the School (see more: http://www.computacaonaescola.ufsc.br). The main idea is to introduce programming through an integrative approach. Students build physical objects, like a doll or robot, and program it to react to the physical world. The reaction can be a movement when somebody touches the doll, or a sound, or a blinking LED. Some examples are shown in Photo 6. We are currently working in the integration between Scratch (a visual programming environment) to Arduino (the interface to the sensors and actuators). These are very engaging learning projects for students developing many future and 21st century learners' skills.

Photo 6.   Some ideas to integrate arts, sensors, actuators, and programming.

References

Martinez, S.L. & Stager, G. (2013). Invent to Learn: Making, Tinkering, and Engineering in the Classroom. Torrance, CA: Constructing Modern Knowledge Press.

Papert, S. (1980).Mindstorms. Children, Computers and Powerful Ideas. New York: Basic books.

For further reading

Tinkering Studio at Exploratorium: http://tinkering.exploratorium.edu/

Scribbling machine activity guide: http://tinkering.exploratorium.edu/sites/default/
      files/Instructions/scribbling_machines_0.pdf

Scribbling at Ahvenisto school, Hämeenlinna:
      https://www.youtube.com/watch?v=rplwyyrRtNA

Computação na Escola (Computing at School):
      http://www.computacaonaescola.ufsc.br

Integration and Interdisciplinarity in Education: Examples Observed in Finland

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Keywords: interdiciplinarity, integration, curriculum, interdisciplinary knowledge

In the 17th century Blaise Pascal (1958, 20) wrote the following in his Thoughts: "All that exists then is both cause and effect, dependent and supporting, mediate and immediate, and all is held together by a natural though imperceptible bond, which unites things most distant and most different. I hold it impossible to know the parts without knowing the whole, or to know the whole without knowing the parts in detail". With this statement this notable French philosopher and scientist described the question of knowledge scientifically produced, an operation which requires deep understanding of the correlation between parts and the whole. If we take this as a point of departure for a modern conception of science, the image of those ultra-specialized researchers - severely short-sighted, knowing more and more about punctual non-related topics – is, maybe, the exact inversion of Pascal's notion of knowledge. To insist on this kind of myopic knowledge means underestimating the complexity of social, historical and scientific phenomena that surrounds us.

When we look at the curricular organization of many schools in different parts of the world it is easy to notice a predominance of the Positivistic model, which divide the school into disciplines and specific subjects, usually non-related and fragmented into classes from 45 to 50 minutes, like an old industry divided into sectors specialized in one single activity. One approach that figures as a big challenge for teachers and schools nowadays is the integration of this artificially fragmented knowledge into real-case problems which requires complex analysis to be solved. This integration is also called interdisciplinarity. Ivani Fazenda (2001), a Brazilian pedagogue, wrote that interdisciplinary approach requires a "change of attitude towards the problem of knowledge a substitution of a fragmented to the unitary concept of human being". Hilton Jupiassu (2006) also mentions that the "interdisciplinary spirit" stimulates a wish for intellectual enrichment through different approaches and interest in the combination of perspectives; it also breaks authoritarianism and exclusivism inside universities and academies, challenging the fragmented conception of knowledge (Jupiassu, 2006). Therefore, the interdisciplinary approach

answers to contemporary questions addressed to science and the production of knowledge, and schools should not move away from this conception also, combining specificity of each area of knowledge and integrative methods.

Two things should be mentioned regarding interdisciplinarity. Firstly, this way of producing knowledge flourishes due to the complexity of the object of analysis itself. Therefore, assuming an interdisciplinary attitude requires the recognition of both the innate complexity of all phenomena that surrounds the human being – even if it is political, social, biological, physical, historical, etc. – and that only one approach, anchored to one unique science or discipline cannot capture the complexity of these phenomena. It also leads us to collaboration and dialogue. Secondly, interdisciplinary knowledge is interstitial by nature; it is produced in the borders of sciences and disciplines. Thus we cannot define the frontiers between different sciences as strict lines that separate them. Instead, borders are spaces for exchanges, communication, fluidity; they are not hard barriers, but porous and unstable lines in which this new and rich knowledge arises.

This kind of integrative and complex knowledge has been produced in universities and research centers for some time. But how can it appear in regular education? Is it possible to produce interdisciplinary knowledge in secondary schools or bachelor studies? Are there specific methodologies that can stimulate interdisciplinary studies and projects in basic education? Obviously there are many and we have been analyzing some of them in Finland. So currently in Finland, methodologies for the integrative pedagogy and an interdisciplinary way to teach and learn new things are sought. The main points are that studying must be learner-centred, collaborative and it must have a strong association with real life and real world contexts. Then the initial study problems should be authentic so that there is a readiness to learn and handle complex, wide, profound interdisciplinary situations and settings.

It is currently a precondition for the beginning of studies and being successful in them that the students find the study content authentic, relevant and personally meaningful, so that they are motivated. This kind of problem-based integrative method will thus become more prominent than before in which, for example in education in the technical sector, mathematics, science and information technology they are naturally embedded in all those content areas with which they are also associated in real life (Enqvist 2013).

One example in STEM (STEM refers to math, science and technology as part of the learning contents, especially in technical field education: S= Science, T= Technology, E= Engineering, and M= Mathematics) context is an integrative implementation of this type of a problem-based learning process (Enqvist 2013). It was devised in HAMK's School of Pro-

fessional Teacher Education, and a key part of which is the TPM cycle (T=Technology, P= Physics, M=Mathematics). The TPM cycle is a kind of extension of the so-called five-step mathematics cycle (OECD 2003, 38).

In the TPM cycle, the initial problem is an interesting real-life technological issue. While the students are solving this problem, they come across various mathematical and scientific contents, which are then brought up and discussed whenever they naturally emerge as the students are working on the initial problem. During an optional module of the School of Professional Teacher Education and in a group oriented towards the technical field, student teachers put together learning processes in line with the TPM cycle, and the outcomes of the implementations thus created have been encouraging.

One initiative worth special attention is the project "Classical Ballet" developed by teacher Sakari Salonen at Kauriala Upper Secondary School in Hämeenlinna. He teaches mathematics there and defined ballet as an object of study. Therefore he can, in collaboration with other teachers, integrate physics, math, literature, physical education, music and arts in the same project. The source for interdisciplinarity, in this case, arises from the complexity of the object of analysis, which involves study and calculation of movements, like rotation, the artistic representation of literary themes, technic and musical performance. Only one approach from one single science cannot capture the complexity of Classical Ballet, which requires a broad study in collaboration with other teachers. Therefore interdisciplinary analysis is a basic requirement for the study of a particular and complex object.

Another example which attracted my attention was the integration of two subjects in Construction Engineering bachelor's course at HAMK. Professor Markku Raimovaara was responsible for two disciplines simultaneously: Project Management and Hydrology. To carry out both disciplines professor Markku integrated them into real case studies. For example they had to simulate the installation of water pumps in one underpass in Hämeenlinna and had to work in collaboration with a company, creating and developing systems to transfer water from one station to other places. In this case, theoretical knowledge and the operationalization of projects were also integrated in a problem that required solutions. Students had to prepare documents for public procurements, study legislation regarding reforms in urban and rural areas, make complex calculations and manage the installation of water pumps. In addition, they had to make use of knowledge learned in other disciplines during the course to accomplish their goals, like environmental legislation and mathematics. The integration of subjects, in this case, was due to the wide range of knowledge and information that students need in order to implement and manage their projects.

Integration of different subjects can happen in many ways, from less complex/ superficial dialogue, based on borrowing tools and models from different sciences, to more complex/ deep integration, like the emergence of an interdiscipline (Klein 1990) Heinz Heckhausen (1985; 1991) used some specific expressions to define these levels of integration: 1) pseudo-interdisciplinarity refers to borrowing of analytical tools; 2) auxiliary interdisciplinarity for borrowing of methods, both for occasional purposes and for enduring relations between disciplines; 3) composite interdisciplinarity describes instrumental solutions to solve specific problems; 4) unifying interdisciplinarity, finally, refers to integration of both theory and methods of different disciplines, resulting sometimes in specific fields of knowledge (like biophysics).

In conclusion, the integration of sciences is not something done only by specialized scientists or in pure academic universities. It can be stimulating when a teacher, in the classroom, makes use of a wide range of knowledge to solve a problem with students and in collaboration with other teachers. Interdisciplinary knowledge, therefore, requires the recognition that fragmented and non-related information cannot capture the complexity of any kind of phenomena and human activities. It also appears as a demand of real case studies/ actions, which requires a wide range of knowledge to solve specific problems and also implement and monitor actions to settle it.

Photo 1.   Sakari Salonen presents Classical Ballet

References

Enqvist, J. (2013). STEM subjects – important, but not attracting much inter-
    est? In T. Eerola (ed.) Towards Vocational Top Expertise. HAMKin e-ju-
    lkaisuja 11/2013. Häme University of Applied Sciences, Professional Teach-
    er Education Unit. Retrieved 28 September 2016 from http://urn.fi/
    URN:ISBN:978-951-784-613-4%20(PDF), 83 – 90.

Fazenda, I. (2001). Integração e Interdisciplinaridade no ensino brasileiro: efetivi-
    dade ou ideologia. São Paulo: Edições Loyola.

Heckhausen, H. (1991). Motivation and action. New York: Springer.

Heckhausen, H., & Kuhl, J. (1985). From wishes to action: The dead ends and short
    cuts on the long way to action. In M. Frese & J. Sabini (eds.), Goal-direct-
    ed behaviour: The concept of action in psychology, 134–160. Hillsdale: Law-
    rence Erlbaum.

Jupiassu, H. (2006). O Espírito Interdisicplinar. In: Cadernos EBRAPE.BR, 4(3). Rio
    de Janeiro: FGV.

Klein, J.T. (1990). Interdisciplinarity: history, theory and practice. Detroit: Wayne
    University Press.

OECD (2003). The PISA 2003 assessment framework. Mathematics, reading, science
    and problem-solving knowledge and skills. Paris: OECD.

Pascal. B. (1958). Pascal's Pensées. New York; E.P. Dutton & Co.

A collaborative virtual classroom for game based-learning using immersive and free creative simulated universe in multiple scales

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Contributions by the authors: Rodrigo S. Duran has written the article manuscript.
Marko Susimetsä has written the comment section to the article.

Keywords: virtual classroom, game-based learning, e-Learning, simulated universe, multidisciplinary learning, collaborative learning

Increasing popularity of distance education made it possible that students of areas with no access to schools could attend quality courses, making lifelong study a reality. Although there have been many developments and improvements during the past decades, mostly Learning Management Systems (LMS), there is still a feeling of isolation to students, as they lack social interaction and collaboration. Many virtual classroom systems try to address this issue by implementing social features to share knowledge and content but still misses a more objective pedagogy concept. At the same time, Problem Based-Learning gained reputation worldwide as a pedagogical approach that enhance problem solving, critical thinking and team work skills. Proponents of Game-Based Learning advocate that games can improve learning as an engaging and immersive learning tool. Based on such principles, the project proposes the creation of a new virtual classroom system, deeply integrated with LMS. The virtual classroom system will embrace the socio-constructivist pedagogies creating new ways of interaction and content sharing inside the virtual classroom using those features to promote learning using a building block open world immersive game where students will be able to design, develop and programming their own blocks as well features ranging from simple to complex systems.

1. Introduction

There are several reasons why on-line education has gained popularity at all levels of education across the globe (Wang 2010). Part of this fast growing popularity comes from the possibility to attend quality courses even in places where traditional education cannot be affordable. Many key factors, like economic reasons, created a convergence towards distance education where several small physical classes can be replaced with a virtu-

al classroom, providing the opportunity for more student engagement in educational activities (Koppelman & Vranken 2008). With the advance of technologies and educational practices the experience of on-line education is even more dependent on the quality of the on-line course (Wang 2010).

While currently most distance education solutions rely on on-line learning management systems (LMS), like Moodle (http://moodle.org) or Learn.com (http://www.learn.com), most of those systems are more focused in asynchronous learning, offering tools like users, roles, courses, messaging systems, calendars, reports, handling assignments and tests and grading course work (Wang 2010). The undeniable value of such systems on management of courses can be confronted with the observation that none of those tools is directly related to learning, as the students feel isolated from their tutors, other students, missing the actual feeling of attending a class (Wang 2010). The level of impersonality present in currently LMS has proved a major de-motivation factor for students, making it imperative that richness of interaction that has permeated personal computing and social media in the last years also makes its way to distance education (Wanderley et al. 2013).

It is possible to conclude that while on-line learning has the potential to become a tool that turns life-long learning experience into reality (Diaconu, Keller, & Valero 2013), the choice of how it will be presented, with appropriate media and pedagogy is a major factor in determining the future success of distance education (Koppelman & Vranken, 2008; Wang, 2010). While pedagogy characteristics tend to have precedence over media, because of the intrinsic characteristics of on-line learning, the careful choice of the general structure and media plays a major role in how the learning process happens (Bijlani, Jayahari, & Mathew 2011). Carefully designed on-line learning systems can help the correct pedagogical approach achieve the desired learning outcomes.

Current trends in teaching pedagogy converge towards the constructivist and socio-constructive views of learning, where learning happens through real experiments and as a product of the social interaction among participants and their social environment (Sancho, Gómez-Martin, & Fernández-Manjón 2008). As one of the socio-constructive approaches, Problem Based Learning has the potential to improve student's skills and learning outcomes providing meaningful and real life problems and fostering collaborative work in order to create solutions to problems using critical thinking and creativity. To achieve those learning outcomes, a PBL class or course must have a very good plan of teaching. Having such a dependency on group dynamics and social interaction only makes the on-line tools even more demanding and carefully designed, as only splitting the students into groups and giving then some support for communication does not guarantee success (Sancho et al. 2008).

In current educational research, many variations of Project Based Learning and Problem Based Learning have been proposed as pedagogical frameworks to achieve different kinds of students' engagement. One of the emerging approaches is Game-Based Learning (GBL), where a computer-based environment is created in which student interactivity occurs (Yacci 2004). Prensky (2001) provides several reasons why digital games can be so engaging, such as fun (related to enjoyment), play (involvement) , rules (structure), goals (motivation), interactive (doing), adaptive (flow), outcomes and feedback (learning), problem solving (creativity), interaction (social groups). As an immersive and absorbing task, play has a deep biological evolutionary function which is directly linked with learning (Prensky 2001).

As there is indication that game-based learning strategies can improve problem solving skills and visual abilities (List & Bryant 2014), perhaps the biggest benefit for game-based learning involves students who need to learn complex skills and need to transfer these skills to real life. The high fidelity of an intrinsic game generally makes it more successful in teaching skills that are complex and require transfer (Yacci 2004). Many researchers investigate how to design and develop games that promote external goals as a way to present subjects to students in an alternative form. Unfortunately, most of the GBL approaches have been developed backwards to LMS, making some key elements lack cohesion, like maintaining historical student records or storing the learning contents (Sancho et al. 2008), or being completely disconnected with those systems, reducing the effectiveness of the approach. Even GBL, being a very powerful tool, cannot by itself cover all the subjects and areas of the pedagogical method, making the connection between LMS and inside classroom (virtual or physical) crucial.

The style of the game has a direct effect on the learning process and in the desired outcomes. During the stages of game development in the past decades, several game genres emerged, such as action games, adventure games, puzzle games, RPG games and simulation games (Prensky 2001). Specifically, simulation games can offer many possibilities in teaching sciences as a platform to reproduce complex concepts in a highly responsive manner, offering to the student ways to visualize and understand those concepts, as well as interact with them. Games are defined as activities that have rules and constraints, a goal, and an emphasis on competition. Simulations, on the other hand, are models of reality with a controlled amount of fidelity. Simulation games combine these two ideas, being models of reality that often have a set of rules, goals, and competition. An educational game or simulation has the additional feature of having a primary objective of enabling a student to learn facts, skills, attitudes, or all three (Yacci 2004). Creating a blended approach with RPG, which promotes personification and interaction, powerful games can be created to promote effective learning.

The game design itself has great impact on the goals and learning experiences provided by the game. Tan et al. (2007) compares different types of frameworks and models to develop game-based activities. The Engaging Multimedia Design Model (EMDM) (Said 2004) focuses on simulation interaction, construct interaction, immediacy, feedback and goals. According to the EMDM, games should have two distinct modes, simulation and construction, so the students must be capable of using their creativity and problem solving skills in order to accomplish the game goals and at the same time receive feedback (Tan, Ling & Ting 2007). The Game Object Model (GOM) (Amory 2001), consists of both pedagogical and game elements. Fun, drama, play, exploration, challenges, engagement, critical thinking discovery, goal formation, goal completion, competition and practice are categorized as abstract interfaces which represent pedagogical elements (Tan, Ling & Ting 2007). In the research presented by Tan, the GOM model is more adequate to developing games as it provides a better guide to combine pedagogical elements and game development elements. It is also important to stress that, storytelling, challenging and interactivity and interface are equally important to the features proposed by the EMDM.

The goal of this proposal is to develop a game-based framework using the concepts of a virtual collaborative classroom deeply integrated with an LMS to aid students and teachers to develop tasks and procedures in order to improve the learning outcomes using a simulated, immersive and massively on-line open world where actors can create content in multiple scales using state of the art computational tools. The underlying concept is that students act collaboratively to share and create content in order to solve problems inside the game using creative and constructional tools. Such tools can be used as simple blocks to develop a scenario or can be expanded to develop complex systems with the possibility to use a real programming language or a more visual tool. Using such capabilities the system can merge virtual classroom virtues, with truly collaborative work, to a massive on-line game-based learning platform that fosters creativity as an open world scenario of building blocks. Those blocks will not be a black box of narrow capabilities, but instead white boxes where the user has the power to unwrap and design or even implement lower scales functionalities, from simpler characteristics to more complex systems. The aim of the project is to foster education in a multidisciplinary view with students as active constructive actors of their environment using collaboration and programming not only to an end on itself but mostly as a design tool.

2. Related work

2.1 Virtual classrooms

Computer mediated systems has been a subject of great research and interest, especially when computer networks started to become more wide-

spread to general users. The notion that content could be made available to a large and spread audience motivated early developers of distance education in adopt and create systems that could adapt currently educational methodologies to a new way of presenting content.

In Turoff & Hiltz (1995) presented the Virtual Classroom® Project from New Jersey Institute of Technology. As a pioneer project, many of the future key concepts are described by the system. It can be described as:

> *"… a teaching and learning environment located within a computer-mediated communication system. The objectives of a Virtual Classroom® are to improve access to advanced educational experiences by allowing students and instructors to participate in remote learning communities using personal computers at home or at work; and to improve the quality and effectiveness of education by using the computer to support a collaborative learning process. By collaborative learning is meant a learning process that emphasizes group or co-operative efforts among faculty and students, active participation and interaction on the part of both students and instructors, and new knowledge that emerges from an active dialog among those who are sharing ideas and information." (Turoff & Hiltz 1995)*

The Virtual Classroom used early Internet and Hypertext technology to create an environment of distance learning. It is remarkable to notice that even during the dawn of the virtual classroom technology the notion that games should be embedded and supported by the system was already acknowledged (Turoff & Hiltz 1995).

Bower (2006) described the pedagogical lessons derived from an experiment when teaching an introductory class using a distance education system. The chosen system Macromedia Breeze Platform provided much of the existing features in current virtual classrooms, such as general presentation delivery, screen sharing, webcam, VoIP features for communication, chat, whiteboard, upload and download of files and polling. It acknowledges the great importance of media choice in leading to different outcomes and used the experiment to discuss how programming learning can be improved using such distance education systems. The screen sharing feature is highlighted as a powerful and helpful tool for the teachers to aid students in solving coding or compiling issues, in the same way that share files tools facilitated the exchange of code among students. Bower emphasizes the communication's capabilities of the environment as students can be able to chat through text and ask questions using the microphone, allowing different levels of collaboration in the class. Group work activities are monitored by the teacher in a very simple way, as each group takes place in a different browser window and all history of conversations are stored in the chat box. Also, the sessions can be recorded for later revision.

In a similar way, Koppelman & Vranken (2008) conducted research to adapt learning methodologies from the physical classroom to a virtual one in an introductory computer science course. Koppelman & Vranken (2008) focused on the interaction among students and teachers, describing the use of the electronic hand rising as a way to create polling feedback for questions or as a way to indicate the desire to speech. The selected system, iLinc, provided similar functionalities as described in the Koppelman & Vranken (2008) article, except from video presentation, with the introduction of the shared whiteboard and the electronic hand rising. The research reports great interest among the students in replaying the recorded lesson or even the students that did not attend the class used this tool as a way to follow the course. Some students reported that the social aspect of the class could be improved using nonverbal communication and social interaction. The overall conclusions were that the virtual classroom performed very well according to students and teachers but the collaboration and social aspect of the classroom can be improved.

Wang (2010) agrees with Koppelman & Vranken (2008) in that there is a sense of isolation of the students inside virtual classrooms. As social interaction and collaboration are key elements in learning, Wang proposes a real classroom, where the main design goals are the access of all kinds of information and relevant materials from the course, effective communication among all members of the environment, more responsive feedback from tutors and peers and foster friendship and collaboration with others. The proposed user interface aims to improve social connections and at the same time create a profile of students learning style to help tutors and other students provide better feedback and coaching.

Recent works, like Wanderley et al., (2013) and Bijlani et al. (2011), also address the collaboration aspect of the virtual classrooms. Wanderley et al. (2013) states that impersonality has proved a major factor of demotivation in distance education using LMS with virtual classrooms. Research made with students and tutors indicated that current interaction tools are inefficient because they mostly rely on text messages, with tutors reporting great difficult in translate complex concepts to text at the same way that feedback to students can be misinterpreted. It also recognized the difficulty to handle several questions via chat and correctly pointed to the individual answers on the whiteboard, as well the lack of tools to promote dialogical conversations. The proposed design, DESI virtual classroom, provides a media center for file sharing and a timeline of contents presented by the teacher. The interactive whiteboard allows presentations from teacher, 3D model visualization with possible interaction from students and a quiz feature.

Bijlani et al. (2011) presents the A-VIEW real-time collaborative e-learning system. As differentials from previous approaches, it offers synchronous and asynchronous objects. As synchronous objects, the system pro-

vides static, dynamic and active objects to be presented in the whiteboard. Static objects can only be presented, like a 3D model, and dynamic objects can be actively changed, like using a virtual chemistry lab and active objects can make decisions and provide feedback, like a 3D collaborative simulation of water ripples. Asynchronous objects consist in forum tools and message boards. The system also states modes of collaboration, where a teacher-student mode allows to teacher maximum control of all resources and students limited access. In the student-student mode, students can share multimedia contents among themselves with limited resources access. The A-VIEW provides capabilities to integrate games into platform and record lectures storing all multimedia content used by the lecture.

2.2 Game-based learning

Since the work of Prensky (2001), a lot of research has been made towards game-based strategies in education. Sancho et al. (2008) uses a socio-constructive pedagogical approach to create a game-based framework integrating an LMS with a game designed as a virtual reality where the students act as avatars solving problems with real life knowledge to progress in the game. As inherent collaborative and immersive, this approach enhance learning experience with game-based scenarios and a compelling storytelling.

Different proposals and methodologies have being applied to combine games and learning. Most popular efforts come from the computer science area, specially programming teaching. As a very difficult task to master, young students mostly suffer from difficulties to understand syntax and often get disappointed or despondent with programming languages, which in turn make then away from the most satisfying part of programming: create. Scratch (http://scratch.mit.edu) eliminate the underlying syntax structure of programming languages using programming blocks allowing storytelling using logical concepts of repetition and tests. Alice (http://www.alice.org) allows users to create stories using a 3D interface to teach an object-oriented paradigm to students using storytelling to create games. Greenfoot (Kolling 2010) is based on a different path. It allows the creation of games facilitating the process of interface building but at the same time with true Java code programmed by the user.

Utting et al. (2010) made a very interesting interview with the creators of the three proposals citing similarities and differences among them. It is possible to highlight as the main idea of all projects to keep it very simple so young students can be attracted. At the same time they recognize that there is a claim from the community to improve features allowing more power to then to create more flexible and complex projects. Following the same line, Li & Watson (2011) presented a method to teach introductory

programming concepts by blending the programming learning tasks with the game construction process using tile-based games.

Of course not only teach programming can benefit from game-based learning strategies. Asbell-Clarke et al. (2013) discusses assessment using a game strategy to engage the learner with scientific phenomena in the effort to build their intuitive understanding about these phenomena. Bramam, Meiselwitz, & Vincenti (2013) argue that virtual reality can produce better outcomes since the playing is even more immersive. Using the concepts of simulation and "virtual worlds" the projects uses a course as a pilot using Second Life (http://secondlife.com) to explore the capabilities of this kind of reality in teaching and education.

As the concept of "virtual worlds" evolved during time, new approaches appeared not only as entertainment but also with educational purposes. Currently the most popular is Minecraft (http://minecraft.net), a building block game designed from strongly correlated with the Said (2004) EMDM framework, where players have two distinct modes: survival and creation. While at first the survival mode boosted game popularity, it was only when creative mode become mainstream that the true educational power of the game unveiled. With several works showing how it is possible to teach with Minecraft (Schifter & Cipollone 2013; List & Bryant 2014), Short (2012) introduces many creative ways to teach biology (creating entire maps of the human body), ecology (complete and complex ecosystems that otherwise would be only available thorough non-interactive movies), Physics, Chemistry, Geology and Geography. Even with very simple and rudimentary tools, the students and teacher were able to exhibit complex situations and environments. As an open world sandbox game, the goal is that the creativity of the user drives how the world behaves.

Repenning et al. (2014) use a similar concept of a block game to give more creation power to users, crafting more complex models from icons aiming a more sophisticated and realistic world but without loose the simplicity. Diaconu, Keller & Valero (2013) propose a new methodology to amplify the spectrum of Minecraft allowing it to truly become a massive multiplayer game with millions of simultaneous connections. Mojang (http://mojang.com) itself, the company responsible for creating Minecraft, acknowledge the importance of the project as an educational resource with the creation of the MinecraftEdu (http://minecraftedu.com), a modification that allows teachers to give assignments and feedback to students inside the game.

Another case of great popular success is the Spore game (http://www.spore.com) from Maxis/ Electronic Arts. Spore is a multilingual, massively-single player on-line game which thematic is based on History, Sociology and Biology. It is an endless game where the player starts as a cell and must evolve to a creature, then to tribal stage until the space conquer stage (Oliveira et al. 2009). The game aims to promote creativity and exploration

where player acts as a "God" with its own pace controlling situations and operations. However, strong criticism came from educational community, rating the game as scientifically flawed, mainly in the Biology area, reflecting prejudices and stereotypes (Oliveira et al. 2009; Schrader, Deniz, & Keilty 2012). Studies suggest that those misconceptions can be overcome using critical thinking techniques to confront the models used in the game against the subjects' taught in the course (Schrader, Deniz, & Keilty 2012).

Research in the field of virtual classrooms actively points towards a better integration among students, but tools in general lack services and capabilities to integrate and connect learners. Also, integration between virtual classroom and LMS seems very superficial or nonexistent in most cases. Game-based learning initiatives toward improvement of learning methodologies are very promising with many successful cases. Despite this success, a strong and coherent connection between game and pedagogy is still missing. While there are many successful games to nurture creativity and teach different subjects, like programming, they are mostly single user interfaces with no collaboration methods. The building blocks games allow students to create structures with freedom promoting a multidisciplinary approach. Embedding more power to the blocks, allowing then more levels of creation and the possibility of choosing between "simple" and "complex" mode of creation will make students able to develop deeper concepts with small incremental steps and at the same time make teachers able to design meaningful tasks inside the game to teach different kinds of subjects. Programming will be used as a powerful tool for all subjects as a "build tool" integrated with all curricula as an essential skill and taught since early years.

3. Methodology

Aiming to create a deeply integrated framework of game-based learning with virtual classroom, the proposal will develop an on-line massive 3D game with built-in features to promote collaboration and learning.

The user interface presented in figure 1 shows the general concept of the system. Being web-based it relies on state of the art technologies such as HTML5 and CSS to create an easy to use environment where users connect to attend to a virtual class. It will be connected to a LMS to store user data and profiles so the teacher knows beforehand what kind of learning style and what subjects were taught in previous classes and have access to the student point of view of the classes. At the center of the screen the system provides a "Dashboard" where students and teacher can share and have access to all kinds of content. Different from previous approaches where the kind of documents previewed is limited, the concept is put in a single interface any kind of documented that supports visualization. The concept is already adopted by Google Drive and easily scalable as new types of files

can be added to support visualization installing new apps. In the same way, the integration offered by Google Classroom to assignment files with Drive can be explored to create a single solution that unifies LMS and classroom files. The goal is not to have different tabs for different types of media and content but a single shared dashboard where teacher and student can easily visualize and interact, creating the notion of an attention board.

Figure. 1.   User interface on planning mode.

Students can interact with the dashboard drag and dropping files using an extended concept of raised hands described in the literature. Promoting the dialogical learning and free collaborative methodology, the teacher can allow students at any time share whatever they want using a dialogical method similar to token ring networks so every student has his own time to contribute to class. If this functionality is not desired, let us say with a larger audience, the extended rising hands will be enabled. A student willing to collaborate will put the content on to the dashboard creating a queue that the teacher will inspect with rich information such as kind of content, the student that suggested and a possible description. In that way the system will foster a more engaging collaboration between teacher and students allowing direct interaction with content.

Missing from the literature, a new feature will extend this concept of dashboard to create groups inside classroom so the dashboard can be replicated to each group. The teacher can assign a role to certain students that will be able to form groups and each group will have the same functionalities as described above. The idea in this mode is that the teacher will act as the coach of the groups, having an external view of each group's work as layers of the whole classroom. Groups can collaborate between themselves sending content to each other or putting content in the classroom dashboard. The message board feature will provide a cascading style making answer-

ing questions easier. In that way every conversation is stored like a forum allowing future revision and quick search.

Each entity of the system (student, group, and classroom) will have a separate timeline. This timeline is created by every action made inside of the entity. Using this method, later revision of the class is richer than only presenting a recorded video because the user will have the flow of actions and not only have direct access to the desired content but the stream of actions that created it. Using its own timeline of events, the student can create a summary at end of every class and use it in next class to remember the subjects, creating a personalized view of the content. Students who did not attended to class can view the classroom timeline or have direct access to other students' timelines, so students with similar profiles of learning can make connections increasing social integration. This timeline feature will have direct connection with LMS, making asynchronous tasks more connected with virtual classroom subjects.

Figure 2.   User interface on game-based mode.

If the dashboard is the main feature regarding collaboration and teamwork, the game-based learning is the center of the learning pedagogical approach. Using concepts based on Minecraft, Spore, Alice, Scratch and Greenfoot, the game will use the concept of a building blocks massive multiplayer game where students can create their virtual world using their creativity to solve problems and assignments provided by the teacher or to make exploratory surveys.

Using the collaborative features of the system, the students can go from tinkering to planning and vice-versa. As subjects will still be present on the dashboard, the students can check their timeline to create buildings and narratives inside the game. We introduce a new concept in the build-

ing blocks games, giving tools to users to further explore and create new kinds of blocks. The blocks themselves will not be "black boxes" anymore, only allowing pre-determined types of structures, but instead they will be configurable and programmable. Using an adaptive "white box" approach, students with no or little skill in programming can define new blocks using a model similar to objected oriented visual IDE, where they can assign values to different types of characteristics of the blocks, in a way very similar from current material editors from modern renderers.

Giving more freedom to users, we allow them to go a step further: complex systems design. Based on similar concepts used on electrical engineering system's design and object-oriented paradigm, each box will have attributes but also actions inputs and outputs. If a user wants to create a very simple plant, he could define that this kind of box has certain features like color, weight or even specific 3D model if he wants and at the same time use biological concepts. He could be very simplistic and say that a plant consumes CO_2 and produces O_2 and model the plant's life cycle. Permitting the user to act in multiple scales, he could unwrap this box and go one level down building boxes inside the box. He could create a box named lungs and define that the CO_2 that comes from the input will be consumed there and produce as output O_2. Expanding the concept to microscopic levels or even to astronomic levels, this feature will give the user the power to define the world itself. It only depends on how much detail he wants for his world.

As a collaborative and massively on-line world, users can work together and create different structures that could interact among themselves. The users are allowed even to define complex systems like gravity or osmosis using a programming language like LUA. With this methodology, different skilled students can achieve different levels of detail using knowledge acquired to create complete systems or even inspect other students' work to understand it or request access to make customizations and alterations and at the same time teaching programming produces palpable outcomes with students having immediate feedback of their actions and a true feeling of using a tool to create "things", not only and end on itself. Programming students can use multidisciplinary skills to help others students or even themselves to understand simple or complex scientific or routine events.

Marko Susimetsä's comment

Rodrigo S. Duran keenly observes the drawbacks of modern online learning environments, mainly the fact that the tools they provide (calendar, messaging systems, file submission etc.) are not related to the very act of learning. As such, they are more about the management of the process than the process itself. Likewise, he notes that educational games are more

or less separate from learning environments, which makes it more difficult to record and assess the learning processes that take place while the students play the games. The author proposes to alleviate this problem by combining game-based learning with a learning environment, arguing that such a combination will be an engaging and immersive learning tool, fostering collaborative work, critical thinking and creativity.

Since computer games are a subset of the larger whole of games and play, I would like to use this opportunity in commenting on Rodrigo S. Duran's article to go a little deeper into the cultural significance of gaming and how important games are as teaching and learning tools. Games and play include almost every facet of human existence: Children role-play, for example, the parts of mother and father when they play with dolls, thus interpreting and internalising the culture that they have observed in their environment; sports are widely followed and provide entertainment and excitement even to those who do not actively participate in the sport. In fact, a German poet, Friedrich Schiller (1759 – 1805) went as far as to say that *"man only plays when he is in the fullest sense of the word a human being, and he is only fully human being when he plays."*

Nowadays, most games are played on computers and they are an integral part of our culture. According to the report of the Entertainment Software Association (2015), 51% of US households own a dedicated gaming console (not including computers used for gaming) and 42% play games more than 3 hours per week. The average gamer is 35 years old and 44% of gamers are female. According to the survey of the Interactive Software Federation of Europe, 25% of respondents played games at least once a week and 45% of gamers were female.

The cultural influence of computer games is similar to any fabricated artefact. When we read books or novels, we are interacting socially with the people who wrote them and – at the same time – the cultures in which the authors lived and that taught them to think and express themselves in a particular manner. Similarly, when we play games, we interact with the creators of that game and face situations that they have created for us. In a roleplaying game, we may come up against ethical choices that are posed to us by the writers of the game. A fine example is the recent The *Witcher 3* (2015), based on the novels of a Polish writer Andrzej Sapkowski) that gives the player numerous ethical dilemmas, such as whether or not to help a man find his runaway family when you learn that they have fled from his violent outbursts, or whether to defend a victim of racism despite the consequences to yourself. The difference between novels and roleplaying games is mainly in the interactivity of the experience: the game allows you to make the choices and face the consequences, while in a novel you read about a person living through them.

For me, personally, there are a handful of games that I feel influenced me or taught me something when I grew up. First, the classic roleplaying game, *Ultima IV* (1985) faced the player with a challenge of self-improvement, asking them to follow and live up to a set of virtues – compassion, honesty, honour, humility, justice, sacrifice, spirituality and valour – in order to finish the game. The player had to adhere to these virtues in encounters with in-game characters by, for example, helping those in need, defending the weak, giving from their own and telling the truth. When they had mastered the virtues, they became "The Avatar" – an example for the people to live up to.

The famous *Civilization* (1991–) series provides a simulation of the rise and fall of human civilizations and cultures in the guise of a strategy game. The player takes charge of an early tribe of humans, founds a settlement and then starts to advance in science and technology by expanding and interacting (also warring) with neighbouring cultures. The player has to make choices between cultural spending, scientific spending and army building to reach one of the several possible victory conditions (e.g. cultural victory, domination victory, scientific victory). The games are full of historical information: short articles on various cultures, scientific advancements, technologies and religions that served as a kind of a Wikipedia before the time of Wikis. Incidentally, in a study by Squire (2004, quoted by Foster & Mishra 2009), concerning the use of *Civilization III* in a classroom, the game was found incompatible with the specific goals of the school curriculum, but the students developed a more general understanding and interest in history through playing it. This and my own experiences indicate that a commercial game can be a powerful tool for informal learning, even if it does not precisely meet the goals of formal education.

The *SimCity* (1989–) series has the player take the part of a governor/city planner who has to balance a budget with city and services development, providing job opportunities for a growing population. The game series provides plenty of opportunities to learn about financial management, crime and fire protection.

Specific educational games were rare in my youth and teachers knew nothing of them. Nevertheless, I managed to get my hands on a very simple game: *Maailman kartta* (World Map 1985). It was a straight-forward geography educational game and had the players fly around a world map in a helicopter and try to find countries and capitals within a given time limit. I found it engaging and educational and I believe that it made me learn the basics of geography much better than the map book at school did.

Naturally, not all games have deep educational content and they may focus on very different areas of skills (cf. Foster & Mishra 2009). Game genres such as roleplaying, strategy and simulation games are more involved in problem-solving skills and ethical decision making than, for example,

platformers and shooters. But, overall, games are able to provide truly immersive learning environments that intrinsically motivate the players to learn new things. Attempts to harness this power to the purposes of education and training have been made with several games and they are already widely used in primary education for math and spelling lessons (for example 'Ekapeli' at http://www.lukimat.fi/lukeminen/materiaalit/ekapeli/ekapeli-in-english-1). For more mature learners, educational games – or learning applications of other games – are usually centred on teaching certain types of subjects: math, physics, geology, biology, programming, architecture etc. These subjects are perhaps most easily translated to a game-based learning content. Other subjects, such as language learning, may require less structured games based on role-play, such as a Second Life type of environment where the learners play various roles in a murder mystery.

Rodrigo S. Duran's proposal is ambitious: a Minecraft-type of building and problem solving game that can be further developed by the students, providing learning opportunities for several subjects: programming, math, physics, biology and geology. Combining this educational game with a learning environment will further increase its usability in teaching these subjects. It would be interesting to think of how, for example, languages, culture and history teaching could also be included in the model. Overall, the proposal is a challenging project for the programmers who need to create the learning environment and the game and the tools for the users to further develop it. But challenging does not mean inadvisable: the development of educational games for the purposes of formal learning and the use of games in education is still taking its baby steps and it is important to try out different things and research and assess their usability in practical contexts.

The NMC Horizon Report for Higher Education (Johnson, Adams Becker, Estrada & Freeman 2015, 22) pulls together earlier research results and notes that games develop students' inductive reasoning skills and urges for the blending of traditional formal and informal learning, indicating that teachers and educators should take game-based learning seriously and they should be aware of the types of games that can support the learning of their own subject area. This does not only include educational games, but also other commercial games that support the learning goals of a given course. Many games develop reasoning skills, but even issues such as cultural tolerance are dealt with in many roleplaying games. Awareness of these games will allow the teacher to introduce them to their students and support them in trying them out – thus effectively harnessing the power of informal learning for the purposes of their own teaching.

On a more general level, education providers should pay attention to game-based education and it should be written into their strategy papers. Modern students are digital natives who have grown up with computer and

video games and the teachers need to be able to meet them in their own world. Epper, Derryperry, & Jackson (2012) propose a basis for how education providers can implement game-based learning as part of their institutional strategy, establishing centres of excellence and funding grants and awards for game-based learning.

I would personally call out for teachers to familiarise themselves with games that can support the broader personal growth of individuals: their values and worldviews, as well as their attitudes towards other people and their worldviews. In an increasingly multicultural environment, we need more immersive methods to make people think of these issues, develop their tolerance and help them understand different points of view.

References

Amory, A. (2001). Building an educational adventure game: theory, design, and lessons. Journal of Interactive Learning Research, 12(2), 249–263. Retrieved 28 September 2016 from https://www.learntechlib.org/p/8421

Asbell-Clarke, J., Rowe, E. & Sylvan, E. (2013). Assessment design for emergent game-based learning. CHI '13 Extended Abstracts on Human Factors in Computing Systems, 679–684.

Bijlani, K., Jayahari, K. R. & Mathew, A. (2011). A-VIEW: real-time collaborative multimedia e-learning. In Proceedings of the 3rd Int. ACM Workshop on Multimedia technologies for distance learning, 13–18.

Bower, M. (2006). Virtual Classroom Pedagogy. In Proceedings of the 37th SIGCSE technical symposium on Computer Science education, 148–152.

Braman J., Meiselwitz G. & Vincenti, G. (2013). Virtual Worlds in the General Education Curriculum. In R. McBride & M. Searson (eds.), Proceedings of Society for Information Technology & Teacher Education International Conference 2013, 2692–2697.

Diaconu, R., Keller, J. & Valero, M. (2013). Manycraft: Scaling minecraft to millions. In Netgames '13: Proceedings of the annual workshop on network and systems support for games, 1–6.

Entertainment Software Association (2015). Essential Facts about the Computer and Video Game Industry. Retrieved 29 September 2016 from http://www.theesa.com/wp-content/uploads/2015/04/ESA-Essential-Facts-2015.pdf

Epper, R.M., Derryberry, A., & Jackson, S. (2012). Game-Based Learning – Developing an Institutional Strategy. EDUCAUSE Center for Applied Research Bulle-

tin August 9, 2012. Retrieved 29 September 2016 from https://net.educause.
edu/ir/library/pdf/ERB1208.pdf

Foster, A. N. & Mishra, P. (2009). Games, claims, genres & learning. In R. E. Ferdig
(ed.), Handbook of research on effective electronic gaming in education. Re-
trieved 29 September 2016 from http://citeseerx.ist.psu.edu/viewdoc/downl
oad?doi=10.1.1.463.2979&rep=rep1&type=pdf

Interactive Software Federation of Europe (2015). Industry Facts. Retrieved 29 Sep-
tember 2016 from http://www.isfe.eu/industry-facts

Johnson, L., Adams Becker, S., Estrada, V., & Freeman, A. (2015) NMC Horizon Re-
port 2015 Higher Education Edition. Retrieved 29 September 2016 from
http://cdn.nmc.org/media/2015-nmc-horizon-report-HE-EN.pdf

Kolling, M. (2010). The greenfoot programming environment, ACM Transactions
on Computing Education 10(4). Retrieved 29 September 2016 from http://
dx.doi.org/10.1145/1868358.1868361

Koppelman, H. & Vranken, H. (2008). Experiences with a synchronous virtual class-
room in distance education. In Proceedings of the 13th Annual Conference
on Innovation and Technology in Computer Science Education, 194 – 198.

Li, F. W. B. & Watson, C. (2011). Game-Based Concept Visualization for Learning Pro-
gramming, MTDL '11 Proceedings of the third international ACM workshop
on multimedia technologies for distance learning, 37 – 42.

List, J. & Bryant, B. (2014). Using Minecraft to Encourage Critical Engagement of Ge-
ography Concepts. In Searson, M. & Ochoa, M. (eds.), Proceedings of Socie-
ty for Information Technology & Teacher Education International Conference
2014, 2384 – 2388.

Oliveira, L. R., Correia, A. C., Merrelho, A., Marques, A., Pereira, D. J. & Cardoso, V.
(2009). Digital Games: Possibilities and Limitations – The Spore Game Case.
In T. Bastiaens, J. Tron, & C. Xin. (Eds.), Proceedings of World Conference
on E-Learning in Corporate, Government, Healthcare, and Higher Education
2009, 3011 – 3020. Retrieved 29 September 2016 from http://www.learn-
techlib.org/p/32915

Prensky, M. (2001). Digital game-based Learning: practical ideas for the application
of digital game-based learning. St. Paul: Paragon House.

Repenning, A., Webb, D. C., Brand, C., Gluck, F., Grover, R., Miller, S., Nickerson, H.,
& Song, M. (2014). Beyond Minecraft: Facilitating the Computational think-
ing through modelling and programming in 3D, IEEE Computer Graphics
and Applications, 34(3), 68 – 71.

Said, N. S. (2004). An engaging multimedia design model. In Proceeding of the 2004 conference on Interaction design and children: building a community. Maryland: ACMPress.

Sancho, P., Gómez-Martin, P. P. & Fernández-Manjón, B. (2008). Multiplayer role games applied to problem based learning. In Proceedings of the 3rd International Conference on Digital Interactive Media In Entertainment and Arts, 69 – 76.

Schifter, C. & Cipollone, M. (2013). Minecraft as a teaching tool: One case study. In R. McBride & M. Searson (eds.), Proceedings of Society for Information Technology & Teacher Education International Conference 2013, 2951 – 2955.

Schrader, P., Deniz, H. & Keilty, J. (2012). Breaking SPORE: Aligning Video Game Affordances to Science Pedagogy". In P. Resta (ed.), Proceedings of Society for Information Technology & Teacher Education International Conference 2012, 2618 – 2625.

Short, D. (2012). Teaching Scientific Concepts using a virtual world – Minecraft, Teaching Science, 58(3), 55 – 58.

Tan, P-H., Ling, S-W. & Ting, C-Y. (2007). Adaptative game-based learning framework. In Proceedings of the 2nd International Conference on Digital Interactive Media In Entertainment and Arts, 142 – 146.

Turoff, M. & Hiltz, S. R. (1995). Software design and the future of the virtual classroom. Journal of Information Technology for Teacher Education, 4(2), 197 – 215.

Utting, I., Cooper, S., Kôlling, M., Maloney, J. & Resnick, M. (2010). Alice, greenfoot and scratch – A discussion, ACM Transactions on Computing Education 10(4), 17.

Wanderley, R., Amaral, R., Ximenes, V., Tewari, D., Madhvanath, S., & Vennelakanti, R. (2013). DESI : A Virtual classroom system for distance education: a design exploration. In Proceedings of the 11th Asia Pacific Conference on Human Computer Interaction, 388 – 399.

Wang, H. (2010). Towards a real virtual classroom. Proceedings of the world conference on education, multimedia, hypermedia and telecommunications. Retrieved 29 September 2016 from https://www.learntechlib.org/p/34774

Yacci, M. (2004). Game-Based Learning: Structures and Outcomes. Proceedings of Society for Information Technology & Teacher Education International Conference. Retrieved 29 September 2016 from https://www.learntechlib.org/p/14709

The Environmental Education in Teaching Training: Experiences in Brazil and Finland

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Keywords: environment, environmental education, sustainable development, everyman's right, teacher training, nature

This article covers the differences between the environmental conceptions used to build up environmental education in Finland and Brazil. The analysis is based on the Brazilian law 9795/1999, which regulates the environmental education at all levels of teaching in Brazil and "Everyman's Right" which is the general public's right to access certain public or privately owned land for recreation and exercise. Also the main definition of environmental education in the National Finnish Curriculum has been reflected. The focus is on the similarities and differences in the general teacher training by the definition of environment in both countries. It is only a small picture of the whole scenario; this sketch is taken from my short experience in Finland and my relationship in a Physics teacher training course at the University of Helsinki. As a conclusion, one can note that the assumptions based on the mechanism environment are the main differences between Finnish and Brazilian approaches associated, form the Brazilian point of view.

1. The environmental education in Brazil

At the end of the 20th century specific legislation on environmental education in Brazil was introduced. According to Law 9795/1999, environmental education "is an essential and permanent component of national education and must be present in a coordinated manner at all levels and modalities of the educational process, in a formal and non-formal character."

The definition of what should be environmental education is given by the same law as follows:

> *"Be understood by environmental education processes by which the individual and the community build social values, knowledge, skills, attitudes and competences for the conservation of the environment and of common use, essential to a healthy quality of life and sustainability." (Brasil 1999.)*

The definition of environment is given by another law which was written before. The law number 6983 (Brasil 1981) defines environment as follows:

> *"We understand as the environment, the set of conditions, laws, influences and interactions of physical, chemical and biological, which allows, sheltering and governs life in all its forms."*

Everyone can see in this definition that the environment is naturally a multidisciplinary subject and a Cartesian way of thinking would not be able to explain its whole meaning.

2. The environmental education in Finland

In Finland, the freedom to roam and related rights are called "everyman's right", similar to other Nordic countries. Everyman's right is a legislation created to regulate the use of the environment.

We can find some definitions like: "Everyone may walk, ski or cycle freely in the countryside where this does not harm the natural environment or the landowner, except in gardens or in the immediate vicinity of people's homes (yards). Fields and plantations, which may easily be harmed, may usually not be crossed except in the winter." (Ministry of the Environments of Finland.)

There is also a policy in Finland to encourage the promotion of environmental education and sustainable development education. Jeronen et al. (2009) says that the environmental education strategy was created in 1992 and the sustainable development education has been organized since 2006. Both primary and secondary education have sustainable development in its curricula. The main theme in primary and lower secondary schools is "responsibility for the environment, well-being, and sustainable future" (National Core Curriculum for Basic Education):

> *"...to raise environmentally conscious citizens who are committed to a sustainable way of life. The schools must teach future-oriented thinking and building the future on ecologically, economically, socially, and culturally sustainable premises."*

Jeronen et al. (2009) understood that the Finnish students should:

- understand the prerequisites for human well-being, the necessity of environmental protection, and relationships between the two,

- learn to observe changes taking place in the environment and human well-being, to clarify the causes and consequences of these changes and to act for the good of the living environment and enhanced well-being,

- learn to evaluate the impacts of their consumption and daily practices, and adopt the courses of action required by sustainable development,

- learn to promote well-being in their own communities and to understand threats to, and potential for, well-being at a global level and

- come to understand that, through their choices, individuals construct both their own futures and our common future; learn to act constructively for a sustainable future.

I didn't study this time how the Finnish legislation cares for the environmental education in upper secondary school, In the next section I describe the insertion of the environmental education in a course of physics teacher training in Brazil, I point out the features of understanding the environment in Brazil and how it is different from the Finnish point of view described above.

3. Background and questioning in the Federal Institutes of Brazil

The Federal Institutes of Education, Science and Technology (FI) were created in the context of Law 11892 (Brasil 2008), and it is predicted that the FIs will attend the basic education through vocational courses and higher education in terms of technological bachelor degrees and licentiate courses to teaching training. From 2010 there was a large expansion of the federal system and the internalization of FI in Brazil. In this context, the FI was founded in the town of Itapetininga in August 2010. The first courses were vocational courses in the areas of Mechanics and Information Technology and a licentiate course in teacher training in Physics.

Itapetininga is a small town in the southeast of Brazil. It is surrounded by Atlantic forest and there is a big area of agriculture production.

Nowadays, we have several actions in environmental Education like environmental weeks, sciences fairs, small groups meeting where the Environmental Education are discussed and sustainable gardening where the school community can participate to produce food. But, these actions were

not easy to implement because most of the teachers and students were not convinced about the importance of environmental education.

Although FI was founded in 2010 with a licentiate course, only in 2012 was the environmental education cited in the core curriculum. In accordance with Law 9795/1999 environmental issues must not be restricted to just a curricular space in the core curriculum of the licentiate courses to teacher training.

The action used to follow this requirement was: the environmental education was correlated to some disciplines (curriculum spaces) like Thermodynamics, Physics Applied to Biological Phenomena and Public Policies in Brazilian Education by its rubrics.

During the discussion, the main questions which arose were:

•   How can I discuss such a deep and complex issue in a technical subject?

•   What is my role as a teacher in my society and my environment?

•   Is the Environment Education policy only a bureaucratic demand or a basic necessity of modern life?

These questions are very difficult and we have no ready answers. In the next section I would like to discuss these questions using the Brazilian and Finnish points of view.

4. Discussion on my observations in Finland

During my time in Finland I noticed that Finns normally associate nature like lakes, forest, stones and animals as a survival element. Maybe the sauna is an example, where the wood, stone, water and fire is joined in the same place to provide pleasure and health to people.

The National Core Curriculum for basic education when put as a target has the idea that "the students should understand the prerequisites for human well-being, the necessity of environmental protection, and relationships between the two" associated in the same way the concept of a unit to mutual survival. Through observations in Finnish schools it was clear that understanding of this target is acquired early on through the methods within project based learning, and student-centredness.

In the Brazilian culture, nature is more associated with the richness, the earth prolificacy. Normally, the extrativism of the indigenous is associated

with the natural care of the whole of nature to humankind. Freyre (1933) coined the idea of racial democracy in Brazil, this concept suffered a lot of criticism, but the main assumption that the contribution of indigenous contribution to formation of national identity of Brazil is incontestable.

Sometimes we can ask ourselves about this kind of conception that nature gives us everything that we need, nurture, shelter, heating without our intervention is a problem when we adopted a capitalist way of life where we want to live in huge human agglomerates.

When the Brazilian law defines the environment as a "… set of conditions, laws, influences and interactions of physical, chemical and biological, which allows, sheltering and governs life in all its forms" we can see this cultural heritage.

Maybe this contemplative behaviour very common in Finns could be a good attitude for Brazilian people. Understanding nature as a partner should improve the Brazilian process to make environmental education.

The passionate vision of Brazilians concerning nature could be a good attitude for the Finnish people. The latest survey of WWF (World Wildlife Funding) in Brazil indicated that 58% of the population take pride in the country's environment and natural resources (Bocchini, 2014). This number is greater than sports, music and culture.

5. Conclusions

I know that to make conclusions about a culture is challenging. We are inside the culture and we are part of this culture. However, I learned something that I hope to implement in Brazil.

During those months in Finland I learned that project based learning is an excellent tool to improve the environmental education. If we want to work in the environment we need to work collaboratively and cooperatively. The disciplinary treatment is nice at first, but it is not enough to achieve our modern objectives.

The cultural heritage of each person can interfere in their concepts of nature but cannot interfere in their results of sustainability.

Martti Majuri's comment

Vicente Barros's reflection on how to use project-based learning to improve the environmental education is very interesting. He writes that if we want

to work in and for the environment we need to work collaboratively and co-operatively.

Learning is contextual, also concerning the environmental education. Using real-life projects and authentic problems as a basis for learning processes has proved to be a successful method in learning science, sustainability and the environment. Joint reflections with other students and in some cases with experts, real practitioners, or even victims of the environmental disasters, deepen the learning results and contextualizes the learning process.

Referring to previous research and his experiences as a teacher, researcher and developer, Vicente Barros concludes that the traditional disciplinary approach to learning environmental issues may seem a good choice at first, but it is not enough to achieve sustainable learning and learning objectives. We have reached the very same conclusions in several learning experiments in Häme University of Applied Sciences. The project and problem-based methods have been applied in studying environmental subjects, for example forestry and agriculture. Especially in forestry planning, waste water projects, greenhouse energy efficiency and energy efficient construction, the co-operation with the industries and the world of work is crucial for the students and the whole learning community. Students are very motivated in engaging in true-life problem-solving together with the world of work, and the commitment to learning process is better than in traditional, discipline-based learning methods. At its best, we achieve long-term learning results and new, innovative approaches to environmental development.

We are currently facing very demanding challenges in the environment and climate globally that the international dialoguing of future actions and education is important. One challenge in environmental education is that the phenomena are global. For example, the effects of climate change cannot only be seen in one's own living area; they may have influences in very remote areas around the world. As a solution, we might use open and distance learning, digital environments and international partnerships even more in Brazil and Finland to make the environmental learning more concrete and available for all, to promote global responsibility of shared concerns, like climate change.

As Vicente Barros writes: "The cultural heritage of each person can interfere in their concepts of nature but cannot interfere in their results of sustainability."

References

Bocchini, B. (2014). "Brazilians think that environmental protection is poor".
    Retrieved 29 September 2016 from http://agenciabrasil.ebc.com.br/
    node/937089

Brasil (1981). Lei nº 6.938, de 31 de agosto 1981. Retrieved 29 September 2016 from
    http://www.planalto.gov.br/ccivil_03/leis/L6938.htm

Brasil (1999). Lei nº 9.795, de 27 de abril 1999. Retrieved 29 September 2016 from
    http://www.planalto.gov.br/ccivil_03/leis/l9795.htm

Brasil (2008). Lei nº 11.892, de 29 de dezembro 2008. Retrieved 29 September 2016
    from http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2008/lei/l11892.
    htm

Freure, G. (1933/1998). Casa-Grande & Senzala. Rio de Janeiro: Editora Record.

Jeronen, E., Jeronen, J.& Raustia, H. (2009) Environmental Education in Finland –
    A case study of Environmental Education in Nature Schools. International
    Journal of Environmental & Science Education, 4(1), 1 – 23.

Ministry of the Environment of Finland: Everyman's right. Retrieved 29 September
    2016 from http://www.ym.fi/en-US/Latest_news/Publications/Brochures/
    Everymans_right(4484)

National Board of Education, Finland. Core Curriculum for Basic Education 2004.
    Retrieved 29 September 2016 from
    http://www.oph.fi/english/curricula_and_qualifications/basic_education

Brazilian students of programming courses improve their motivation when placing them under student-centered learning and project-based learning approaches

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Keywords: student motivation, student-centered learning, project-based learning, programming, preventing drop-outs

This article is a summary report on an exploratory design research of educational intervention conducted on a public institute of education and technology in Brazil. There are remarkable problems of dropout rates in the school. The educational intervention presented here offers a new strategy to mitigate dropout rates by re-designing teaching based on a student-centered approach with emphasis on guided participation and project-based learning. There are some challenges recognized in motivation and performing in studying computer programming. Introductory courses are known to be a challenge for most of the students. The difficulties to learn the fundamentals on how to program computers have led to high rates of dropout at higher education or vocational degrees. Dropping out is easy when a student does not pass a course and needs to repeat it. Students need more motivation – a persistent effort pays toward learning (Law, Lee, & Yu 2010). In The Brazilian Federal Network of Institutes of Education and Technology the main goal is providing free and public education from high-school to doctoral degree. The network was created in 1909 and comprises 562 educational units spread the whole country. It offers 1 million students seats; and it comprises 60 thousand staff members (teachers and support staff).

1. The context of the study is Petrolina City in Brazil

The study institution of this article is located in Petrolina city. There are twin cities: Petrolina and Juazeiro with half a million inhabitants (300 and 200 thousand). Their Human Development Index (HDI) is 0.697 and 0.667, respectively. The region achieved economic feasibility in agricultur-

al production once the government promoted investments in irrigation infrastructure during the 1970s and 1980s. However, it remains one of the most social problematic regions in Latin America, due its low efficiency of social and educational investments. There are small cities surrounding them and their lower HDI is 0.581.

The Institute of Education and Technology is in the Sertao - Petrolina campus; the region has been known as one of the poorest regions in Brazil. The Brazilian Federal Network of Institutes of Education and Technology: According to the Brazilian Government, from 2004 to 2011, 25 % of the student had graduated in bachelor teacher training (4-year long ISCED 6). The first year dropout rate was 57 %. The indicators for the vocational education were worst.

2. The research interest

The research interest of this study was to find out if teachers in computer programing courses at the study institution decide to apply student-centered approach with emphasis on guided participation (Rogoff 1995) in their teaching, would it help to increase students' motivation and reduce their dropout rates? The previous research results are promising, the student-centered studies, student guidance and guided participation (Rogoff 1995, Collins 2006) as well as project-based learning may increase student motivation in studying programming (Jenkins 2001, Law et al. 2010).

The goal of the study was to figure out a method and a strategy to enhance motivation and mitigate dropout rates in programming studies. The current state in the study institution is pedagogically rather traditional. Most of the computer programming classrooms are teacher-centered; and most learning projects are evaluated by their results merely than an effective learning process in social context.

3. Implementing the student-centered approach

A teacher of the programming study course created a pilot course with student-centered approach. At the beginning of the course students filled in a questionnaire inquiring their motivation before and after the course. A teacher was curious to find some statistical data whether the student-centered approach will increase the motivation and decrease the dropout rates. The idea was to develop teachers work on the basis of questionnaire feedback and teacher's own observations of student's activities and behavior on the course. In the questionnaire the teacher explored the students' motivation according to Jenkins (2001), paying attention to extrinsic motivation, the desire to complete the course in order to attain some expected reward, e.g. leveraging career, and to intrinsic motivation, the students' in-

terest in programming for its own sake. There are also social and achievement aspects in motivation; to please some third party whose opinion is valued or perform well for personal satisfaction (Jenkins 2001).

In his teaching the teacher paid special attention to the following, crucial elements in his teaching: students' workload, limitation in the quality of interaction and communication between students and teachers and students' ownership of learning and assessment (de-la-Fuente-Valentín, Pardo & Delgado Kloos 2013). According the teacher's own observations it was important set levels of tasks, expectations and feedback will help students keep the learning zone. The teacher implemented this strategy progressively rather than tried to change all course activities at once. He needed some "orchestration systems tools" to deal with large groups of students for delivering preprogrammed activities with automatic grading reviews. The teacher took care, that applying student-centered approach and also new learning tools didn't mean lack of face interaction or poor quality of communication. The students had possibility to dialogue about the approach and new learning strategy with their teacher. For example the teacher recognized that the students were concerned that individual contributions would not be identified by the teachers during assessment in this approach. Also, the outcomes and criteria of learning in student-centered approach was discussed beforehand.

4. Initial results of the study

There were 61 students who answered the questionnaire from April to September 2015 which covered questions related to their motivation to start a new course, to keep going through the entire program, and the main reasons to keep learning. According to the analyzed questionnaire results seventy percent (70%) of the students said they felt less motivated to start a new course with the new, student-centered approach. This is natural, because in this phase students were not familiar with the approach and they didn't know what it means in practice. Interestingly, when they were asked about their motivation in the questionnaire at the end of the pilot course, eighty five (85%) percent of them said they feel more motivated now. Although the student-centered approach was experienced very motivating by students, the strategy has not been disseminated or implied further in the institution yet. In terms of dropout rates of the institution, there has not been any effective variation either.

In further, the student-centered approach would be very interesting to apply, implement and further develop in the institution. The new research and follow-up in needed too. It is also important to dialogue openly about the dropout problem with teachers, managers, students and parents for finding new solutions for the challenge. One key element is making teaching more student-based and here more students' voice in their own learning process.

References

Baeten, M., Kyndt, E., Struyven, K., & Dochy, F. (2010). Using student-centred learning environments to stimulate deep approaches to learning: Factors encouraging or discouraging their effectiveness. Educational Research Review, 5(3), 243–260.

Collins, A. (2006). Cognitive apprenticeship. (Ch. 4). In R.K. Sawyer (Ed.). The Cambridge handbook of the learning sciences. (pp. 47–60). New York: Cambridge University Press.

Correia, A. R. S., Ryymin, E., Pacheco, F., Aarreniemi-Jokipelto, P., Joyce, B. (2015). A Strategy to Increase Students Motivation and Decrease Dropout Rates on Computer Programming Courses in a Public Institute of Education and Technology. In S. Carliner, C. Fulford & N. Ostashewski (Eds.), Proceedings of EdMedia: World Conference on Educational Media and Technology 2015. Waynesville, NC 8786 USA: EdITLib, 2015, pp. 1267–1272.

de-la-Fuente-Valentín, L., Pardo, A., & Delgado Kloos, C. (2013). Addressing dropout and sustained effort issues with large practical groups using an automated delivery and assessment system. Computers & Education, 61, 33–42.

DeFilippi, J. R. (2001). Introduction: Project-Based Learning, Reflective Practices and Learning. Management Learning, 32 (1), 5–10.

Kain, D.J. (2003). Teacher-Centered versus Student-Centered: Balancing Constraint and Theory in the Composition Classroom. Pedagogy, 3, (1) 4–108.

Jenkins, T. (2001). The motivation of students of programming. In ACM SIGCSE Bulletin (Vol. 33, No. 3, pp. 53–56). ACM.

Law, K. M., Lee, V., & Yu, Y. T. (2010). Learning motivation in e-learning facilitated computer programming courses. Computers & Education, 55(1), 218–228.

Rogoff, B. (1995). Observing sociocultural activity in three planes: Participatory appropriation, guided participation and apprenticeship. In J. V. Wertsch, P. del Rio, & A. Alvarez (Eds.), Sociocultural studies of mind. Cambridge, UK: Cambridge University Press.

The experiences of the flipped classroom in Kazakhstan – Implementing video lessons in secondary school mathematics

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Keywords: flipped classroom, teaching, mathematics, video materials

1. Implementing the flipped classroom in an upper secondary school mathematics lesson

In this work we present our conclusions after implementing a pedagogical approach "The Flipped Classroom" (e.g. Lage, Platt & Treglia 2000) in mathematics lessons. The Flipped Classroom is a pedagogical approach that reverses the traditional educational arrangement by delivering instructional content outside of the classroom. It usually includes technology-supported online activities, like video lessons and use of internet.

This method is considered as a new pedagogy in the Kazakhstani education system. The authors of this article implemented the approach in 2014–2015 at the upped secondary level Nazarbayev Intellectual School in Semey, Kazakhstan. It follows the ideas acquired in the nine-month pedagogical training in the Bolashak Programme in which the other author of the article, E.S. Paizov, participated in the School of Professional Teacher Education, HAMK. On his return he started to collaborate with colleagues, in particular, the second author B. T. Kaiyrzhanove, in pedagogical development and experimenting.

The purpose of the implementation of this pedagogical approach was to find out the advantages of this method and for what teachers need to pay attention to while making video lessons on mathematics. Through oral questioning of upper secondary school students, we acquired students' opinions about the advantages of this new method. On the basis of their experiences, students gathered also some advice for teachers who wanted to implement the pedagogical method in future too.

2. Comparing the flipped classroom to the traditional teaching methods

The use of technology in schools has increased dramatically over the last few years. The impact of such technologies are still being understood by practictioners and present several challenges and opportunities. The flipped classroom is a rather new pedagogical approach that is being used within the Nazarbayev Intellectual School (NIS) network of schools in Kazakhstan. This approach has the potential to improve student achievement and motivation. The flipped classroom makes use of the Internet and the concept of online learning and video conferencing. Such terms and technologies have filtered into the classroom over the last ten years due to reliability and the ubiquitous nature of the Internet.

The flipped classroom students become empowered with direct activities that take place within the classroom. Students are given new information in which to study and develop outside the classroom. When they return to the classroom they consolidate their individual learning with the help of the teacher. This method utilises the available technology with the teacher producing e.g. instructional videos that contain theoretical contents to students. The student then access the video lessons and study independently the contents. When the students return to the classroom they are ready to solve practical tasks in the guidance of the teacher.

In the traditional classroom the teacher first explains the theoretical material and the rest of the lesson time is spent on the students applying the knowledge. The students would then be given homework to consolidate their learning. In the context of a mathematics lesson approximately 50% of the lesson time is spent on the explanation of the theory. The flipped classroom approach affords the teacher the time during lessons to strengthen the students' own knowledge building. The teacher can work with individual students and help them with any difficulties that they may have encountered.

3. The experienced advantages of the flipped classroom method

We started to use this method in mathematics lessons from the beginning of the academic year in an upper secondary school. We experienced the following advantages of using the flipped classroom:

1. Video lessons are a useful resource for students, especially for those that have missed lessons due to participating in different contests, illness and weather conditions. They could easily watch the lessons using their mobile devices or computers.

2. Students also benefit from re-watching video lessons if they did not understand or had forgotten the previous lesson material. This

resource is particularly useful for the challenging and difficult topics, so if students want to recall the material, they have access to it.

3. Students are given an opportunity to experiment with different techniques to solve mathematical problems. This increases motivation amongst students and often leads to a discussion on the merits of each technique used.

4. As a result of the trilingual policy of all NIS schools the Mathematics Department have implemented the Content and Language Integrated Learning (CLIL), a method first coined by David Marsh from Jyväskylä University (Marsh & Wolff 2007). The videos have been produced in English that has helped to improve students' language level. The videos give students an opportunity to re-watch the lessons and pay attention to the terminology at the pace that is appropriate to them.

5. Creating the video lessons in English also helped the author to develop my level of English so the author was able to watch myself conducting the lesson and make an analysis of my speech afterwards. Self-assessment is a powerful tool in the learning process and professional development of a teacher.

4. Students' experiences of the video lessons

In order to help make the project successful we have made 25 video lessons during the academic year covering a variety of topics in mathematics. These videos have been set up on my very own YouTube channel – to date the channel has been visited nearly 3,000 times. The video lessons are uploaded to the site and the students are informed via email with the request to watch the lesson. The pupils were initially amused with the videos and then started to appreciate them as a valuable learning resource. As part of the evaluation of the project we asked feedback from the students and their parents. The response received was extremely positive about the flipped classroom pedagogy. Here is a selection of some of the feedback:

> *"We understand the topic better by re-watching video lessons, and it is good for reviewing materials which we learned at the beginning of the term." A 12th grade student*

> *"At first it didn't seem to me that it is applicable for mathematics, but then after watching 2 – 3 times these video lessons I started to analyze. Very convenient, I like it. " A 12th grade student*

"It is a helpful method for preparing for the examination at the end of the study year or term so you can review all the materials." A 12th grade student

"Parents who could not attend lessons can have a chance to study themselves by watching videos and if you don't understand you can re-watch it." A 11th grade student

"I need to listen to the teacher's explanation 2 – 3 times to comprehend material, that is why it is useful to me." A 10th grade student

There are a variety of editing tools and software available to create videos for the lessons. The software differs in price and complexity. The authors recommend the following software for those wishing to trying video editing for the first time: Vittle, iMovie, Camtasia studio and Screen-o-matic.

5. The authors' tips for planning and implementing the video lessons

We would also offer the following advice for those planning to create video lessons:

1. The length of time of a video lesson should vary depending on the age of students. The younger the students then the shorter the video should be – due to the concentration level of the children being limited. In my practice, I understood that the longest video lesson for 12th grade students must be 15 minutes at most; otherwise, we can lose their interest to the lesson;

2. Before making the video lesson the teacher should plan and prepare carefully and ensure that all the resources are available for the lesson. The teacher should also think about having a script and consider the scenario very carefully.

3. Always take into account students' feedback for improving the quality of the lesson.

4. The subject should be explained in such a way that the students understand the concept being delivered. The language should be appropriate for the audience.

5. It is also useful to reflect on the students understanding after watching the video lesson. The teacher should also ask for feedback from the students and share their understanding with their peers. This process helps the student develop their cognitive mind and critical thinking. The discussions about the context of these new materials give more opportunity to use pedagogical methods

such as Learning cafe, Jigsaw, Dialogical Method, PBL, Collaborative Learning etc.

6. Teachers' experiences on video lessons

The video lessons were shared with our colleagues in the Mathematics Department in order to gauge their opinions and gather feedback. In general, the feedback was positive, teachers liked this pedagogical method and many have started to implement it as well. Especially after discussing it with their students they understood how meaningful the videos are as a learning resource.

> *The teachers in the Mathematics Department made the following observations on implementing the flipped classroom:*
>
> *"The curriculum requires students to remember lots of information and unfortunately they often forget some part of information delivered in the classroom. By using the flipped classroom method the student will learn how to comprehend the new knowledge themselves and develop a deep understanding that allows them to put it into practice."*
>
> *"For a variety of reasons some students lack focus and concentration during lessons. This is often down to stress and concerns about homework that they bring into the lesson. For such students the videos are a tremendous help since they can watch the video lesson at a more convenient time."*
>
> *"Some students feel uncomfortable asking many questions during the lesson. They also may not want to upset the teacher and ask for the new material to be explained again."*
>
> *"If students come to the class prepared for the new topic beforehand it would give more opportunity for students to engage in deep discussions with the teacher about the new topic."*

7. Challenges in the flipped classroom

As with any other teaching method the flipped classroom method has some weaknesses. While implementing this method the authors experienced a few issues. The most significant of which is the fact that it is not always possible to explain new learning content in a short period of time. It often depends on, e.g. the context of the material and the learning topics. A teacher need to carefully consider whether to use flipped classroom or an alternative method.

To conclude we sum up that we are really pleased that they decided to implement and experiment this method in teaching. Taking a hands on -approach has allowed us to see the concrete positive impact on the students. We have also enjoyed receiving positive feedback from parents who appreciate the effort made to engage with their children.

Marja Laurikainen's comment:

Ermek S. Paizov and B.T. Kaiyrzhanov describe very clearly their implementation of flipped classroom in mathematics at the Nazarbayev Intellectual School in Semey, what kind of benefits it has brought to teaching and learning, and what were the experiences of both the students and the teachers from the experiment. The authors state that the method of flipped classroom is rather new in the network of the Nazarbayev Intellectual Schools (NIS) – the technology in schools has increased drastically in the near past and they are still being understood by practitioners. However, the authors have understood that the flipped classroom method has the potential to improve student activity and motivation, and thus increase students' learning achievements.

Indeed, today's generation of students, the "Millennial generation" as they are called, prefer interactive and experiential-learning approaches (Phillips, C.R. & Trainor, J.E. 2014). The millennials are considered to be unique in their reliance on technology – the millenials see computers and the Internet not as tools but as integral parts of their lives (Merritt 2002). According to Howe & Strauss (2003), the core traits of the millennials are: special, sheltered, confident, team-oriented, conventional, pressured, and achieving. Good academic performance is very important to them and they expect to have what they need, when they need it to succeed. Thus, Skiba & Barton (2006, 3) state that the unique characteristics of millennials "are challenging the traditional classroom teaching structure, and faculty are realizing that traditional classroom teaching is no longer effective with these students". McMahon and Pospisil (2005) add that the characteristics of millennials include 24/7 information connectedness, learning environments that support multitasking, and preference of group work and appreciation of the social aspects of learning.

In order to enhance the understanding of these millenials, educators must move from the mere memorization of knowledge and facts ("surface learning") towards "deep learning," where understanding is developed through active and constructive processes (Ritchhart et al. 2011, 7). Thus, educators must shift from a teacher-centered paradigm towards an active and learner-centered paradigm. Prince (2004) states that learning occurs through a meaningful student activity with the guidance of the teacher. Biggs and Tang (2007) agree saying that the most important thing is what the student does and not what the teacher does. In addition, Baeten et al. (2010)

add that student-centered learning is more likely (among other factors) to lead to a deep learning.

From this broader conceptual framework of teaching that promotes active learning and where the students are responsible for the information gathering portion of learning, flipped classroom has become one of the increasingly used methods to meet the learning needs of the millenials (Phillips & Trainor 2014). Technology and the use of multiple media in flipped classroom provide opportunities for teachers to meet the needs of students with various learning styles (Bryant & Hunton 2000). Roehl (2013) adds that flipped classroom enables a range of teaching methods such as videotaping the lectures, creating videos with voiceover and screen-capture software, instructions accompanied by visual aids, utilizing videos found online (e.g. YouTube and TeacherTube), and integrating available discipline-specific websites of videos. This allows teachers to improve communication and connection with students possessing a broad range of abilities. Therefore, what began with helping students who missed classes to catch up with their studies has turned into an innovative and transformative approach globally, at different education levels and in various subject areas. (Phillips & Trainor 2014.)

As the authors Ermek S. Paizov and B.T. Kaiyrzhanov found out some advantages of flipped classroom through their implementation.

Firstly, the students of today, the millennials, are born with technology and prefer using it over the more traditional sources of information. Fulton (2012) stated that the use of technology and multiple media is appropriate for "21st century learning", it enables students to move more flexibly at their own pace and with their own devices, and also allows them to return to the material if they did not understand it fully in the first time. In addition, Nicholas (2008) stated in his study that over 90% of students preferred a mixture of course activities, including lecture, group work, discussion, and problem solving. The literature demonstrates that instructional videos have a positive impact on student attitudes and student behavior (e.g. Bolliger et al. 2010; Hill & Nelson 2011; Holbrook & Dupont 2010; Chester et al. 2011). Talbert (2012) found evidence that the flipped classroom helps students learn more effectively, whereas Frydenberg (2012) does not claim increased learning compared with the traditional classroom but the feedback from the students suggests that the flipped-classroom was more engaging than in-class lecture. In addition, Bergmann et al. (2011) state that in flipped classroom the students are more engaged in the material and see the importance of it into their everyday lives. The use of technology and active learning methods increase students' motivation and self-directedness to their own learning, as the authors Ermek S. Paizov and B.T. Kaiyrzhanov found out from their implementation experiences.

Secondly, the experiences of the implementation of flipped classroom by the authors Ermek S. Paizov and B.T. Kaiyrzhanov revealed that the teachers thought this method would give more time to deep discussion between the students and the teacher during the classroom. Indeed, as Bergmann et al. (2011) state, flipped classroom moves the teacher from the stage to interacting one-on-one with the students. Thus, flipped classrooms gives teachers the opportunity to walk around and listen to students' opinions and concerns (Stone 2012). On the other hand, flipped classroom gives the students the opportunity to practice in-class what they are learning, to apply their knowledge, which supports the constructive alignment approach recommended by Biggs and Tang (2007). In addition, in flipped classroom it is easier for teachers to customize and update the curriculum as well as provide it to students 24/7 (Fulton 2012). Lastly, even though flipped classroom requires some careful preparation, especially when it comes to the out-class materials, as the authors Ermek S. Paizov and B.T. Kaiyrzhanov stated as well, the initial preparation need not to be repeated and there is the benefit of shorter pre-class preparation. Hence, the flipped classroom courses can be run without spending significant additional academic time in preparation (Butt, 2014).

The academic research of flipped classroom and its effectiveness is still rather limited at present. However, Bishop and Verleger (2013) reported on eleven studies that demonstrate student opinion towards flipped classroom to be positive having only minor group opposing. In Butt's (2014) student survey flipped classroom was also received largely positive, around half of the students found it beneficial for their studies at the start of the semester, while the same number was 75 % at the end of the semester. The rest 25 % of students who did not see the benefits of flipped classroom to learning is consistent with the 32 % in Schullery et al. (2011) survey and the 20% in Bates and Galloway (2012) survey. In addition, the evidence from the study by Stone (2012) suggested that in the small classroom flipped classroom can have significant benefit for learning that also enhanced the students' attitudes. In the large lecture/course, however, the results were not as dramatic, although some improvement was measured.

Flipped classroom does not come without challenges, as the authors Ermek S. Paizov and B.T. Kaiyrzhanov pointed out. As mentioned ahead of this, the initial preparation of the materials is crucial and can be one of the biggest pitfalls, as well how the students use the video materials (poor quality of videos; technology issues and possible distracting conditions under which the students view the video or the students may not watch the video at all before class; teacher is not available to answer questions during video viewing; and difficulties for second language learners or those with learning disabilities) (Milman 2012). Talbert (2012) listed other pitfalls such as increased responsibility on students for their own learning can leave some of them feeling uncomfortable or abandoned, some students are not used to this kind studying and prefer traditional lecturing, and student resist-

ance to taking on the increased responsibility for learning. Thus, teachers may need to include clear expectations of self-direction and motivation within their syllabus of the course (Roehl et al. 2013). In addition, changes to materials and other adjustments to the course forces teachers to learn and access more of the technological tools (Prensky 2010). On the other hand, in flipped classroom it is important to recognize e.g. the financial limitations of schools, teachers, and students who may have limited financial resources. The success of flipped classroom relies on the accessibility of computers and internet outside the classroom. Therefore, educators must ensure that all learners will be able to easily and consistently access the online content (Roehl et al. 2013).

References:

Baeten, M., Kyndt, E., Struyven, K. & Dochy, F. (2010). Using student-centred learning environments to stimulate deep approaches to learning: Factors encouraging or discouraging their effectiveness. Educational Research Review 5(3), 243 – 260.

Bates, S. & Galloway, R. (2012). The inverted classroom in a large enrolment introductory physics course: a case study. Retrieved 29 September 2016 from https://www.cs.auckland.ac.nz/courses/compsci747s2c/lectures/paul/Simon_Bates_Ross_Galloway.pdf

Biggs, J. & Tang, C. (2007) Teaching for Quality Learning at University. Third Edition. The Society for Research into Higher Education. Retrieved 29 September 2016 from http://www.umweltbildung-noe.at/upload/files/OE-KOLOG%202014/2_49657968-Teaching-for-Quality-Learning-at-University.pdf

Bishop, J.L. & Verleger, M.A. (2013) The Flipped Classroom: A Survey of the Research, 120th American Society of Engineering Education Annual Conference & Exposition, Atlanta, Georgia, United States, June 23 – 26. Retrieved 29 September 2016 from https://www.asee.org/public/conferences/20/papers/6219/view

Bolliger, D. U., Supanakorn, S., & Boggs, C. (2010). Impact of podcasting on student motivation in the online learning environment. Computers & Education, 55, 714 – 722. Retrieved 29 September 2016 from http://dx.doi.org/10.1016/j.compedu.2010.03.004

Bryant, S. M., & Hunton, J. E. (2000). The use of technology in the delivery of instruction: Implications for accounting educators and education researchers. Issues in Accounting Education, 15(1), 129 – 163. Retrieved 29 September 2016 from http://dx.doi.org/10.2308/iace.2000.15.1.129

Butt, A. (2014). Student views on the use of a flipped classroom approach: Evidence from Australia. Business Education & Accreditation, 6(1), 33.

Chester, A., Buntine, A., Hammond, K., & Atkinson, L. (2011). Podcasting in education: Student attitudes, behaviour and self-efficacy. Journal of Educational Technology & Society, 14(2), 236 – 247.

Frydenberg, M. (2012). Flipping Excel. Proceedings of the Information Systems Educators Conference, 29(1914), 1 – 11.

Fulton, K. (2012). Upside down and inside out: Flip your classroom to improve student learning. Learning & Leading with Technology, 39(8), 12 – 17.

Hill, J. L., & Nelson, A. (2011). New technology, new pedagogy? Employing video podcasts in learning and teaching about exotic ecosystems. Environmental Education Research, 17(3), 393 – 408.

Holbrook, J., & Dupont, C. (2010). Making the decision to provide enhanced podcasts to post-secondary science students. Journal of Science Education and Technology, 20(3), 233 – 245.

Howe, N. & Strauss, W. (2003). Millennials Go to College. American Association of Collegiate Registrars and Admissions Officers and LifeCourse Associates.

Lage, M., Platt, G. & Treglia, M. (2000). Inverting the Classroom: A gateway to Creating an Inclusive Learning Environment. Journal of Economic Education, 31(1), 30 – 43.

Marsh, D., & Wolff, D. (2007). Diverse Contexts-Converging Goals. CLIL in Europe. Frankfurt: Peter Lang.

McMahon, M., & Pospisil, R. (2005). Laptops for a digital lifestyle: Millennial students and wireless mobile technologies. Proceedings of the Australasian Society for Computers in Learning in Tertiary Education, 421 – 431.

Merritt, Stephen R. (2002). Generation Y: A Perspective on America's Next Generation and Their Impact on Higher Education. The Serials Librarian, 42(1), 41 – 50.

Milman, Natalie B. (2012). The Flipped Classroom Strategy: What Is It and How Can It Best Be Used?, Distance Learning, 9(3), 85 – 87.

Nicholas, Arlene (2008). Preferred Learning Methods of the Millennial Generation. The International Journal of Learning, 15(6), 27 – 34.

Phillips, C. R., & Trainor, J. E. (2014). Millennial students and the flipped classroom. Journal of Business and Educational Leadership, 5(1), 102.

Prensky, M. R. (2010). Teaching digital natives: Partnering for real learning. New-bury Park: Corwin.

Prince, Michael (2004). Does Active Learning Work? A Review of the Research. Journal of Engineering Education, 93(3), 223 – 231.

Ritchhart, R., Church, M., & Morrison, K. (2011). Making thinking visible: How to promote engagement, understanding, and independence for all learners. San Francisco: Jossey-Bass.

Roehl, A. (2013). Bridging the field trip gap: Integrating web-based video as teaching and learning partner in interior design education. Journal of Family & Consumer Sciences, 105(1), 42 – 46.

Roehl, A., Reddy, S. L., & Shannon, G. J. (2013). The flipped classroom: An opportunity to engage millennial students through active learning. Journal of Family and Consumer Sciences, 105(2), 44.

Schullery, N.M., Reck, R.F. & Schullery, S.E. (2011). Toward Solving the High Enrollment, Low Engagement Dilemma: A Case Study in Introductory Business, International Journal of Business, Humanities and Technology, vol. 1(2), p. 1 – 9.

Skiba, D.J. & Barton, A.J. (2006). Adapting Your Teaching to Accommodate the Net Generation of learners. OJIN: The Online Journal of Issues in Nursing, 11(2).

Stone, B. B. (2012). Flip your classroom to increase active learning and student engagement. In Proceedings from 28th Annual Conference on Distance Teaching & Learning.

Talbert, Robert (2012). Inverted Classroom. Colleagues, 9(1). Retrieved 29 September 2016 from http://scholarworks.gvsu.edu/colleagues/vol9/iss1/7

For Further Reading:

Knewton Infographics on Flipped Classroom:
http://www.knewton.com/flipped-classroom/

The DIALE Project: http://www3.hamk.fi/dialogi/diale/index_eng.html

Teacher Rinat Zhumabayev's Youtube Channel: https://www.youtube.com/channel/UCefthHqIWoHBWuIZbpBwGdQ/videos

The role of leadership in school improvement

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Nowadays there is a growing awareness of the fact that school improvement and student outcomes to a certain extent depend on the quality of leadership. If schools plan to give students qualitative education they need effective leaders and managers. The aim of this article is to investigate the role of leadership in the school improvement and reflect some theoretical aspects related to educational management. Also examples offered by Finland are presented.

1. Introduction

Nowadays leadership in education is taking on special significance in social life. The importance of leadership in school improvement was beyond question a long time ago. Recognition of differences between leadership and management is increasing this day and principals are required to be both leaders and managers. Managing is considered to be an essential requirement but leadership has more importance for schools (Bush 2011). There is a belief that the quality of leadership has significant influence on school improvement and student results. Schools need effective leaders and managers if they want students to get the best possible education (Bush 2008). School leadership enables improving student achievements by creating an appropriate environment and atmosphere for teaching and learning.

In this article leadership is mainly related to the leadership of principals comprising their ability and skills as leaders which are recognized as key factors in providing school improvement and development. In opposition to this view other researchers have argued that effective school leadership is about creating a learning community and constructing knowledge collaboratively (Harris & Muijs 2005). It means that a teacher leadership along with headship is essential for school improvement. Both approaches are possible and a balance between them should be found. In this case Finnish schools might be recognized as a striking example of constructiv-

ist model of leadership where a good relationship is built not only within schools but also between them. Also in Finnish schools, distributed leadership naturally exists and it is based on shared responsibility and trust. The Finnish example is interesting as well as unusual in the light of global accountability and global educational reform movements (Sahlberg 2010, Sahlberg 2011).

2. Definitions of leadership

There are many ways to define the concept of leadership. Bush (2003) states that there is no agreed definition. Perhaps it depends on different opinions that people have and how they try to define it. Even though everyone intuitively knows the meaning of leadership, different people realize it in different ways (Peter 2013). Bertocci (2009), by analyzing different definitions of the leadership, comes to the conclusion that it involves influence. Also he gives the following definition "leadership is combination of characteristics and personality traits in an individual that compels that person to inspire others to achieve goals that without leader's motivation would not normally be accomplished".

According to Guy (2013) some definitions consider leadership as the focus of group process where a leader is in the center of group processes. Also leadership can be defined as a power relationship between leaders and followers. According to this view leaders have the power to effect change in others. Transformational process is another view of leadership that encourages followers to reach more than is expected from them. Also there is a skill perspective view where abilities of a leader are essential to make effective leadership possible (Peter 2013). Sadler (2003) added that "leadership is also a role in groups and organizations when used as a collective noun can refer to those responsible for the destiny of a country or a company".

In this case it seems that the expression of Leithwood, quoted by Peter Earley and Dick Weindling (2004) is appropriate: "Arguably, a lot of things have been learned about leadership over the last century. But this has not depended on any clear, agreed definition of the concept, as essential as this would seem at first glance". Weller and Weller (2002) write that influence can be seen in a variety of forms like "simple request, legitimatized request, consultation, ingratiation, pressure, coalition". However a main component of any definition is recognized as a process of influence. In spite of various ways to conceptualize the leadership, some elements should be considered as the most important ones: 1) leadership is a process, 2) leadership involves influence, 3) leadership occurs in groups, 4) leadership involves common goals (Bush 2008).

According to Guy (2013) the following definition can be based on the components given above: "leadership is a process whereby an individual influences a group of individuals to achieve a common goal". Sadler (2003) also mentions that leadership as a process can be divided into several parts: it involves influence like behavior and persuasion and interaction between leaders and followers. The nature of interaction depends on situation and the results of the process can be various (Sadler 2003).

There are five commonly believed myths of leadership identified and they are: 1) leadership is a rare skill, 2) leaders are born, not made, 3) leaders are charismatic, 4) leadership exists only at the top of organizations, 4) the leader controls and directs (Sadler 2003). However, the study of leadership has been changed during the decades. Nowadays instead of trying to find distinctive features of leaders, the interest is on their behavior. Also the research focus on the relationship between the leader and followers instead of personalizing a leader (Sadler 2003).

3. Differences between leadership and management

In practice people have vague ideas about leadership and management. According to their understanding leaders and managers are the same people who are undertaking both. Davies (2009) asserts that in most cases leadership is differentiated from management. Armstrong and Stephens (2005) writes that managers and leaders can be the same people but for leaders it is not necessary to be a manager. Management can be differentiated from leadership but before we need to define management. Tony Bush (2011) quoted Bolam who had defined management as "an executive function for carrying out agreed policy". He also cited Sapre who had stated that "management is a set of activities directed towards efficient and effective utilization of organizational resources in order to achieve organizational goal" (Bush, 2010). According to Armstrong and Stephens (2005) management is "deciding what to do and then getting it done through the effective use of resources". The first definition given above represents management as an organizational function. From last two definitions we can see that they have common features telling about efficient use of resources. However all of them say about the same things concerning effective control and utilization of resources on the way to achieve organizational goals or to provide appropriate policy.

If the management focuses on providing resources, the leadership concentrates on people (Armstrong & Stephens 2005). Bertocci (2009) also states that the main things defining the essence of leadership are people and vision, while management can be identified as "dealing with systems, processes, budgets, equipment". The leadership can be seen in connection with setting the values and the vision of an organization and management as acting that is based on the vision (Coleman 2010) In that case

the key words suggested by Armstrong and Stephens (2005) are interesting. According to their idea leadership can be explained by following words "change, vision, communication, proactive, high risk, aligning and motivating people" whereas management is based on the key words like "organizing, planning, budgeting, rationality and control". Bertocci (2009) puts forward a similar idea that managers inclined to "plan, organize, structure and budget" while leaders act by visualizing and communicating to followers of what should be done.

According to Davies (2009) leadership is giving direction and motivation to others with the purpose of improving and developing an organization. Management is something which is connected to effective operating and planning. The writings of Mintzberg (2011) deserves attention because his attitude is different from other authors' attitudes. He writes that leadership cannot be separated from management because social processes would be transformed to individual ones. Undoubtedly it concerns only those who combine positions of a leader and a manager. He points out that in spite of the fact that leadership includes group processes it focuses on individual. Calling somebody a leader we at the same time consider others in a lower position and we call them followers.

From the different visions considered above we can conclude that majority of studied authors tend to differentiate management and leadership. However, as Mintzberg (2011) mentions, instead of paying attention to individual leadership we need to build community where leadership and management are together.

4. Leadership and school improvement

According to Zepeda (2003) school improvement is a multifaceted process that never really ends. The author also asserts that a term school improvement is complex and it defies a definition. In this case the words of Dimmock, quoted in this Zepeda (2003) are interesting: "attention is currently turning to how schools might redesign themselves to best serve their students in full recognition that each school is a unique mix of students and contextual conditions". Actually when we talk about school improvement in most cases we mean increasing school effectiveness. The effectiveness of schools can be identified, for example, by assessment of outcomes and through quality (Ezenne, 2009). Harris and Muijs (2005) state that it is clear from many school improvement studies which have been conducted that leadership is a key factor in school's ability to improve. Leadership is frequently connected to school improvement (Bush, 2008). There is a recognition that school improvement depends on leadership (Harris et. al. 2003).

According to Ezenne (2009) school leaders hold great sway over making mission and vision of school. A principal as a leader in school makes up a clear goal and provides appropriate environment for students and teachers. Harris and his team (2003) suggests that effective leaders in schools are those who can build collaborative environment through good relationship. Also there is a view that effective leaders in schools are those who can provide school improvement through collaborative working and creating professional learning community within and between schools. Building a learning community is considered as the most important aspect of school improvement.

School improvement as a new strategy demands teachers and administration to work with each other in a completely different way. School improvement and increasing school effectiveness should be based on creating a learning community (Zepeda 2003). According to Harris and Muijs (2005) successful schools create collaborative environments which encourage involvement, professional development, mutual support and assistance in problem solving. It is significant that study of leadership role in school improvement is changing. Particularly it concerns those whom we mean by the word "leader", because leadership has been associated with head teachers or principals. Teacher's leadership ability and skills are also important in school development and improvement (Harris & Muijs 2005). It is appropriate to draw attention to constructivist leadership where leadership is considered as a way of collaborative learning which gives an opportunity to work together whether it is generating new ideas or reflecting on work and acting in accordance with new collective understanding (Lambert 1998). This can serve as an example of teacher leadership in action (Harris & Muijs 2005).

So taking into account the above given information we can say that leadership is not always about leading schools by head teachers or principals. It means that teachers can be involved in this process and leadership of head teachers or principals can be distributed among teachers. Distributed leadership in schools is one of the forms of leadership where teachers are given enough responsibility for changing fields which are important for school improvement and they have the opportunity to lead as well. (See e.g. Spillane, Halverson & Diamone 2001.)

5. Teachers as leaders

According to Harris (2002) there is a good reason to believe that teachers as leaders can lead within as well as beyond the classroom. Beyond the classroom teachers can lead to be guided by the following aspects: 1) understanding responsibility to help other teachers with the purpose to get students to achieve successfully, 2) considering themselves as developers of other teachers, 3) observing and mentoring others, 4) conducting dis-

cussions about learning and teaching. The idea of teacher leadership is not new because teachers have discharged an obligation of team leaders, head of departments, etc. for a long time. However they did not execute a real role of leaders because they did not initiate changes. Nowadays the role of teachers as leaders increased and there is a view that teachers' sphere of influence should be extended beyond the classroom (Harris 2005).

Wilmore (2007) adduces the research results carried out by R. Ackerman and S. Mackenzie where they identified characteristics and responsibilities of teacher leaders. According to their findings a previous formal role of teacher leaders still exists and now the role of teacher leaders is more informal and consists of sharing their experience and expertise, mentoring and building collaboration. Based on information given above school leadership can be recognized as a key factor in effective school improvement. Instructional leaders play a significant role in providing instructional improvement in schools (Gumus & Akcaoglu 2013). According to Hallinger (Gumus & Akcaoglu 2013) over the past thirty years instructional leadership was considered as a conceptual model to determine school leadership but other concepts such as distributed and transformational leadership are taken into account as models to define school leadership.

Davies (2009) writes in his book that strategic leadership is crucial for school development. According to his inference the main goal of those who led schools for last twenty years had been school improvement. This goal was against the policy of centralizing and assessment which were based mainly on test results.

6. The Finnish approach to school leadership

Finnish educational system is concentrated on decentralization. According to Hargreaves, Halasz and Pont (2008) the Finnish society as well as an educational system is based on trust, collaboration and responsibility. As these authors mention educational leadership in Finland is "leadership for learning, leadership by learning and leadership as learning – not leadership for performance and testing".

According to Moos (2013) transnational and global discourse on educational leadership is mostly formed according to UK/US thinking and traditions. The Nordic educational leadership is based on totally different values like equal society, horizontal hierarchies and comprehensive schooling. The Nordic discourse also has a long tradition of trust. There is trust between all members of educational process and it should be emphasized that teachers are trusted by all levels of administrative system and society. The Finnish model demonstrates certain independence of schools and in turn society shows its trust to education (Moos 2013). Trust is the essential link between a leader and led, vital to people's job, status functions and

loyalty, vital to fellowship. It is doubly important when organizations are reaching rapid improvement, which requires exceptional effort and competence, and doubly so again in organizations like schools that offer few motivators (Harris & Muijs 2005).

According to Couture and Murgatroyd (2012) transforming accountability in the Finnish education system into shared responsibility among teachers has been one of the culminating ideas in promoting teacher leadership there. Majority of distributed leadership examples in Finland are connected to creating community rather than distributing obligations and certain school's autonomy allows them to organize leadership in their own way.

In Bolashak Teacher Education Programme in 2014 in HAMK, we participants visited primary and upper secondary schools of Hämeenlinna town of Finland, with the purpose of finding out some facts about the Finnish approach of leadership by questioning and interviewing principals and teachers. We asked teachers from different schools of Hämeenlinna: "Do school leaders share decision-making with staff members?" The teachers agreed strongly. According to different studies of Finnish approach of leadership and based on questionnaire results, we can say that teachers in Finnish schools are actively involved into the process of decision-making when instructional questions are concerned. That can be one of the examples of distributed leadership in Finnish schools.

Since 1999 all principals of schools in Finland are required to have a Master's Degree, to be qualified teachers, to have enough teaching experience and also they should get a national educational leadership certificate provided by National Board of Education (Moos 2013). According to all interviewed principals' during the Bolashak Teacher Education Programme, they do not have only administrative work but also they should do some teaching every week. It allows them to keep trustful relationship with staff members and to have credibility among teachers (Hargreaves et. al., 2008). It enables them to participate in pedagogical discussions as teachers not as principals in other words as equals.

It is worthy of notice that relations between a principal and staff are not hierarchical. Moreover in some cases it was difficult to distinguish a principal from a teacher. Gouwens (2009) describes relationships between principals and teachers by the following expression "principals and teachers share governance of schools and they view one another as colleagues and professionals". As interviewed principals asserted they saw themselves more as leaders rather than as managers. They mostly refer management to financial management and to being responsible for material and technical support. According to their words it takes a small part of operating time and majority of time is spent on working with people. The leadership is understood by most of them as being able to work with different people who expertise on different fields. As an example, a principal of one Finn-

ish school can be quoted "school is a quiet, unique place to work in with so many experts in different fields. I want to learn something from them". A leader's task is to create appropriate environment and atmosphere so that knowledge and skills of followers would be demonstrated and further implemented to realize common strategy on the path of achieving common goals.

In Finnish schools we can see a striking example of pedagogical and distributed leadership because principals do not push ideas through teachers and they do not delegate them obligations. Headmasters try to work with their staff by staying a side and by giving them orientations. Principals claimed that they have much wider view of school and that their task is to give direction to teachers who have narrower view because they are mostly focused on their own subjects. The pedagogical leadership of Finnish principals is exhibited in their desire to take an active part in the matters connected to teaching processes. According to the interviewed principals they need to know how it feels like to ask teachers to do certain things. If teachers do not agree with a certain thing principals based on their own experience can discuss with teachers whether it works or not.

The Finnish principals believe that successful leadership is based on trust and cooperation. Their leadership approach is to create appropriate environment for all members of educational process. The staff satisfaction has significant importance which is reached by creating healthy and encouraging atmosphere among teachers. Teachers are also considered to be leaders (Couture & Murgatroyd, 2012) and the teacher leadership is a way of creating shared responsibility and learning community. So there is the Finnish approach of leadership which appears in an attempt to establish professional community which is based on good relationship and trust.

7. Conclusions

A lot of articles and books were written about leadership but still researchers could not come to common conclusion how to define the concept of leadership. Probably the concept of leadership is one of the most complicated ones and the majority of researchers judge it as an elusive term. During the whole period of leadership study a lot of researchers have investigated it and it is still in the process of development. The attempts to explain an essence of leadership were undertaken by many authors but there is no "correct" definition of it yet. In spite of the lack of consistency a lot of definitions have common specifics.

Some definitions consider the leadership from the position of leaders so that personal characteristics of leaders allow them to inspire others to accomplish tasks which normally cannot be done. The leadership mostly is considered in connection with relationship between leaders and followers.

Although there are researchers who are against this approach because in this case followers are put in a lower position than leaders. Other definitions consider the leadership as group processes that include an influence which can be used in different forms like "simple request, legitimatized request, consultation, ingratiation, pressure, coalition". According to this concept leaders are in the center of the group processes but they are not considered as the main element of the process; on the contrary here leaders are as a necessary part of the process. The process of influencing others targets to make them clear about what should be done and how it should be done to accomplish a shared goal.

Despite the fact that people have general ideas about differences of leadership and management, these two concepts can be easily distinguished. First of all leaders and managers might be the same people but leaders are not always managers. In most of the definitions management refers to effective using of resources when the concept of leadership focuses on people and vision.

No doubt principals of schools are responsible for setting clear goals and vision. However nowadays the study of school leadership is changing and changes are not only touching principals who are frequently recognized as leaders but also teachers whose role as a leader is increasing. School improvement requires administration and teachers to work in a totally different way and this work must be based on establishing learning community. So the leadership and its role in school development are not always about leading the school by principals. It has another meaning which can be called as distributed leadership where teachers are involved into leadership process and leadership of principals can be distributed among teachers. According to the concept of distributed leadership teachers get sufficient responsibility for changing areas which is important for school improvement.

The Finnish approach of educational leadership is based on different values and it can be described by the following factors like equal society, horizontal hierarchies and comprehensive schooling. Educational leadership in Finnish schools is closely connected to cultural values and they may not be considered separately. Trust between all members of an educational process and autonomy enable responsibility to be shared among all of them.

References

Armstrong M. & Stephens, T. (2005). A Handbook of Management and Leadership: A Guide to Managing for Results. London: Kogan Page Publishers.

Bertocci, D. (2009). Leadership in Organizations: There is a Difference Between Leaders and Managers. Lanham: University Press of America.

Bush, T. (2008). Leadership and Management Development in Education. Los Angeles: SAGE.

Bush, T. (2011). Theories of Educational Leadership and Management. London: SAGE.

Coleman, M. & Glover, D. (2010). Educational leadership and management. Developing insights and skills. McGraw-Hill International.

Couture, J-C. & Murgatroyd, S. (2012). Rethinking School Leadership – Creating Great Schools for All Students. Alberta: FutureThink Press.

Davies, B. (2009). The Essentials of School Leadership. Los Angeles: SAGE.

Dimmock, C. (2011). Leadership, Capacity Building and School Improvement: Concepts, Themes and Impact. London: Routledge.

Earley, P. & Weindling, D. (2004). Understanding School Leadership. London: Paul Chapman Publishing.

Ezenne, A. (2009). Leadership for School Improvement in the Caribbean. Charlotte: Information Age Publishing.

Gouwens, J. (2009). Education in Crisis: A Reference Handbook. Santa Barbara: ABC CLIO.

Gumus, S. & Akcaoglu, M. (2013). Instructional Leadership in Turkish Primary Schools: An Analysis of Teachers' Perceptions and Current Policy. Educational Management Administration & Leadership, 41(3), 289–302.

Hargreaves, A., Halasz, G. & Pont, B. (2008). The Finnish approach to system leadership. In B. Pont, D. Nusche, & D. Hopkins (eds.), Improving school leadership, volume vol. 2: Case studies on system leadership. Paris: OECD, 69–109.

Harris, A. (2003). Building Leadership Capacity for School Improvement, McGraw-Hill International.

Harris, A. (2002). School Improvement: What's In It For Schools? London: Routledge.

Harris, A., Day, C., Hopkins, D., Hadfield, M., Hargreaves, A. & Chapman, C. (2003). Effective Leadership for School Improvement. London: Routledge.

Harris, A. & Muijs, D. (2005). Improving Schools Through Teacher Leadership. McGraw-Hill International.

Lambert, L. (1998). Building Leadership Capacity in Schools. Alexandria: ASCD.

Moos, L. (2013). Transnational Influences on Values and Practices in Nordic Educational Leadership: Is there a Nordic Model? Dordrecht: Springer.

Sahlberg, P. (2011). Finnish Lessons: what can the world learn from educational change in Finland. New York: Teachers college press.

Sahlberg, P. (2010). Rethinking accountability for a knowledge society. Journal of Educational Change, 11(1), 45–61.

Schyns, B. & Hansbrough, T. (2010). When Leadership Goes Wrong: Destructive Leadership, Mistakes, and Ethical Failures. Charlotte: Information Age Publishing.

Spillane, J. P., Halverson, R. & Diamond, J. B. (2001). Investigating school leadership practice: A distributed perspective. Educational Researcher 30(3), 23–28.

Weller, D. & Weller, S. (2002). The Assistant Principal: Essentials for Effective School Leadership, Thousand Oaks: Corwin Press.

Wilmore, E. (2007). Teacher Leadership: Improving Teaching and Learning From Inside the Classroom. Thousand Oaks: Corwin Press.

Zepeda, J. (2013). Instructional Leadership for School Improvement. New York: Routledge.
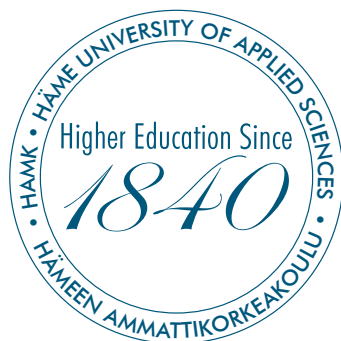
This article collection consists of writings of international teachers, who have participated in the international teacher education programmes or teacher exchange of the School of Professional Teacher Education of Häme University of Applied Sciences (HAMK), later referred to as HAMK. The authors are the alumni of the first Finnish-Brazilian VET Teachers for the Future -Professional Certificate Programme organized in 2014–2015 and the Bolashak Programme for the teachers of Kazakhstan 2014. The first pilot of The VET Teachers for the Future Programme was eight months long and implemented both in Finland and Brazil. There were 27 teachers in the pilot group, 14 studied in Häme University of Applied Sciences (HAMK) and 13 in Tampere University of Applied Sciences (TAMK). The contents of the programme included for example competence-based education, innovative learning methods, digitalization, co-operation with the world of work and regional development in Brazil. There have been three student cohorts in the programme since 2014 and over 100 upper secondary, vocational and higher education teachers from Brazil. The Bolashak programme was a nine-month continuing education programme for upper secondary teachers which was implemented in Finland. The programme included two parts: English language training using the CLIL (Content and Language Integrated Learning) method and innovative pedagogy research internship, with periods of job shadowing and practice in Finnish schools. Altogether 21 upper secondary teachers participated in the training. In addition, one of the authors participated in an international teacher exchange of the School of Professional Teacher Education from Göttingen University in 2015. The contents of the exchange were educational experiences of Finland and competence-based education. Also Finnish teachers and teacher educators from HAMK have contributed to the articles. The editors of the collection are Essi Ryymin, Brian Joyce and Marja Laurikainen, all from the School of Professional Teacher Education.

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