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Sanna Juvonen, Päivi Marjanen & Tarja Meristö (eds.)

LEARNING BY DEVELOPING 2.0 - CASE STUDIES IN THEORY AND PRACTICE

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**CASE STUDIES IN
THEORY AND PRACTICE**

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Katri Ojasalo

INTRODUCTION – LEARNING BY DEVELOPING IN THE OPEN, NETWORKED, DIGITAL WORLD

The Learning by Developing (LbD) action model was born at Laurea University of Applied Sciences at the beginning of the century (see Raij 2007). Even though society has undergone a profound transformation during the last decades, the LbD action model has proved to be a well-justified and relevant pedagogical model. It effectively combines the three main tasks of a university of applied sciences, i.e., education, research and development, and regional development. In the continuously changing world, the LbD action model has helped Laurea and its students and staff to flexibly adapt to the rapid transition of working life and actively influence the development of the region.

This publication is devoted to the current state and ongoing developments of the LbD action model. In this introduction, my aim is to guide the readers to the interesting articles of this publication and briefly address some issues affecting how the LbD action model is used and understood today. I start by discussing how LbD is still a very up-to-date action model – in fact, it seems to be even more relevant today than it was a decade ago. While the lifespan of specific knowledge is getting shorter and shorter, the individuals' and communities' ability to continuously learn new ways of working has and will become even more important. I then cover some emerging phenomena and challenges affecting the basic elements of LbD. Due to the massive transformations radically taking place in our world, some aspects of the LbD action model need to be revised and expanded.

In the first article of this publication, Katariina Raij goes through the history of the LbD action model and provides a brief summary of its basis and central concepts. Her article shows that Laurea has been a real trailblazer by developing a pedagogical model that has lately proved to be something society is strongly expecting from higher education institutions. Due to the remarkable changes in society, the higher education landscape has also changed considerably during recent years. Traditional pedagogical approaches tend to fall short of educating individuals who can meet the challenges of the 21st century. Consequently, there seem to be two major trends in education (see, e.g., Carvalho & Goodyear 2018). First, pedagogical approaches tend to shift towards more student-centered, project- and inquiry-based forms of learning; students are expected to take greater responsibility for and control of their own learning. Second, traditional spaces for learning are being reshaped and expanded. For example, many higher education institutions are developing open ecosystems with companies and other partners, involving work-based learning and industry involvement in the design and delivery of education (see e.g., ET2020 Working Group on the Modernisation of Higher Education report 2017). A greater number of companies and other actors have noticed the benefits of cooperating with higher education institutions. Companies that use universities to a greater extent in their innovation activities seem to be more successful, and these companies seem to have recognized the important role universities play in knowledge development (Janeiro et al. 2013).

The above-mentioned trends in education have been materialized in the LbD action model since the beginning of the century, long before this kind of action was widely expected from the higher education institutions. The LbD action model has provided a mechanisms for individuals' and communities' knowledge creation to keep pace with the complex transitions in the operational environment. As well, in recent years, thousands of Laurea students have integrated this new knowledge into working life. Through the LbD action model, Laurea has exerted influence over regional innovation ecosystems by establishing development projects with local companies and other actors. The article about the Well-Being Forum written by Tarja Meristö and Liisa Ranta for this publication introduces an interesting example of recent regional influences of the LbD action model. The article shows that from 2011 to 2017, more than 600 regional stakeholders have registered for the forums, including 120 associations and organizations.

One of the current trends strongly embraced not only in education but in all kinds of organizations is design thinking (see e.g., Ojasalo et al. 2015; Razzouk & Shute 2012). The basic elements of LbD, i.e., authenticity, partnership, creativity, experiencing and investigative approach (Raij 2007) are all compellingly manifested in the design thinking approach. Design thinking is strongly participatory, dialogue-based and issue-driven (Shamiyeh 2010), and its central feature is creativity (Ambrose & Harris 2010). Similar to the LbD action model, design thinking aims at creating meaningful solutions (Verganti 2009), and the process includes continuous experimentation and learning (Liedka & Ogilvie 2011).

Over the last ten years, Laurea has focused on design thinking and service design competences (see Ojasalo 2012), which have provided a new, concrete direction for the LbD action model. Service design offers a multidisciplinary, human-centered, co-creative approach and an iterative process that can be used in all development work (e.g., Meroni & Sangiorgi 2011; Wetter-Edman 2011; Ojasalo et al. 2014). It also reinforces the LbD action model by providing concrete tools and methods to be used in development and innovation processes (Ojasalo & Ojasalo 2018a and 2018b). In this publication, Päivi Pöyry-Lassila and Annemari Kuhmonen discuss service design methodology in the LbD context. They point out that service design is an integral part of project management skills and competences due to the importance of deeply understanding user needs and having a participatory mindset, i.e., seeing users as partners and active co-creators. They suggest that service design especially suits agile project work that includes prototyping, testing and iterating.

Even though the LbD action model is relevant and remains up-to-date in most aspects, the complex changes and uncertainties in the operational environment are affecting its basic elements. Today, the world is much more networked, open and technology-based than at the beginning of the century. We are living, studying and working in a world where emerging technologies and disruptive innovations are revolutionizing human life and the global economy. The physical and the digital worlds are rapidly converging, and digital technologies are making science and innovation more open, collaborative and global. Much more cooperation across organizational boundaries is now taking place, and many changes happen within larger ecologies of social transformation. Consequently, society and working life are shifting towards more complex and long-term community-driven involvements. This requires organizations to actively share information and interact with their environment and external stakeholders in more open ways (e.g., Felin & Zender 2014). Next, I discuss some of these developments in the light of the basic elements of LbD, i.e., authenticity, partnership, creativity, experiencing and the investigative approach.

First, authenticity in the LbD context means that a real-life development project forms the learning environment. Quoting Katariina Raji (2007, 22), “the learning process is based on a genuine development project carried out for the world of work, which corresponds to the areas in which the students wish to become experts”. From the digitalization point of view, an authentic learning environment is a very up-to-date phenomenon in education. This is highlighted, for example, in a recent report (ET2020 Working Group on the Modernisation of Higher Education 2017): “Given the ubiquity of digital communication, new student generations often value authentic and meaningful learning experiences provided by community engagement.” Related to this statement, Anssi Mattila and Tuija Marstio ask a relevant question in their article in this publication: “Is the LbD model as such applicable to learning which takes place 100% online?” Their study concludes that there seems to be a positive view on also applying the LbD action model in online education at Laurea. Still, even though authentic development projects can also be carried out in digital learning environments, some basic pedagogical aspects of LbD have to be revised.



In other words, many questions still need to be deeply examined before successfully applying LbD in digital learning environments, e.g., how collaboration, teamwork and workshops are effectively organized digitally, how experiencing and community learning is facilitated, how instructors can best fulfill their roles and how assessment is carried out. To answer these and other relevant questions in the near future, we need to actively share good practices. Related to this, Susanna Niinistö-Sivuranta, in her thought-provoking article in this publication, focuses on the requirements that LbD and digitalizing open education place on leadership.

Second, partnership refers to collaboration, competence-sharing and learning together, including agreement on different roles, i.e., the roles of the researcher, the developer and the facilitator in the use of tools (Raji 2007). Today, working life is more complex than a decade ago and, thus, in the near future many LbD projects will be done in projects involving larger ecosystems rather than a sole organization from the region. For example, new kinds of partnerships between municipalities and universities present an opportunity for the creation of living labs involving diverse stakeholders (e.g., students, local citizens, university staff, and staff of other organizations in the community) working together in various innovation projects. In this publication, several articles show examples of LbD projects conducted in larger ecosystems with several partners, e.g., the article written by Heini Toivonen, Sanna Juvonen, Anu Sipilä, Riitta Lehtinen and Annica Isacson. When performing development work in an ecosystem, roles are much more complex, and each actor contributes to the achievement of an overarching solution (Pera et al. 2016). Today, the term partnership is often replaced by the term co-creation, which has become an

almost “magical concept” (Puerari et al. 2018). Co-creation is expected to make development processes more creative, effective and meaningful. Co-creation aligns well with the LbD action model due to its dual purposes: 1) working together towards a common goal and 2) learning together, building knowledge and creating networks (Puerari et al. 2018). In their article, Päivi Pöyry-Lassila and Annemari Kuhmonen explore the LbD action model by emphasizing co-creation, especially the process of collaborative knowledge co-creation. Further, the article written by Heikki Penttilä, Johanna Leskelä and Katja Tikkanen provides a current example of emphasizing partnership and multidisciplinary team learning in authentic development projects.

Third, creativity is seen in the LbD context “as a resource for the development project” and “one of the destinations” (Raij 2007, 23). In this publication, Satu Bethell examines the role of creativity in social welfare practice and education. Creativity and innovation are today at least as important as they were a decade ago – especially creativity as the result of engagement and group knowledge (Ehlen et al. 2017). Recently, open innovation has emerged as an important concept in industrial and public contexts (see, e.g., Borgers et al. 2018). Open innovation means “a distributed innovation process based on purposively managed knowledge flows across organizational boundaries” (Chesbrough & Bogers 2014, 17). In the near future, open innovation will certainly affect how the LbD action model is applied. Similarly, experimental culture is today highlighted in all kinds of organizations and is one of the priorities of the Finnish Government (see Kokeileva Suomi 2018). Diverse hackathons, jams, contests and innovation platforms are popular ways to promote experimental culture and find innovative ways to develop society, new services and work itself. These events typically aim to efficiently and quickly produce fresh ideas for solving topical societal or organizational problems with a wider set of individuals and organizations, who may possess relevant knowledge or capability (see Felin & Zender 2014). Students and staff of Laurea have recently been active in organizing and participating in many kinds of hackathons, jams, sprints and innovation contests. This is also providing a new direction for the LbD action model.

Fourth, experiencing stresses, in the LbD context, “the active and responsible role that each participant must assume for his or her own learning, as well as participation in shared activities and learning” (Raij 2007, 23). An effective tool supporting and illustrating students’ experiencing and learning is a portfolio. In their article in this publication, Anna Nykänen and Minna-Kaisa Lehtilinnä show how a portfolio can be utilized in the LbD action model. As well, Marilla Korttesalmi and Tiina Leppäniemi provide concrete methods for supporting students’ experiencing and learning – the methods relate to, for example, creative and reflective writing. In their article, Teija-Kaisa Aholaakko and Reija Korhonen examine a competence

assessment tool and especially its usefulness for competence-based self-assessment. Jyrki Suomala’s article describes the basic principles of human learning from perspectives of neuroscience, and Eija Heikkinen and Sanna Juvonen compare pedagogical approaches supporting the needs of future working life.

Fifth, the investigative approach refers to “a research-based and critical way of working” and “the application of research-based information and scientific studies” (Raij 2007, 23). Today, many Laurea students study within very comprehensive research-oriented LbD projects – often in Laurea’s externally funded research, development and innovation (RDI) projects – providing them challenging learning experiences. In this publication, there are several articles describing LbD projects carried out in Laurea’s externally funded RDI projects. For example, Päivi Marjanen explores students’ experiences of belonging to a research group in the national LAPE project. Kirsi Hyttinen and Roisin Smith analyze case study findings from the Gaming for Peace project funded by Horizon2020. In his article, Jyri Rajamäki discusses two RDI projects: the national Pedagogical Solutions for Social and Healthcare Professionals – SotePeda 24/7 project and the international Horizon 2020 project ECHO. Soile Juujärvi introduces a pilot study that has been a part of the Competent Workforce for the Future – COPE project funded by Academy of Finland. And Tarja Meristö and Jukka Laitinen describe the future-focused EAKR-funded KEHÄ project.

In conclusion, higher education is expected to prepare students for the future, providing them with competences for dealing with the emergent and transforming society and working life. This publication shows that Learning by Developing creates competences needed for the uncertain future. In addition, this publication proves that the LbD action model very effectively combines the three tasks given to the Finnish universities of applied sciences, including RDI and regional development. I hope you are inspired by the articles in this publication, which cover a number of contemporary aspects of Learning by Developing. Lastly, I want to thank all the authors for further developing the LbD action model by researching and applying it in various contexts and sharing their findings and thoughts in this publication.

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I THEORETICAL BACKGROUND AND FUTURE APPROACHES

Katariina Raij

SUMMARISING THE BASIS OF LbD FOR FURTHER DEVELOPMENT – REVIEW

Abstract

This article summarises the basis of the Learning by Developing Action Model (LbD) and describes the central concepts of LbD on the basis of earlier studies and reviews. The development of LbD has had a special role at Laurea, enabling the integration of the three tasks of the Universities of Applied Sciences, the development of close and trust-based networks with the working community and society, and led to the study and development of learning based on a pragmatic learning theory. At first, LbD became the strategic choice at Laurea, and is now seen as the Laurea brand. LbD offers a methodology for the development of professional competences as well new innovations for improving the world. The article reviews the previous 18 years and collects together the central concepts by discussing the didactics of LbD. It then proceeds to summarise the phases of LbD to be used for the further development of education and offers tools for organizing the work of teachers as LbD teachers.

Background

The Learning by Developing Action Model (LbD) was developed at Laurea University of Applied Sciences from the year 2000. The three tasks given to Universities of Applied Sciences by the Ministry of Education and Culture in Finland gave the initial impetus for developing new ways of acting in response to expectations. At Laurea, the tasks of pedagogy, regional development and research and development were seen as an integrated whole from the beginning. The framework of Laurea's first pedagogical strategy (Laurea 2002) was based on research findings (Raij 2000) that identified the concept of competence as the integration of knowing, understanding, acting and situation management, and the integration of knowledge written in theories and models, embedded in skills and abilities, moral knowledge and experiential knowledge. This is represented as a holistic model of professional competence in educational research (see Hodkinson & Issitt 1995; Cheetman & Chevers 1998). Competence-based education became a leading principle (Raij 2014.) Further pedagogical research work in the context of Laurea enabled the identification and development of an action model, which was later named as Learning by Developing (LbD), referring to participating in constructing one's own competence and the development of society (Raij 2007; 2014). The aim of a professionally oriented university was seen to be more than creating and constructing new knowledge, it is strongly linked to acting and cooperation.

The first phases in developing and implementing the LbD action model

As has been described earlier (e.g. Raij 2013), the task of regional development brought authentic working life projects to Laurea, which, in turn, led to the development of cooperation between students, teachers and working life experts as well as building new networks with society. In the first phase, acting together for impacting and renewing the working life sector led to **project-based education**, and the new practice challenged Laurea to develop and construct learning environments that enable the integration of the three previously mentioned tasks. **A research and development project formed a primary learning environment** (Raij, 2007; 2014). The most important issue was recognizing the changes in participants' roles, such as seeing the student as an equal partner, the working life expert as a partner and the teacher as a facilitator, partner and expert in his or her own field. **Competence-based education** as a part of the new learning culture, including the development of new innovations with and for society, as well as internalizing the model of the three integrated tasks, led to the discovery of a pragmatic learning theory as the basis of learning by acting together. Dewey's 'Learning by Doing' offered a philosophical basis for the further research and development work as was shown later by Taatila and Raij (2012).

Second, a pedagogical study (Raij 2007) was conducted to identify the impact of changes in the nature of learning. The study answered the questions of how genuine working life-oriented R&D projects changed the nature of studying, and how working life-oriented R&D projects integrated pedagogy, regional development and research and development.

The research method used in collecting and analysing material was phenomenography (e.g. Marton & Säljö 1984; Marton 1995), which is interested in the conceptions people have of the selected phenomena. It focuses on the ways in which people perceive their world. The material was collected in two different phases: 1) by interviewing lecturers (n=6) who had experiences in carrying out research and development projects together with students and working life representatives, focusing not only on their conceptions as such but additionally on how their conceptions changed, and finally on their views of how to develop future project works; and 2) by observing the learning processes described by 25 lecturers in the seminars (n=2) related to the two-year professional training programme on innovative teaching (in 2004–2006), in which the aim was to educate LbD teachers to act as mentors at Laurea's different campuses. Furthermore, participation in two research and development projects facilitated further the systematic gathering of information for validating the findings. Reliability was checked all the time by asking questions in order to ensure the conclusions reached by a researcher. The collected material led to identifying the characteristics and stages of the LbD action model as a wheel in which the phases follow each other in a flexible way. Based on the participants' (n= 6 + 25) experiences, the stages can be summarised as: 1) perceiving a phenomenon; 2) reflecting on and interpreting the meaning of collected knowledge; 3) defining a research and development project leading to identifying and describing future activities on the basis of a set abductive hypothesis; 4) acquiring new tools as concepts, theories and models as well as different skills needed in project work; 5) acting together by creating something new and collecting new experiences; 6) the assessment of the processes of a project and one's own learning processes; 7) sharing experiences and testing their meanings; and 8) identifying acquired competencies and producing new knowledge of and for practice. The characteristics of the LbD action model were identified as authenticity, partnership, experiencing, research orientation and creativity (Raij, 2007; 2014).

On the basis of encouraging feedback, addressed by at first applying project-based education, and later the LbD model, further development work was highly supported at Laurea as the following examples show. Since 2002, annual development seminars for the staff, and regular development seminars as well separate training programmes were carried out for Laurea staff at different campuses and regional units. Furthermore, the two-year Professional training programmes (PD) were implemented twice together with the University of Tampere during the years 2004–2009. The impacts were described: 1) as transformative teaching (published in the report 2006), and 2) presentations at several international workshops at the European Conference on Educational Research in Vienna in 2009. During the years

2008–2011, Laurea hosted the annual 'Learning by Developing – New ways to learn' international conferences. Additionally, it was regarded as important that LbD had a role in study plans made with and for students and new teachers. The need to change and renew a curriculum to be in line with the LbD, based on a pragmatic learning concept, was clearly seen, which led to the development of a new competence-based curriculum since 2007 (e.g. Raij & Rantanen 2007). Furthermore, round table discussions were implemented in 2015 at different campuses for the further development of LbD based on teachers' experiences and the challenges they had encountered in applying the model.

The examples are presented to show how the development and implementation of the LbD action model was seen as a shared strategic choice at Laurea. It led to the development of networks with national and international universities as well public and private sector organisations, and opened partnerships in national and international research and development projects funded by EU and national research and innovation foundations. Research and development projects, in turn, enabled the further development of innovative campuses, such as Well Life Center in Espoo (2004–2009), which was the first campus in which academia, the public and private sectors as well as clients from society worked together physically and virtually for a human being's good. Well Life Center was a home for the significant Caring TV research and development programme (2005–2011) in which digital health care and social services were developed with and for clients, care professionals and public and private organisations in four different research projects. Caring TV can be seen as a fore runner in applying technology in the health and social care sector (Raij 2016). Furthermore, Laurea became a leading university campus in developing and producing new technology-based innovations in the field of security as several, international research and development projects show. In addition, LbD as a strategic choice enabled the development of entrepreneurial education in cooperation with companies as the Laurea Business Venture (LBV) and Peer to Peer (P2P) programmes show. LbD became Laurea's trade mark (LbD Guide 2011).

LbD action model based on pragmatic learning theory

Looking back at the development of LbD, the most important issue was to identify the basis of a pragmatic learning theory to be in line with the LbD action model. We can say that solid ground was found. Based on the classification of educational philosophies, a pragmatic approach represents an interpretive paradigm that sees the social world as always changing and emphasises an ability to act in an ever-changing world as well as an ability to participate in changes (e.g. Hildebrand 2003). As Taatila and Raij (2012) pointed out, considering the tasks given to professional higher education in Finland leads to conclude that the interpretive paradigm is embedded in them. Furthermore it has been shown (since the beginning of pedagogical development work at Laurea) that cooperative authentic actions between students, teachers, working life experts and other stakeholders make it possible to

achieve new competencies as new ways of action and produce new innovations for changing society. A pragmatic learning concept emphasises the meaning of social relationships, experiences and interactions between a human being and his or her own environment. Learning means constructing and reorganising one's own experiences, dealing with new situations and purposeful acting. According to Dewey, an experience is seen as aesthetic, emotional and transformative, including skills and understanding. It expands ability to experience in a new way, perceiving phenomena and constructing the world of values. Transferring experiences can be seen as the integration of acting, cognition and values. Dewey's central concepts of Experience, Value, Action and Knowledge can also be found in the context of the LbD action model (Dewey 1899; 39-40; 1934, 35-39; 1963).

Despite developing LbD since 2000, it is still worth emphasising the essential difference between pragmatism and constructionism. In pragmatism, learning is always active but differs from constructionism, in which learning is conceptualised as the construction of cognitive structures, whereas a pragmatic learning theory sees **it as the formation of habits of action**. The path of actions originates from a practical goal leading to the formation of new beliefs and new habits of action and learning becomes a tool in this process (Philström 2007; Kivinen & Ristelä 2003). In pragmatism, it is highlighted that activity is not primarily cognitive as it is in constructionism but learning and knowing is an affair of doing (Dewey, 1934; Kivinen & Ristelä, 2003).

In the origins of LbD (Raij 2000), knowing and understanding are linked with acting leading to situation management. Different types of knowledge (knowledge written in theories and models, embedded in skills and abilities, moral knowledge and experiential knowledge) emphasise the significant role of knowing as an action to be applied in acting for enabling the development of new habits of action. The integration of different components of the holistic model of competence as well as the types of knowledge becomes possible in cooperation with an environment. As mentioned earlier, a primary learning environment in LbD is seen as a research and development project, whereas a higher education institute with its workshops, laboratories, test labs, living labs as well as the world of work ensure possibilities to act in the best way for being able to change an environment and to reconstruct one's own competence. Carrying out research and development projects requires teamwork, and the integration of different competences for developing new ways of action.

Facing didactics in LbD

Studying the impact of changes in the nature of learning and developing LbD raised a need to redefine traditional didactic concepts in a new way based on a pragmatic learning theory. As was mentioned earlier, discovering project-based learning as a possibility to participate in the development of a region led to realising the meaning of a research and development project as a learning environment as well as the



meaning of multifunctional and cross-sectoral cooperation between teachers, students and working-life representatives. Additionally, the concept of learning as a tool for achieving new ways of action, as mentioned earlier, was identified. This chapter is an attempt to summarise the central didactic concepts of LbD based on analysing earlier research work (Raij 2000; 2007; 2014, Taatila & Raij 2012) and applying the outcomes of the international research and development project 'Young Entrepreneurship – Developing in Action' (YEDAC) funded by the EU. It was carried out in 2013–2015 for developing entrepreneurship education in Europe by six different EU countries. The project selected the Learning by Developing Action Model to be applied in the development work, and Laurea as the work package leader in producing the entrepreneurial didactic model (Raij 2014). The YEDAC project defined entrepreneurship as a process and a mind-set, and to be in line with the concept of the active citizen (Council of Europe 2004), which emphasise, among other things, sensing, acting and mobilising (see Ireland, Hitt & Sirmon 2003), and taking action individually and collectively as an active citizen, which can be seen to be embedded in LbD. From a wider perspective, all students could be seen as future 'entrepreneurs' in building their own changing careers as future professionals.

In developing the entrepreneurial didactic triangle, based on LbD, in the above-mentioned YEDAC-project (Raij 2014), a starting point was to perceive the didactic relationships between a teacher and the world of work and a student as partners, as well as professional competencies as the new ways of action needed in future work. In LbD, we can share the point that didactics are always connected with some context in society, but in a future-oriented way in aiming to improve the world.

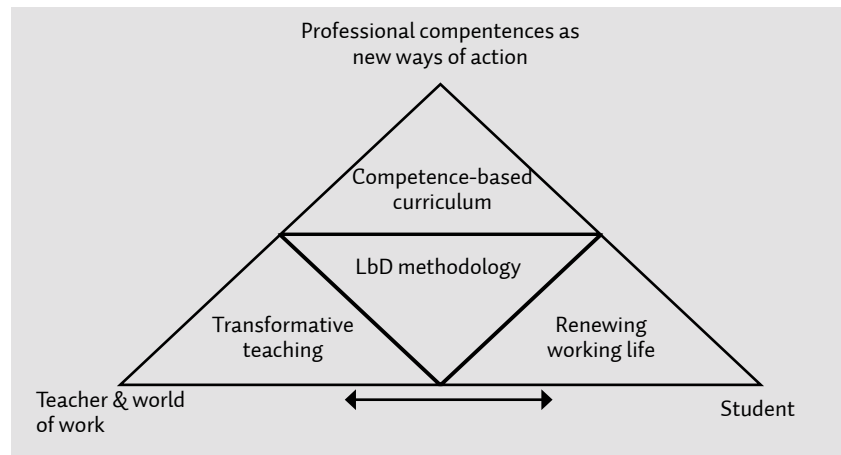


Figure 1. *The didactic triangle in the LbD action model*

When we look at the entities in LbD through the interpretative paradigm, where the social world undergoes constant change and renewal and students should be prepared for having abilities to function in a constantly changing world and participate in the change, they have special meanings. A traditional classroom teacher does not have a traditional role in LbD (LbD Guide 2011). Neither right answers nor constructed cognitive structures are enough. In LbD, as described earlier, new competences as new ways of action as well as new innovations are the desired outcomes. This is an attempt to describe the didactic triangle linked to LbD covering the fields of professional higher education in the following way (see Raij 2014). (Figure 1.)

The team of teachers, working life representatives and students enable renewing working life by working together in research and development projects

The partners in LbD are students, teachers, working life representatives and other stakeholders, depending on the nature of a research and development project that forms a primary learning environment. The role of a teacher is multifaceted, LbD led to discussing transformative teaching (see Kallioinen 2011). A transformative teacher is seen as a facilitator, co-actor and a coach, representing his or her own expertise.

The LbD Guide (2011) describes the new roles of transformative teachers as 1) preparers and organisers of the LbD implementation process, 2) implementers and 3) evaluators. The roles were later clarified as teachers' actions in the following way. In a workshop, a teacher is responsible for transmitting advanced intellectual actions in the professional fields (see Engeström, 2001) containing new concepts, theories and models as well as skills needed in the selected project. They are, however, meant to be used as tools for developing new ways of action. In a project,

a teacher has the role of facilitator, partner, developer and researcher. The teacher provides space for students and facilitates their competence- construction processes in relation to practical experiments. As an evaluator, the teacher is involved in assessing the achievements of student's competences as well as the outcomes and the process of the research and development project in cooperation with all the partners involved, which can be seen as holistic evaluation with two aims (see Taatila & Raij 2012). Evaluation is seen as a reflective, development-oriented co-operational process between the students, teachers and working-life representatives. The partners' feedback, peer feedback, the students' own self-evaluation as well as teachers' quantitative and qualitative assessments are all important elements in holistic evaluation. Students' competences are identified and credited by comparing them to the learning objectives described in competence-based curricula (LbD Guide 2011).

The integration of different competences as well as interaction with a society requires team work, which can be a challenge for a traditional teacher, who used to work alone in a classroom. Facing the challenges, an ever changing world of work means to graduating students, calls for the changes in the institutional processes, and in the operational patterns of staff (see Taatila & Raij 2012). Referring to the expectations concerning active citizenship, teachers are responsible for giving space and offering opportunities to learners to become active citizens, who are able to make decisions and take actions individually and collectively by following principles such as equality, inclusiveness, diversity and social justice (see Council of Europe 2004), which are in line with Laurea's own values: sense of community, social responsibility and creativity.

As has been seen, research and development projects differ from each other, and contents are derived from various subject matters. Thus, at the beginning of an LbD project, it is not possible to be aware of all competences that can be achieved during the project work in advance. This, in turn, underlines the meaning of team teaching not only in producing new competences but furthermore in identifying as well as assessing the achieved competences in cooperation with others who are involved. The team consists of different co-actors and different experts. Transformative teaching offers possibilities to develop new ways of action as a teacher or as a partner as well, which can be seen as a lifelong learning opportunity. Working life partners can have many roles in cooperating in research and development projects. Based on collected research and development work experiences, working life representatives can be seen as facilitators and coaches, developers and researchers and experts. Some of them participate in producing new innovations, take responsibility for testing new products or guide and facilitate students to take more responsibility in carrying out their own projects. Additionally, they have a role in assessing and enabling the achievements of new competencies, and assessing and steering the research and development projects. Pirinen (2013b) points out that education with research and development work requires close and trust-based collaboration between staff and management as well as with students and working life representatives. Trust-based collaboration is also needed in enabling the development of new competencies between teachers with different subject expertise as well as with

working life representatives. However, working together with students in different projects and participating in producing new innovations with students, working life can ensure employing the best work force and, at the same time, opens up jobs for students after graduation, as has been seen.

A student's central role (see Raij, 2007; 2013) in LbD is emphasised. As has been observed, giving space for individual creativeness and facilitating the integration of different talents can be seen as promoting every learner's growth to find his or her own strengths and possibilities for a future life. A student is seen as a partner who can develop his or her own idea in a project, while, at the same time, achieves competences and produces new innovations. Acting together in an authentic project is seen as an enabler. Based on systematically collected student feedback, it was concluded that the LbD model can significantly advance the general working-life readiness of students as well as their possibilities for high-quality learning. It was enabled by cooperation and the development of partnerships as well as students acting as partners. Additionally, LbD was seen as enhancing the growth in self-directed learning. (Kallioinen 2008.) We can go back to the second international LbD evaluation in 2009 in which the authors identified the following as the strengths of LbD: 'growth of independent thought, self-confidence, a highly experiential atmosphere, a high degree of responsibility, early experiences of personal responsibility for results and duty to colleagues, early experiences of having people relying on you and experiences with equality.' LbD is also focused on ensuring that students can 'do things' rather than just be able to repeat answers in exams (Vyakarnam, S. and Illes, K. 2009). All these strengths can be seen to be in line with the objectives of active citizens (see the Council of Europe 2004) and (see LbD Guide 2011).

Professional competences as new ways of action

As was described earlier, the integration of the components of learning knowing, understanding, acting and situation management and the different types of knowledge (knowledge in theories and models, moral knowledge and experiential knowledge), which enables the growth of professional competences led to identifying the holistic model of professional competence (Raij, 2013). It means that graduates will be able to manage different situations based on their experiential knowledge and find new solutions because they are able to search for and apply the newest knowledge in the field, they have skills and they are able to develop new skills for producing something new, and they have moral knowledge for being aware what is right, good and fair. The competences as learning objectives are described in curricula, which are utilised in planning education, and in assessing one's own learning as a process and as achieved competences. A pragmatic learning philosophy emphasises the formation of new habits for enabling active participation in changing a world. Professional competences cannot be seen any more as the competences demanded by current working life, but future-oriented and being prepared to actively participate in changes as, for example, the development of robots clearly shows. Additionally, the rapid development of technology highlights the meaning

of the development of networks with an environment, which, in turn, enables the integration of different future-oriented competences. However, from a student's point of view, it is important to understand the integration of the learning components as a balance. Students are at the centre of research and development activities, they become equal partners with increasing responsibilities (see Taatila & Raij 2012), but they cannot be left alone to struggle with their problems in different projects; they need the presence of teachers as experts in their own fields as well as facilitators, such as for guiding to find the meaningful theories and models to be reflected in workshops, as well as new concepts for being able to identify phenomena as the targets of their own research projects. During the latest round table discussions in 2015 at Laurea, students' concern of being left alone as well as the level of their theoretical background, without having a teacher as a close partner in their work, was discussed. Looking at a learning environment as the integration of different types of knowledge as well as the integration of different learning components could be helpful for enabling the formation of new ways of action as competences. Since projects have connections with authentic real-life situations, the learning outcomes as competences are in line with the professional goals, but the objectives can be achieved in many different ways as well as in many different contexts. This kind of project enables the integration of different competencies.

LbD methodology

The LbD methodology is described as methods that enable the achievement of competences needed in an ever-changing world of work based on the holistic model of professional competence. The aim is not to go for scientific knowledge but the new ways of action, which are constructed by utilising produced knowledge. As Taatila and Raij (2012) pointed out, in a pragmatic university, research is not the goal as such (Finnish Law, Act 558/ 2009) but is conducted to support development activities and, in this way, is modelled on the phases of action research, which has its roots in pragmatism and social sciences. As Cohen and Manion (1985) point out, the purpose is not in producing new scientific knowledge that can be generalised, but in discovering knowledge that can be used and applied purposefully in a certain context. Action research studies social realities in order to renew it, and changes reality to be further studied (Cohen & Manion (1985). It allows utilising a variety of research methods, as Heikkinen (2001) has pointed out. Participative action research (see Creswell 2005) emphasises the importance of the participants' role. All partners are encouraged and empowered to be actively involved in processes for their own good. Action research involves analysing the background of activities, reflecting on and developing alternatives for solving problems and achieving goals, and producing new knowledge and operating methods (see Aaltola & Syrjälä 1999, Kuula 2000, Heikkinen 2001) in the forms of cycles of planning, acting, observing and reflecting. According to Heikkinen et al (2006), several approaches can be applied to the investigative development of activities, such as design research as part of action research, particularly with regard to developing and renewing customer-oriented services, which is in line with the tasks of professional universities in society.

When we compare the principles and the phases of action research with the stages identified in LbD, the pragmatic similarities are found. It, in turn, explains the use and application of Action research in several research and development projects in professional education as the earlier mentioned projects in the Caring TV – research programme (2015–2009) and mHealth booster project (2014) show.

However, the stages of LbD as a circle have been identified in the context of professional education, which is focused on producing new competences as well as new innovations for improving the world. They offer a frame for developing and producing new competences, and innovations for renewing the world of work with new knowledge embedded in competences in the following way.

Applying the phases of a process, which was produced for entrepreneurship education in the earlier mentioned YEDAC project (p.5), a learning environment can be built on workshops, which make it possible to carry out different projects. They might help teachers to organise their work as 'LbD teachers' as it was seen during the round table discussions arranged for Laurea staff in 2015. (Table 1.)

Table 1. *The stages of the LbD action model*

PLANNING	<ul style="list-style-type: none"> IDENTIFYING THE PHENOMENON OF THE R&D PROJECT WITH ITS CONCEPTS AND RELATIONSHIPS BETWEEN CONCEPTS, AND DEFINING A PROJECT WITH ITS ACTIVITIES REFLECTING ON THE MEANINGS OF PREVIOUS RESEARCH FINDINGS AND SOLUTIONS PREDICTIVE RECOGNITION AND DESCRIPTION OF PROCESSES RELATED TO THE PROJECT, WHICH MAKES POSSIBLE BOTH AN ABDUCTIVE HYPOTHESIS (AN INITIAL PRESUMPTION (BASED ON PRIOR CLARIFICATIONS, FACTS AND DISCOVERIES) AND A PERSONAL CURRICULUM
ACTING	<ul style="list-style-type: none"> ACQUIRING TOOLS THAT ARE EXISTING THEORIES AND MODELS, SUBJECT-RELATED CONCEPTS, AND INSTRUMENTS FOR ACTING ACTING TOGETHER, WHICH ENCOMPASSES THE CREATION OF PROBLEM-SOLVING SKILLS, LEADING TO NEW HABITS OF ACTION
EVALUATING	<ul style="list-style-type: none"> CONTINUOUS EVALUATION OF THE PROJECT AND PERSONAL LEARNING PROCESS (THE CONSEQUENCES OF ACTIVITIES) REFLECTING ON SHARED EXPERIENCES AND CREATING NEW MEANINGS RECOGNISING AND EVALUATING ACHIEVED COMPETENCE ASSESSING THE IMPACT OF THE PROJECT
DEVELOPING	<ul style="list-style-type: none"> SHARING, DISSEMINATING AND EXPLOITING THE OUTCOMES

For planning, which includes close cooperation with society, to identify the phenomenon of the R&D project, selecting a theme by taking into account regional or global challenges is a beginning. It involves the participation of students, teachers, working life representatives and other stakeholders, and could be named as a thematic workshop, whereas the development of ideas as well as acquainting with the topic could take place in idea workshops. Acting is divided between three workshops. Tool

workshops are meant to provide students with intellectual knowledge as well as skills needed in a project, whereas project workshops cover acting for carrying out project work in a team. Reflecting workshops are meant to enable reflection on the meanings of consequences in carrying out the research and development projects. Evaluation takes place in evaluation workshops, which enable the continuing evaluation of the projects developed around the ideas, achieved experiences, learning outcomes and products or services produced in the project. Evaluation includes self-evaluation, peer evaluation, and teachers' as well other stakeholders' evaluation as it is described in the LbD Guide (2011). The presented workshops are meant to be seen as a framework for structuring a teacher's work, and they can be seen as linked together in a flexible way, not as a mechanical process.

Conclusions

This article is intended to summarise the basis of LbD for supporting the work of teachers and new staff. Although the mentioned basis and concepts are to be found in earlier articles, summarising was seen important at Laurea as a way reminding about the development processes, and enabling the further development of LbD as well as the work of Laurea staff and students. LbD had a significant role in developing professional higher education, and in developing Laurea as a professional university with five Center of Excellence nominations from the Finnish Higher Education Evaluation Council (FINEEC) during the years 2003–2012. On the other hand, we can argue that Laurea has enabled the development of LbD by focusing at the beginning on, for example, the development of regional units, on building different campuses with new innovative and integrated educational programmes as well as building close and trust-based networks with a region. An important issue in developing a higher education institution is the development of leadership. This process has been studied by Rauhala (2014), who concludes that: 'LbD has challenged the traditional teacher ship and management and leadership practices because it demands more cooperation between the teachers of different fields, and presupposes a student to be an equal partner in learning and RDI processes'. Based on the studies and reviews of Laurea, covering a period of about ten years, Rauhala, (2014) sees that the clear vision derived from the pedagogical strategy has been the strength of the management of Laurea. LbD has become more concrete, which has decreased the gulf between the thoughts of management and staff (Rauhala 2014). People working at Laurea are responsible for taking care of the development of the known brand of Laurea.

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Learning by Developing in Innovative Knowledge Communities

At Laurea University of Applied Sciences, we apply the Learning by Developing (LbD) Action Model, which is based on pragmatic learning theory and integrates competence producing learning and an innovative R&D project. The defining characteristics of LbD are authenticity, partnership, trust, creativity and an investigative approach (Raij, 2014).

Learning by Developing (LbD) can be conceptualized with the help of several theories in the field of learning and education sciences. Taatila and Raij (2012) have defined LbD pedagogy with the help of pragmatism, even though they have recognized that the LbD model has similarities with some ‘constructionism-based’ learning theories. In this article, we have chosen to utilize the theory of **trialogical learning** to conceptualize and analyze learning by developing from the perspective of collaborative co-creation of new knowledge. We acknowledge the pragmatist roots of LbD, but our aim is to explore LbD from a novel perspective emphasizing co-creation. Trialogical learning has been defined by Paavola and Hakkarainen (2005; 2008) as a form of learning where the active learners systematically and collaboratively create new knowledge and understanding through developing and transforming their shared objects of activity. In other words, trialogical learning takes place in the interaction through which the shared objects are developed. The shared objects of activity may be both concrete (artifacts, products), or conceptual (ideas, practices), but they play a central role in mediating the trialogical learning process. The essence of trialogical learning is **the co-creation of knowledge**. The individuals participating in the learning process may come to it with various backgrounds, skills and knowledge, but they all contribute in the emergence of new knowledge.

According to Hakkarainen (2009), the collaborative creation of new knowledge takes place through collective epistemic practices “that guide and channel the participants’ intellectual efforts in creative and expansive ways”. This trialogical learning process is characterized by both deliberate advancement of the existing knowledge and a systematic pursuit of new knowledge exceeding the current level of knowing. In essence, knowing and doing together are seen as inseparable sources of creativity and learning (Hakkarainen, 2009).

As pre-requirements, trialogical learning requires four elements: (1) individuals with their ideas and personal knowledge and expertise, (2) a community consisting of individuals interested in participating in deliberate knowledge advancement, (3) a shared space for collaboration, and (4) shared objects (ideas, practices, and knowledge artifacts) that are developed collaboratively, and that mediate the knowledge-creation process of the community (Paavola & Hakkarainen, 2005).

Päivi Pöyry-Lassila & Annemari Kuhmonen

MASTER AND BACHELOR STUDENTS LEARNING TOGETHER BY DEVELOPING: CO-CREATING OPEN BADGES

Abstract

This article will describe a pedagogical experiment in which students from both Master’s and Bachelor’s programmes are learning by developing in an RDI project. The novelty of this experiment is how to conquer the challenge of enabling collaboration between students with different backgrounds and degrees to achieve a common target of the development assignment and the personal learning objectives. Further, we discuss how the LbD model enables teachers and RDI staff to collaborate, and what must be taken into account in such border-crossing collaboration. We see LbD as a process of collaborative knowledge creation, and we analyze LbD with the help of the concept of trialogical learning. This kind of learning takes place in an innovative knowledge community (IKC) formed, in our case, by students, teachers and RDI project members. The experiment was constructed around the “Chips For Game Skills” RDI project focusing on the identification of the future competencies and skills needs in the gaming industry and development of the education to facilitate the employment opportunities for the students in the game companies. In our article, we will describe in more detail the design, implementation and experiences of this experiment from the perspective of LbD pedagogy and reflect on the experiences gained from this experiment.

Building on Sfard's (1998) work, Paavola and Hakkarainen (2005) introduce a third metaphor for learning, the knowledge-creation metaphor ('trialog') (see Figure 1) according to which learning is understood as an action targeted at expanding existing knowledge and competencies through a process of an "innovative inquiry". The knowledge-creation metaphor of learning emphasizes generating new ideas and advancing knowledge (Paavola & Hakkarainen, 2005). However, learning as information acquisition is needed to form a knowledge base for learning through participation, i.e. through participating in professional practices. Trialogical learning requires these two ways of learning to succeed, and its goal being the collaborative development of shared objects. This must be taken into account when designing LbD, as a shared information or knowledge base is needed, as well as the community in which to participate. Essential for trialogical learning is having the shared objects to develop, as they are the "heart" of this kind of learning.

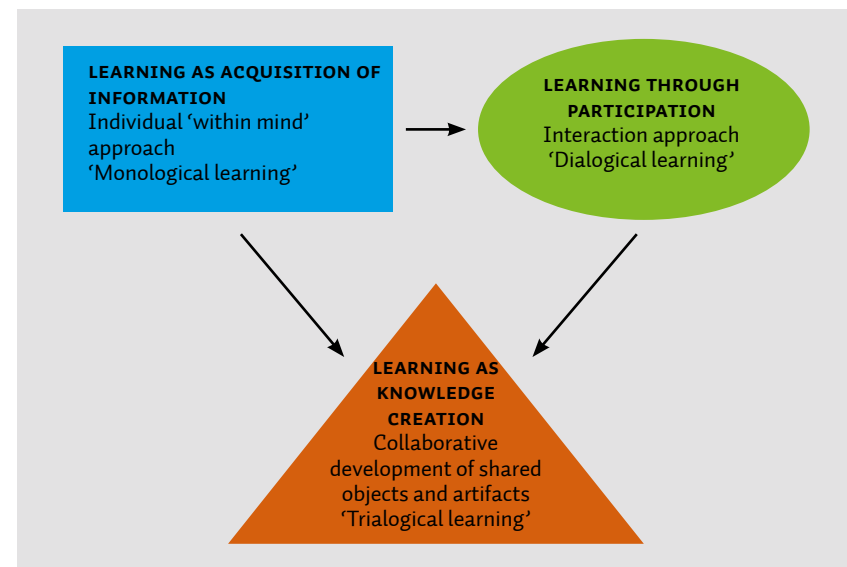


Figure 1. The three metaphors of learning (based on Paavola & Hakkarainen, 2005)

Trialogical learning is collective in nature and thus it requires **an innovative knowledge community (IKC)** to succeed (Paavola, Lipponen & Hakkarainen, 2004; Hakkarainen et al., 2011). The idea of an IKC is to bring together people with diverse backgrounds and skills to collectively create new knowledge together. The IKCs actively seek for something that does not yet exist, taking into account both knowledge and practice. IKCs aim to progressively cross the boundaries of existing knowledge and to transform the practices through expansive learning. Their ultimate goal is to create something new (Paavola & Hakkarainen, 2008). Participation is an essential element in knowledge co-creation, but according to the trialogical learning process, the participants are also expected to actively contribute to the collective pursuit of knowledge advancement, reaching beyond the boundaries of the existing

knowledge and expertise. The responsibility for knowledge creation is shared, and each member of the community can and is expected to make a contribution to the shared learning process (Paavola et al., 2004; Hakkarainen et al., 2004). Especially when the work-life competence needs are rapidly and continuously changing, trialogical learning taking place in IKCs can be seen as an efficient way of learning new skills that work-life requires (Pöyry-Lassila, 2015).

Learning by developing is here understood as a process of collaborative knowledge co-creation, trialogical learning. Further, the learning process is supported by an innovative knowledge community with varying participants: teachers, students, RDI project experts and game industry representatives. The participants learn through developing the shared object, which in our case is the open badge related to game development skills.

The Experiment: Chips for Game Skills Project

In this experiment, the design-based research method (e.g. Barab & Squire 2004; Barab 2006) was followed. Design-based research is iterative—the interventions or pilots developing the pedagogical model and practices build on the results of the previous interventions/pilots. Design-based research is preferably conducted in real-life situations to ensure that the contextual factors affecting the learning process are taken into account.

The experiment has been constructed around the "Chips For Game Skills" RDI project focusing on the identification of the future competencies and skills needs in the game industry and development of the education to facilitate the employment opportunities of the students in the game companies. The goals are to create a digital open badge system to communicate skills and competencies achieved by the students that make them more employable, and organize game competition and networking events to intensify dialogue and collaboration among employers, educators and students in the field. In this RDI project, Laurea focuses on the gamification of project management, teamwork coaching of the student game developer teams and the creation of a producer model for game teams, and teamwork open badges utilizing service design processes and methods. In Laurea, the students from different campuses and different degrees, i.e. peer-to-peer (P2P) business students, who study in real-life business projects, ICT bachelor students, Master's degree, and R&D pathway students have been offered the opportunity to be integrated in the development processes.

At the initial stage of the R&D project, a service design workshop was organized to ensure that all participants would have a shared knowledge base for further collaboration. The participants were first given an introductory lecture by a principal lecturer on design thinking, co-creation and co-design. After this orientation phase, the Bachelor and Master students were divided into teams and assigned tasks. The teams focused on different aspects of the identification of project management competencies

of game development students: design of project management open badges, a local game competition, a gamified project management e-coaching concept and a game development team producer path. The task was to create initial prototypes to be worked further in the next project cycle iterations. In pedagogic terms, the aim was to build innovative knowledge communities for collaborative knowledge creation, and the design of the open badges would serve as the shared object of development. Through the collaborative development of these badges the students would engage in dialogical learning, or learning by development.

We chose service design as the methodology of development of project management skills and competencies because we considered it extremely important to understand the needs of the users and have a participatory mind-set where users are seen as partners and active co-creators. In addition, service design fits for agile project work including prototyping, testing and iterating. The next steps where the Bachelor and Master students will be collaborating are the design of the gamified project management/game team producer model and the development of the producer model. Students from different programmes and campuses will form an IKC around the same development target.

The IKCs enable different kinds of learning at different competence levels as the IKCs are formed by participants with various but equally valuable skills (Hakkarainen et al., 2011). Even though the levels of expertise might vary, all members can participate equally in the joint process of the IKC, and each participant's input is valued.

According to Ojala (2017), a wide range of competencies and working life skills for expertise are obtained from the Master's degree, but the abilities obtained from the degree are not adequate in relation to the importance of these skills when carrying out work tasks. For their own part, the IKCs could reduce this gap by offering the opportunity to learn by developing the future competencies. Learning could happen, for example, at EQF (European Qualifications Framework) Master level 7 when writing academic articles or making conceptual analyses and Bachelor level 6, meaning "advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialized field of work or study" (What is the European Qualification Framework (EQF)?).

Insights from the experiment – How to apply LbD in collaboration between Master and Bachelor students

Based on our experiences from this experiment, the Master's and Bachelor's degree students share the view that collaborative knowledge creation brings added value to the achievement of both the goals of the assignment and personal learning objectives in R&D projects since IKCs form an inspiring ground for prototyping ideas and creating innovations, for example. Students with different backgrounds and skills and competencies learn from each other by developing and sharing their expertise and simultaneously develop their teamwork skills, such as ability to express themselves, listen to others and respect different opinions.

Our experiences show that by giving the opportunity to co-create in projects, both Master and Bachelor students can achieve win-win situations by sharing a common target of development, which means that cutting the artificial boundaries of different degrees and campuses as well as marketing of R&D projects to the students is extremely important. Our observations highlight that the students should collide with each other and other R&D project stakeholders at as early a stage of the project as possible, in order to implement genuine collaboration and co-creation in the project. Based on our reflections, the LbD model enables teachers and RDI staff to collaborate by, for example, working in pairs guiding student projects, facilitating workshops and coaching teamwork skills. They can also share their expertise in the development tasks, such as the gamification of the project management process or co-creation of teamwork open badges. Several things need to be taken into account in such border-crossing collaboration: a person involved should be innovative, open-minded, have a positive attitude towards constant changes and have excellent lifelong learning skills.

Conclusions and Future Directions

The IKCs consisting of Master and Bachelor students, teachers and R&D experts form a great platform for developing future skills and competencies required in the



robotic age, the age of nonstop innovation. The significance of teamwork skills is increasing in work life, and reports show that the majority of companies work on projects so complex that only teams of people working together will be able to solve them.

According to Neumeier (2012), the five crucial meta-skills are: feeling, seeing, dreaming, making and learning. Feeling is a meta-skill of intuition, empathy and emotional intelligence, whereas seeing means the ability to think holistically or in complete systems. Dreaming is about applied imagination and innovation as employees must learn to imagine future possibilities. Making is the talent of design, broadly defined, and learning means knowing how to learn from experience or feedback or the talent of auto-didacticism (Neumeier, 2012). These skills can be practised in IKCs, combining the learning of different competence levels.

We are living the Conceptual Age, the new era of work, where left-brain technical skills, knowledge and expertise are no longer the key requirements, but right-brain skills are the key, and professional success and the personal satisfaction of workers increasingly depend on the six essential aptitudes: design, story, symphony, empathy, play and meaning. The best employees excel at creative problem solving, and creativity in general. Design means that the main focus is put on how things work and feel, using service design, product design, earning logics design, etc. The world is no longer controlled by data or information only, but by the way companies are able to utilize them in the form of storytelling. Symphony means systemic thinking, the skill to orchestrate, the ability to see whole pictures and combine different components. When it comes to empathy and emotional intelligence, people have the need to be seen and heard. In addition, humans are also homo ludens—in the Conceptual Age people should play. The three specific ways to manifest play are games, humour and joyfulness. (Pink, 2006.) These new era skills can be encouraged by the teamwork at IKCs.

In the future, the LbD model could be extended so that collaborative learning across fields and degree levels would be systematically supported. The idea of phenomenon-based learning enables the opportunity to bring Master and Bachelor students together in R&D projects in workshops, different service design assignments, project work and at the thesis stage. A prerequisite for this degree and field crossing learning is a collaborative, innovative and entrepreneurial mind-set among teacher-educators and R&D staff.

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LAUREA OTANIEMI MULTI- DISCIPLINARY TEAM LEARNING ENVIRONMENT LbD 2.0

Abstract

Laurea University of Applied Sciences' Learning by Developing (LbD) action model is based on a pragmatic learning concept. Laurea has revised education and provided students a team learning environment. This means the transfer from a teaching-centered culture to a more multidisciplinary learning centered culture.

The purpose of the new team learning environment is to enable students to develop their future competences in genuine learning environments and multidisciplinary development projects. Team learning competence develops best in an environment in which students can apply their skills and knowledge through authentic tasks. Learning is based on dialogue and requires thinking, reflection on action and integrating theory into practice. The teacher's role as a coach involves helping the team members focus on their tasks, solve problems and reflect on their learning based on developmental and realistic evaluation.

The key methods of developmental evaluation include diverse participatory assessment methods in the team dialogue as well as external and realistic evaluation. Developmental evaluation of team learning during a project creates task specific benefits where development may also involve changes in the real life learning environment. The students' activities are reconsidered and they commit themselves to an actor-specific process of change in order to develop their future competences.

The active roles of team learning produce LbD elements, such as sociability, co-working and students' expertise. Utilisation of internal entrepreneurship and creativity enable the changing roles of co-learning within the team. The focus is shifting from individual learning to a collective understanding of learning processes.

Laurea University of Applied Sciences responds to the future competence requirements in society with the LbD (“*Learning by Developing*”) action model. Laurea’s Learning by Developing model is based on a pragmatic learning concept. According to Raji and Niinistö-Sivuranta (2011), the formation of new methods of action and reform of the workplace are central elements of this model. The LbD action model emphasises collaboration, activities that change individuals and the environment as well as the role of experiences and interaction. Learning is always active by nature. (Raji & Niinistö-Sivuranta 2011, 8.)

Universities of applied sciences engage in collaborative workplace development cooperation and supply the job market with competent professionals who have good workinglife skills. How should universities of applied sciences produce and revise the education they provide? The possibilities to answer these questions are better than before, as employers are continuously becoming more interested in cooperation with Laurea. The purpose of the Otaniemi Campus team learning environment discussed in this article is to enable students to develop multidisciplinary competence in genuine workplace learning environments and development projects.

Learning in workplace operating environments

On the one hand, learning is defined as active and individual construction of knowledge, while on the other hand, it is defined as a culture-bound and socially constructed activity (Harju 2014, 37). According to Hannu Kotila (2003), the prevailing learning concept refers to the applications of learning-related theoretical ideas in teachers’ practical work in teaching and learning situations (Kotila 2003, 13). Kimmo Mäki suggests a transfer from a teaching-centered culture to a more learning concept-centered culture. This would mean analysing the teacher’s work by applying various work roles, through which the learning concept discourse would return to the everyday challenges of work and their solutions (Kotila 2012, 33). Harju (2014) also emphasises the roles related to education and learning and the tasks of these roles in stating that school still has a central role in learning the skills required in the future (Harju 2014, 37).

Learning also changes along with changing operating environments, and what is learned is often bound to the time, place or theme relating to the activity (Salakari 2009, 19). Learning enables competence, which refers to bonds between knowledge, skills and attitudes in authentic actions. An ultimate interpretation of the definition is that competence can only exist in real work, and, therefore, universities of applied sciences should, at least partially, provide education through authentic activities. (Saranpää 2012, 71.). Development is temporally targeted at the future, as the past cannot be retrospectively developed. Development, in turn, requires active performance and an actor. Therefore, it is a functional concept. (Atjonen 2015, 68.) The significance of workplace projects that are based on team learning in accordance with LbD can be explained from the perspective of the competence produced by the different team roles and their functions as well as the perspective of co-creation at workplaces.

Students working on projects learn to work in accordance with the workplace rules, while developing their personal team and project work skills. Workplace connections enable networking with real-life clients and collaboration partners already during studies. On the other hand, participation in projects requires initiative, proactivity, innovation, entrepreneur spirit and responsibility of the participating students as well as genuine interest in team work.

Learning environments and dialogue in the coaching of teams

Competence develops best in an environment in which students can apply their skills and knowledge in practice. Students should resolve authentic problems in the learning situations. Learning should be active and be based on dialogue and collaboration. (Figure 1.) It requires thinking, reflection and integrating theory into practice in authentic environments. Learning is inspiring when it is associated with an authentic situation at the workplace. (Partanen 2014, 23–26.)

The active roles of team learning produce LbD elements, such as sociability, co-working and experientiality. This means engaging the owners of the project and possible end user clients actively in the development work. Utilisation of internal entrepreneurship and creativity enable the changing roles of co-learning within the team. The interaction and dialogue skills required at work can develop in genuine interaction with the partners and clients in the area.

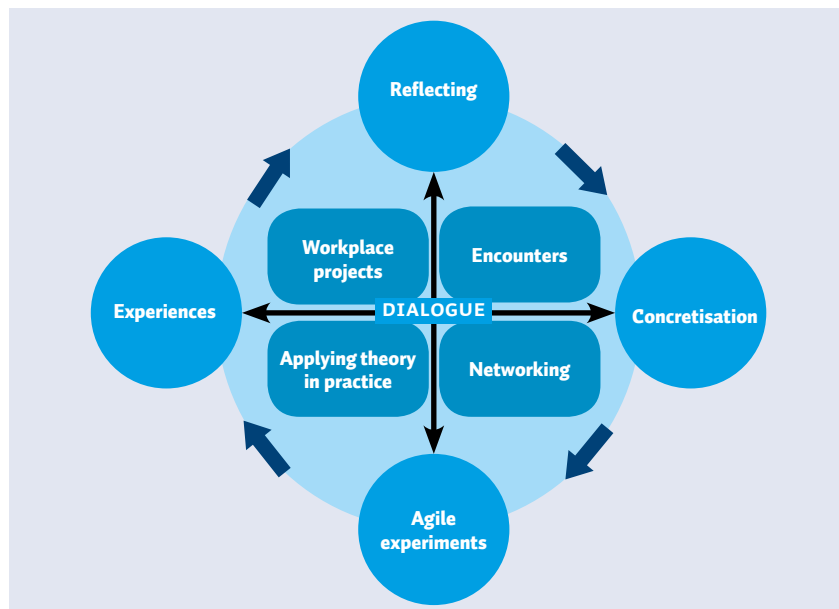


Figure 1. Learning in a team (cf. Partanen 2014, 24)

Dialogue and team learning transform the role of the teacher into that of a coach and facilitator. Project learning includes the basic idea of flipped learning, that is, the coach introduces the students in a team to independent learning at their own initiative and supports the freedom of choice as a pedagogic solution (Toivola, Peura & Humaloja 2017, 29). It is important to create an atmosphere that promotes learning, development and participation, which enables thinking and innovation and ensures the utilisation of these in everyday life. In dialogic learning environments, there is room for co-thinking, promoted by active and committed participation, open and confidential interaction and support as well as the building and sharing of knowledge and reflection on knowledge. (Syvänen, Tikkamäki, Loppela, Tappura, Kasvio & Toikko 2015.)

The teacher's role as a coach involves helping the team members to solve problems and reflect on their learning. The coach uses questions to help the team to focus on the relevant aspects with respect to the project. The greatest strength is the development of new insight during the work, as the students do not previously know a solution to the problem to be resolved. The most efficient learning is achieved in a completely new environment in which the problems are unexpected and unusual. (Partanen 2014, 28.)

It is important for the team coach to keep in mind the three key aspects of team learning (Partanen 2014, 35):

- students learn best when they are personally committed to the assignment
- the subject to be learned becomes significant when it is discovered and understood as a result of personal contemplation and searching
- personal commitment to the goals of learning and appreciation of the student's participation in the joint learning process promote learning.

The diverse character of workplace assignments in team learning

An authentic learning environment is not – not even at Laurea in Otaniemi – a permanent state or context. Instead, it is a state that is subject to continuous co-creation and disregards the traditional roles of actors (see Kotila 2012, 31). Because of its continuously changing nature, the operating environment has significant importance for the acquisition of competence and the development of service activities. Therefore, it is justified to contemplate (e.g. Harju 2014, 43–47) shifting the focus of learning to authentic workplace learning environments in which students encounter assignments that are challenging for them. In workplace environments, we must engage in cooperation with those actors who want to utilise the opportunities provided by collaboration with universities of applied sciences in their own development work.

Project assignments can be divided into three main types, in which development is defined on the basis of the relationship between the levels of consensus and certainty of realisation concerning the target (Atjonen 2015, 84–86). According to these main types, the achievement and assessment of change are

1. **simple**, when the related levels of certainty and consensus are high (cf. “cook-book instructions”); carrying out an assignment does not necessarily require expertise.
2. **complicated**, when the levels of certainty and consensus do not match in the socio-technical change. An example could be a pursued change in health promotion through encouraging the use of city bikes. The technical aspect may be associated with the accessibility of bikes and the social aspect with the importance of the individually experienced change in health behaviour.
3. **complex**, when the gap between certainty and consensus is wide. Basically, all human studies-related development assignments and their assessment meet complex challenges. This means that the higher the number of changing elements, the more complex the situation may become socially.

In social innovation, a complex environment and complex ideas easily lead to juxtapositions and challenges that also test the themes of assessment. The efficiency- and profit-based aspect of development is based on self-assessment and situational assessment. The job of the coach is to participate in the team dialogue to promote user-driven assessment and choices of method in projects from the development perspective. (Patton 2011, 13–16.)

Workplace projects are carried out in cooperation with Laurea’s public-, private- and third-sector partners (Figure 2.). In project-based team learning, authentic workplace learning environments are seen as an essential promoter of learning and enabler of the acquisition of competence. Interdisciplinary competence during a project enables the development of creative and critical thinking, utilising the potential of the individual and team with respect to the learning outcomes and the roles of the team activities.

PRIVATE SECTOR	PUBLIC SECTOR	THE THIRD SECTOR
<ul style="list-style-type: none"> - WELLBEING AT WORK, EVENTS, SURVEYS - COMPANIES, E.G. MPS, NCC, LET’S VIRTUAL, SMARTFIER 	<ul style="list-style-type: none"> - HOSPITALS, SERVICE MARKETPLACE AND CENTRE ENVIRONMENTS, EVENTS - REGULAR PROMOTION OF HEALTH AND VARIOUS MEASUREMENTS AND SURVEYS, E.G. CITY OF ESPOO, CITY OF HELSINKI 	<ul style="list-style-type: none"> - SPORTS ASSOCIATIONS, NON-PROFIT ORGANISATIONS, VOLUNTARY WORK - E.G. HONKA RY, ESPOON MIELENTERVEYS YHDISTYS EMY RY, SYDÄNLIITTO

Figure 2. Examples of projects and authentic learning environments

Collaboration projects are frequently carried out with the private sector. For instance, Laurea have started developing occupational wellbeing activities for employees with NCC (Nordic Construction Company) and the consultancy and recruitment company MPS. In addition, virtual physical exercise programme content in Swedish was produced for the Lets Virtual company to promote the physical functional ability of the elderly. Furthermore, usability of the virtual connection was tested and its concept development was evaluated.

Cooperation with the public sector is represented by, among others, projects carried out for various municipal sectors. Many team learning workplace projects are carried out for different sectors of the City of Espoo. An example of this collaboration is the “service centre physical activity pilot” for City of Espoo’s services for the elderly to promote the functional ability of senior citizens. In addition, patients’ user experience has been tested with Espoo Hospital by participating in and evaluating the development of Good Life Technology’s “rehabilitation kiosk”. With the City of Helsinki, students have carried out the project, which piloted various means for the promotion of physical activity to support independent living in a service housing unit.

Student teams also carry out a broad range of LbD projects for the third sector. The activities of the teams working on the different projects include, for instance, promoting the wellbeing of sensitive client groups and supporting the activities of organisations in the area. Various events have been arranged for children with learning difficulties, and health promotion counselling has been provided for young immigrant women. For their part, the third-sector projects implement the Laurea 2020 strategy for a responsible higher education institution.

The students are equal partners and developers at the planning and assessment meetings of different sectors, participating as members of the workplace expert network. They learn to take into account and produce different viewpoints, resolve different problems in an agile way and specify reasons for their solutions. Therefore, team learners are sought-after development partners among experts as well as various client groups.

The basics of assessment guiding team learning and development

In addition to the task-specific use of knowledge in learning environments, team learning is enabled through developmental evaluation of competence and workplace development as well as developmental evaluation of peer learning within the team. The subject of the developmental evaluation does not directly consist of the acquired knowledge and skills. Instead, it consists of the evolving thinking and the overall learning process of the team and the individual (see Hakkarainen 1991; Partanen 2013, 19). Therefore, the job of the coaches is not to “give the right answers”.

Instead, developmental and realistic evaluation is applied in the complex team learning environment.

Developmental evaluation can be applied in research and innovation work preformatively, such as the development of new test versions preceding the actual action model to be formatively and summatively tested. On the other hand, developmental evaluation is useful in operating environments that aim to support online-type development work, such as the modification or expansion of a project or a model being developed, the use of a closely related branch of knowledge, or further development. (Patton 2011, 17.) These are described, for example, by hackathon- and pitch-type implementations that generate new project or business ideas, and by long-term team work for continuous development that represents the conceptualisation of project work, planning and new approaches.

The objective of developmental evaluation is to help students and the team to identify the strengths, best practices and areas of improvement in their work. Developmental evaluation helps student teams to achieve their strategic goals and determine the direction of future development activities. In addition, it creates opportunities for the continuous improvement of activities. The key methods of developmental evaluation include diverse participatory assessment methods as well as external evaluation, which is integrated as part of students' everyday life and normal development work. The developmental evaluation approach is applied in all stages of the project as part of the planning, implementation, reporting and monitoring of assessment. The basic idea of real-time assessment is rapid feedback; this may speed up the utilisation of potentials, enabling the progress of development and more efficient timing of the activities. (Atjonen 2015, 95, 244.)

Realistic assessment aims to combine the circumstances and the theoretical models that generate impact as well as their mechanisms, which developmental evaluation also wants to benefit from. The purpose of realistic assessment is to use feedback to make the theory applied in projects visible and comprehensible, so that the actual impact mechanisms of development work can be disclosed. Change is seen as a learning process, in which discussions between the evaluator and students disclose factors that prevent and promote project work. It has been suggested that only a strong theoretical basis can enable genuine change and response to a development need. The learning process and a mixed-mode approach link realistic assessment and developmental evaluation together. Particular attention should be paid to a learning environment-based approach, as the change indicating development is included in activities carried out at an authentic workplace. (Atjonen 2015, 246.)

Developmental evaluation is usually carried out as team work. The coach or facilitator is just another member of the team's steering group, which works together with the team to conceptualise, modify and develop ideas in order to achieve a clearer understanding of the phenomenon being studied and, thus, to provide better opportunities for a goal-oriented change. Developmental evaluation is a continuous process, so that the targets of evaluation based on self-assessment by teams and



their members as well as the criteria for the targets can produce a sufficient amount of reliable evaluation data. In addition, the participation of different actors in the evaluation may increase the reliability of self-assessment. Development requires a systematic approach and systemic thinking in the joining of the central elements of each evaluation (cf. Figure 1). (Atjonen 2015, 22, 82–83.)

Developmental evaluation must clarify the questions that promote or challenge development, so that it is possible to start looking for answers to them. The questions may arise from the perspectives of different roles or tasks. After the clarification of questions, the methods are chosen for collecting data in order to find the answers. Developmental evaluation uses mainly qualitative methods in order to strengthen the project-specific reliability of development. The observations made of the activities are collated into conclusions that enable providing the collaboration partners with the results of the project as well as the recommendations for development. (Atjonen 2015, 37–38.)

In principle, any evaluation can be developmental. However, developmental evaluation aims to separate development from improvement (Patton 2011, 41), so that development can reach deeper into the evaluation of the relationship between the learning environment and the project assignment. Development involves changes in the learning environment. The basic starting points and practices of the activities are reconsidered and, when necessary, the actors commit themselves to an actor-specific process of change.

Progression of students' competence and workplace development

Many types of new skills and competence have been identified in the evaluation discussions between teams and coaches. The assessment of the development of competence through workplace projects can be divided into learning through team and project work; development of personal competence and core competence in the relevant field of study; and competence in workplace development.

With respect to team learning, it is useful to have students with different strengths and competence backgrounds as team members. In addition to efficient creation of ideas, the requirements for team members include flexibility and good organisational skills, excellent skills for encountering the client as well as punctuality, precision and perseverance. According to the circumstances, a quiet creator of ideas and a team member with a calming and balancing effect are also important. In their peer assessment, team members pay particular attention to the other members' successful everyday work, utilising it in their own work in accordance with the principles of developmental evaluation. When carrying out peer assessment of learning, students reflect their own behaviour on the everyday behaviour of the other team roles in the projects. This assessment mainly targets the teammates' individual strengths, which as resources enable and further motivate the development of team work skills:

“Creates a positive spirit”

“A cohesive system”

“Creative, improvising”

“Takes the reins”

“Calming, balancing”

Professional knowhow and its development can be most reliably demonstrated by directly studying the performance work of the team: how did I succeed personally, how did we succeed as a team, what was challenging about the project and what did we achieve with respect to the workplace-related goals? In addition, the change in project-specific goal-setting is assessed as an indicator of competence-producing team learning. The assessment involves agreeing on giving and sharing feedback that is relevant for the owner of the project, the network actors and the end users. Students have described team work-based projects from the perspective of the development of their personal competence potential:

“It was a positive surprise”

“There were many encounters”

“I developed a stronger trust in my competence”

“You must be competent and find ways to solve problems”

“Willingness to learn and enter your discomfort zone”

“A modern way to study, a participatory way to learn”

Students have reflected on their own work and the development of their competence:

...I apply in practice the team work skills I learned. I'm sure it will be useful in the future, both at work and elsewhere.

...The projects taught me and gave me more confidence to use diverse materials for the written implementations of our group.

...Gave me more than I could imagine in advance. It also strengthened my opinion on the type of operating environment I would prefer after graduation...

The teams have also received positive feedback from workplaces, and there are plans to continue the collaboration on new projects. In practice, this is shown in increased cooperation proposals from workplaces. The flexibility of the teams enables agile experiments and faster responses to assignments in the area.

...Thank you for participating in the promoting entrepreneurship event! Your stand was quite crowded at times, and clients had positive experiences of participation...

...The students have worked very professionally and responsibly in the planning and implementation of the project...

...We were very happy with the practical implementation of the remote client guidance pilot and the report that assessed user orientation and the functioning of the equipment. Cooperation with the team was very smooth, and we are interested in similar co-creation in the future, with students working on projects and taking responsibility...

Future competence for workplace development

The construction of the learning environment has an impact on the training of future skills. Therefore, the environment should extend beyond the boundaries of the classroom, so that various collectives may join it, enabling the use of information technology and online learning environments as well as the use of the services of social media. Norrena (2013) suggests the following as pedagogic elements that create future competence and can be applied to team learning in accordance with the LbD principle: project learning, knowledge construction, supporting the (also individual) learning and self-regulation of the student, and supporting communication skills and coordination. (Norrena 2013, 27, 31.)

In the future, the improvement of skills to analyse, critically evaluate and identify sources of information will be essential. The focus is shifting from individual learning to a collective understanding of learning processes. This requires social skills, which is why it is more difficult than individual learning. At the workplace, employees must have the ability to grasp the situation, they must be flexible and

they must be able to resolve problems. In addition, they must be able to generate new perspectives for any thinking and doing. (Wilenius 2015) Students reflect on the development of their future-related skills as follows:

...The projects have been very workplace-oriented, and the work of our team could possibly constitute a future business model for an entrepreneur...

...The project is principally suitable for any workplace – we developed a good service package...

...Our stand at the entrepreneur fair could also be “sold” to companies or other fairs (also with the purpose to market one’s own business)...

According to the results of the survey of the need for competence in the fields of social services, health and sports (2016), working methods will become more client-centered and multidisciplinary in the future. Digitalisation, mobile work and low-threshold activities will increase. Multifunctionality and networks are considered important. In addition to the current service structures that are largely related to the restoration of functional ability, the promotion of wellbeing and health through cross-disciplinary and cross-sector cooperation will be emphasised. (Kukkonen, Sihvo, Helminen, Immonen, Moisio, Poutanen & Tiikkaja 2016, 29.) Team learning in accordance with the LbD action model trains students already during their studies to be agile and appreciative of multidisciplinary cooperation. They become solution-focused developers and professionals who value their own work and the work of others, possess good social skills and have developed extensive networks already before graduation.

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Päivi Marjanen

RESEARCH GROUPS AT THE UNIVERSITY OF APPLIED SCIENCES

Abstract

The article describes students' experiences of belonging to a research group. Four of the students from Laurea University of Applied Sciences were interviewed about their experiences in a research group, especially from the point of view of what they have learned. Competencies, which students mentioned, were divided into different competencies using the competence fourfold of Delamare - Le Deist & Winterton (2005). A small-scale study showed that the students who participated in the study group varied differently from their learning, and the research group gave a student-centric approach to learning the professional competencies that are needed in working life.

Introduction

Research groups are typically understood as a part of scientific research, which means systematic, especially scientific, activities to investigate information. At the University of Applied Sciences, the main tasks are teaching, regional development and applying research to working life. For Laurea, its pedagogical model Learning by Developing (LbD) provides frames for teaching and learning. It is also important to know what kinds of expertise the University of Applied Sciences produces.

This article focuses on teacher and student reflections on research group work, which is now used as a part of the national LAPE project. LAPE, the services for children and families programme, is a part of the health, social services and regional government reform. Almost all municipalities in the Helsinki metropolitan area are involved in the project. The project is extensive and over 30 separate working groups have been started in order to reach the programme goals. The main objectives of this reform are stated to transform welfare services into an integrated system, strengthen basic services and shift the focus towards preventive work and early support (Programme to address child and family services, 2017). This program aims are e.g. to develop integrated child- and family-centric services. Laurea's role in this project is to develop a digital tool with which professionals who work with children can collect subjective well-being information from small children aged from five to eight years old.

The focus of this article is to reflect on how a project- and inquiry-based research group fits Laurea and its pedagogical model and what kinds of competencies it offers students. The article uses the competence-based categorization of the University of Applied Sciences whose students need wide multidisciplinary know-how. The student group of the LAPE project consists of Master (N6) and Bachelor (N4) level students. For this article, four of these were interviewed.

Professional competencies

The curricula of formal schools have built strongly competence-based during last decades. This trend is seen in Europe, the United States and Asia. It has received criticism because of its behavioural approach and strong commitment to social and economic claims. Even the definition of 'competence' is demanding. However, what is important is that the word has been used to create a bridge between education and work requirements (Van der Klink & Boon 2002). An analysis by researchers shows that a common knowledge base for competencies and their definition is difficult to find globally.

Different explanatory attributes can be given to competence, and different views can be found in the division of competence. For example, Ruohotie and Honka (2003, 56-57) define competence by using the following concepts: professional, methodological, social and contribution competencies. Professional competence involves performing the tasks of a certain area of activity. Methodological competence is about reacting to problems in work and finding solutions. Social competencies relate to the ability to communicate and demonstrate social ability and empathy for others. Contribution refers to the transformation of one's own work and work environment, the ability to organize and make decisions, and to take responsibility for their own development. However, competence-based behaviour is defined as a performance representation that describes the acquisition of knowledge, skills and abilities (Delamare Le Deist and Winterton 2005, 39).

The aim of education at the University of Applied Sciences is to be able to perform expert tasks. Laurea's curriculum has been built on a competence basis. Learning by Developing is based on pragmatism. Dewey, the father of pragmatism, reminds us that school is the only place where learning is the main aim of learning, elsewhere it is a by-product (Dewey MW9: 176). This may result in the fact that school information will be self-destructive to things that can be learned without contact in a meaningful activity. Laurea's LbD action model is understood as a competence-oriented model that integrates competence-producing learning and an innovative research and development project. According to Raji (2003), the holistic model of professional competence integrates the components of knowing, understanding and doing and situation management. In addition, it is the integration of different types of knowledge, embedded in skills and abilities, moral knowledge and experiential knowledge. In later research, Raji has stated (2014) that competencies can be categorized as cognitive, ethical, motivational, societal and functional competencies. As Raji summarizes, competencies emphasize the meaning of knowledge and having the skills and abilities to apply knowledge and act and manage situations in the world of work.

This research uses the Delamare Le Deist and Winterton (2005) categorization of competencies because they have presented a holistic approach to the definition and construction of them. It contains such knowledge, skills as the dimensions of behaviour that are essential elements in defining competencies. According to the researchers, it is necessary to take into account the competencies of both the conceptual (cognition, knowledge, understanding) and operational (functional, psychomotor and application skills). When defining competencies, one should also consider those related to human efficacy with the same dimensions. Delamare - Le Deist and Winterton (2005, 39) suggest a fourfold approach to the changing requirements of competency work. According to the researchers, competence is a personal or a professional trait and can emphasize the conceptual or functional aspect of competence. Based on this, a fourfold competence field is formed, in which functional competencies (concrete skills needed in work) and cognitive competencies (work requiring professional knowledge) represent professional competencies. Social competencies (interaction skills, etc.) and meta-competencies (learning abilities, etc.), in turn, are personal competencies (see Table 1). According to Raivola and Vuorensyrjä (2000, 16), meta-competencies can be divided into three categories. Personality and its integrity means ethical qualities such as responsibility and accountability, the ability to demand from oneself and others, and decision-making ability. Meta-competencies that promote performance are, for example, a positive attitude, initiative and healthy self-confidence. The third class of competencies are group work skills that facilitate the individual's activities in social situations (Raivola & Vuorensyrjä 2000, 16).

Table 1. Competence model (Delamare - Le Deist & Winterton 2005).

	OCCUPATIONAL COMPETENCE	PERSONAL COMPETENCE
CONCEPTUAL COMPETENCE	COGNITIVE COMPETENCE	META-COMPETENCE
OPERATIONAL COMPETENCE	FUNCTIONAL COMPETENCE	SOCIAL COMPETENCE

Research results

For this paper, four students, three from Master’s programmes and one from a Bachelor’s programme, were interviewed. They all did their thesis for the project. Some of them have also done other studies for it. Students were asked for their opinions on collaborative project working, but also what they have learned during it. Interviews lasted from 7 to 20 minutes. The data was analyzed using fourfold competence model of Delamare - Le Deist and Winterton (2005, 39).

In the interviews, students mentioned competencies from all fourfold sectors. Students produced especially functional competencies. It was surprising because three of them have been in working life for many years. The assumption was that work experience would cause the focus to move more through theoretical competencies. Students mentioned competencies such as how to use digital new tools, time and processes management. These kinds of competencies might be easier to verbalize. They are more concrete than conceptual competencies. One reason could also be that these skills can be implemented straight for work.

I personally feel that involvement in the LAPE project and topics are definitely what I can use in my own work, and I have no reason to believe that others cannot use it. When work with children and families is done, these themes increase one’s own skills at work and my colleagues (at work) have been interested in the subject and the progress of the research... H2

Conceptual, more theory based competencies were also mentioned. In particular, they appreciated competencies of conducting research such as new research methods, information retrieval and methods for analysis. The topic of well-being was also mentioned but only in one interview. According this small amount of data, it seems students see beyond the topic and understand the value of the task on a general level.

Meta-competencies are a set of skills that can be applied in very different types of work and in different organizations. They are infrastructure information, skills and application capabilities that benefit from various daily life situations and various

job assignments (Nordhaug 1991; Kiviniemi 2001). It might be that it takes time to understand what kinds of meta-competencies someone has learned, and students I interviewed have not yet realized them. It is likely that after half a year they could more easily verbalize the new competencies they got from the project. During the interviews, students still mentioned some personal meta-competencies, such as designing large entities, challenging oneself, flexible and new kinds of thinking, daring to tackle demanding challenges and learning how to apply them.

Even though social skills did not appear to be so important in this data, students mentioned competencies such as co-operation skills and working in a group, which is a challenge in a different way. To do research in a research group means that you share your data and ideas all the time. It is very important is that you follow the process and timetable, otherwise the group work does not function.

It’s a pleasure. It’s nice that there are also Master’s students. In addition, what’s so good you can do many things and investigate what you really like. For me, the timetable is difficult. There is always a problem, but I really like it a lot. H3

In addition to the theoretical knowledge and practical skills, I would have expected some comments about values because the research subject is quite value-laden. I assume that values were not mentioned because all the interviewees already worked with children and they have learned competencies like child-centric work orientation and child hearing in their previous studies.

According to a small case study, it appears that the students were satisfied doing research group work and they were able to name it as an LbD-oriented pedagogical study because the concept is linked strongly to working life development. Students worked with real cases together with working life.

But, yes, it is the cooperation and its importance and the course of the project, how it is managed. Interest has come, you can do it again, so that you are not afraid of anything, I can do it again. H4

Conclusion

The LAPE project offered an alternative way of participating in a research-based development process for students. Overall, the students were happy this kind of project work. They saw their role and its importance in its entirety. Their work in the project was important and all the material they produced was used in a larger ensemble. What was surprising was that the competencies the students mentioned as having learned during project varied a lot. However, the students’ responses cover completely the fourfold categorization of competencies.

Higher education institutes are part of society, and the demands to have an impact on society are increasing (see the Bologna Declaration 1999). Laurea's LbD model, in which real changes in the world of work and new habits of action are the expected outcomes, offers a model to solve challenges facing society during studies.

The aim of creating future expertise challenges the development of curricula in higher education (Raij 2014). Expectations also address new ways of doing research and development work and of applying research to real-life situations. In conclusion, all the academic definitions of competencies emphasize the meaning of knowledge, but this is not enough in itself. Having the competencies to apply knowledge and act and manage situations in an ever-changing world of work are of crucial importance.

I think this is good. This is pretty much similar to working life. You have the common goals, the deadline, and there is a lot of planning in it ... However, this is a different matter, even though the group works in the school when it comes to the world of project work, as a student but still as a full-fledged member. There is a lot more to that. Hi

LbD focuses on learning outcomes and is student-centred (Raij 2013, 15). LbD emphasizes acting together in projects, which are connected to real-life situations (Raij 2014). The research group provided the opportunity to participate in a nationwide project. It has been a lookout for national development work. Working in the research group enables students from different stages to work on the same project. It also enables the development of different competencies depending on the needs of students. The LAPE project provided the possibility to tailor thesis work and different kinds of learning tasks for studies. The research group provided the possibility to focus on the individual learning needs of students combined with the goals of the project. If the teacher focuses strongly on the curriculum-based teaching design, this is not possible. At the same time, they cannot be so student-centric. Even though curriculum-based learning can be studied in peer groups, it is not easy to integrate for funded projects because then the student's tasks are not so easy to tailor for the needs of the project. However, we have to remember that research groups demand a lot of individual guidance. The student interviews categorization showed that students learned competencies that are needed in working life. The LAPE project also provided the possibility for students to put theory into practice. In the ideal situation, the outcomes of LbD projects are individual learning, community learning and the production of innovations.

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II EDUCATION IN LBD ACTION MODEL

Marilla Kortesalmi & Tiina Leppäniemi

PROJECTS – CONCEPTUALISING PRACTICAL KNOWLEDGE

Abstract

In this study, we researched the transformation of knowledge in project-based learning. We studied how Kolb's (1984) cycle of learning can be applied to the project environment. We also studied the role of reading and writing in the learning cycle. We collected the data from students of Business Administration at Laurea University of Applied Sciences at the Tikkurila and Hyvinkää campuses. In total, n=33 students participated in the survey. According to the data, learning in a project environment is a dynamic process and the dimensions of the learning cycle visualises that adequately. However, reading and writing had an important role in structuring practical experiences to abstract conceptualising and in the transformation of knowledge.

Keywords: project learning, learning cycle, knowledge transformation

Introduction

Learning in practical cases is applicable at the higher education level where reciprocal interaction with area development is one of the focus areas. According to Raij (2014), practical experiences function as a part of learning processes when experiences are structured, and new experiences are conceptualised. Thus, learning new skills and gaining new knowledge in projects requires both structuring new experiences and conceptualising them. Project learning is one way of implementing the Learning by Developing (LbD) model. Professional growth is an important part of learning outcomes. In the LbD model, gaining professional capacities happens in phases. The phase of active doing is followed by comprehending and knowing. New practices are developed in the process (Raij 2014).

Kolb's (1984) learning cycle also emphasised the procedural nature of learning. In the cycle, the process starts from practical experiences. In reflective observation, the experiences are deepened. Following the abstractive conceptualisation, reflected experiences are conceptualised. In the last phase, the practical, reflected and conceptualised experiences can be extended. The dimensions of the learning cycle are grasping knowledge and transferring knowledge. Knowledge grasping from concrete experiences is associated as apprehensive, and from abstract concepts as comprehensive. Knowledge transformation to reflective observation is intentional, and to active experimentation extensive (Kolb 1984). With the emphasis on practical doing, the learning cycle has been adapted especially to learning in authentic environments (e.g. Samppala 2017).

Project learning is based on the partners' problem-solving situations, and the learning utilises authentic operational environments. In projects, student teams deal with the challenges the partners face. Therefore, the projects fundamentally enable the authentic learning environment as well as social interaction during the learning process. The projects are dynamic—they start with framing the problem and end with the presentation of the results. Social interaction affirms the process. Feedback from activities as well as reflection on the activities steer the process. From a pedagogical point of view, the lecturer formulates the theoretical background and conducts the process.

The Learning by Developing model has similarities to Kolb's learning cycle. Both models emphasise the importance of conceptualising experiences. Also, practical knowledge does not transfer to abstract knowledge unintentionally. In Kolb's learning cycle, the dynamic character of the learning process is evident. Projects are typically processes where the starting point is clear. They also have a strong intended outcome as projects are built to incorporate authentic challenges. Therefore, our interest was to study how the project-learning process can be implemented in the learning cycle.

The projects sustain the elements of reading and writing. However, their role and influence on the learning process is not systematically analysed. Dating back to 1977, the relationship between writing and learning is often quoted by Emig, who argues that writing develops thinking as it makes the ideas visible and thus enables us to interact with our thoughts and to constantly modify them. In the project environment, the process is interactive and reflective. However, the project outcome can remain at the practical problem-solving level if not systematically conducted towards the structuring and conceptualising levels.

During the 2017–2018 semester, we systematically applied reading and writing elements to the projects we were lecturing on. Even though reading and writing are part of normal project processes, we emphasised them in different practices. Kortessalmi included study circles in the projects and Leppäniemi conducted projects for creative writing and reflective writing. The projects were interactive, and the participants discussed the examined theories and written samples. As Clourier (2016, 80) argues, academic writing is no longer just about joining and participating in a scholarly conversation, it is about taking part in a genuinely collective effort.

Based on the feedback discussion, students' experiences of reading and writing work were positive. Students with advanced writing skills felt that encouraging feedback and acquiring techniques for writing encouraged them to write more in the future. When producing text as an indispensable part of higher education studies, it was obvious that the enhancement of writing competence influenced the entire study path. The purpose of the study circle was to extend the theoretical background for each student groups' relevant topic. While the project report usually focuses on solving and describing the challenges each team experienced in their projects, the theories that were discussed in the reading circle conceptualised the experiences extensively.

The learning outcomes of these projects, as well as the feedback and discussions, encouraged us to further research the role of reading and writing in a project environment.

Projects as a learning environment

According to Kolb (1984), in problem-solving situations there are different sources of knowledge. Grasping the knowledge via apprehension is based on the senses. Comprehending the knowledge requires interpretation of the structures (see Figure 1). Dewey, the father of pragmatic learning, explains (1910) that apprehensive learning is concrete thinking and direct observing to produce both explicit and implicit knowledge. Comprehensive learning requires abstract thinking. It is based on observation indirectly and produces explicit theoretical or conceptual knowledge. Sloman (1996, 2002) uses the same dichotomy to describe the reasoning. The associative system relies on personal experiences, whereas a rule-based system

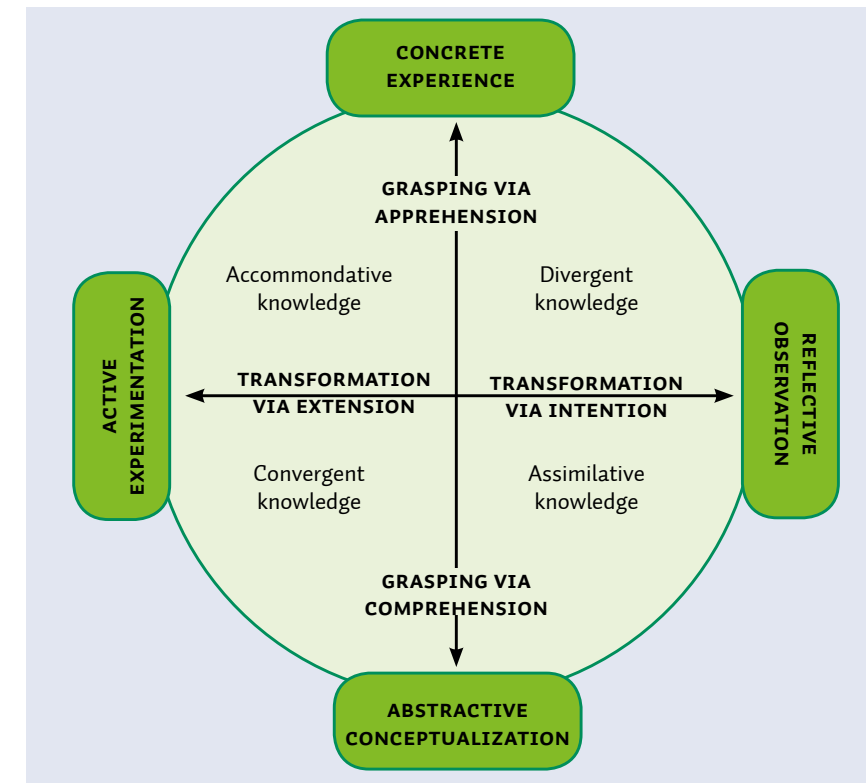


Figure 1. Kolb's (1984) learning cycle.

utilises the linguistic, cultural and formal structures. In problem-solving situations, associative reasoning can provide the first impression and the rule-based reasoning modifies that.

Later learning theories have emphasised the importance of social interaction in learning the process. Jarvis (2010) argues that social interaction not only enables learning but is also required to transfer practical experiences to knowledge, skills, attitudes and emotions. Mezirow (2003) argues for the importance of reflection and discursive interaction in the learning process, especially with adult learners.

Project learning is based on problem solving in an authentic environment. Action and practical experiences are the core elements in learning. Skilful acting in projects happens when the projects have a clear focus and fruitful interaction between students, the lecturer and the partner. Projects are fundamentally processes that start with assignments from the partner and end with the evaluation of the outcome. The pedagogical framing at the beginning defines the learning and social interaction during the project sustains the process. The project results are presented in reports and in evaluation discussions. Creating the reports and getting feedback from performances are the places for reflection on the learning outcomes.

From the learning perspective, the project environment has strengths as well as critical points. Practical activities in the project do not automatically associate with structured experiences or understanding the general concepts. Where authenticity is the strength of projects, light conceptualising is the weakness. From the partner point of view, the project outcomes are successful if the results meet the original target. Success in practical activities can conceal the original target of the project for the students, which is learning new skills and practices.

Conceptualising the structures and gaining an abstract level professional vocabulary can be empowered in social interaction. The projects serve opportunities for discussions. The tasks have to be delegated and the purpose of the project needs continued steering. Project meetings are authentic places for feedback and reflection. Learning in projects enables learning from peers and from the client, added to theoretical pursuits (see Korttesalmi 2015). However, the practical knowledge should be structured and conceptualised in order to result in comprehending and understanding. That is, learning is not unintentional and needs to be facilitated.

In this study, we analysed how experiential knowledge transforms formal information. We focused especially on the roles of reading and writing in the learning process. The transformation of information in the learning process is both continuous and reflective. In particular, practical knowledge and experience do not have a concept, and processing the information requires a cognitive effort. Comprehending the structures requires the conceptualisation of knowledge. One clear practical example of incomprehension is the attempt to explain knowledge or experience before we have conceptualised them ourselves.

We first studied how the learning cycle can be adjusted to the project learning environment. Then we analysed where in the learning cycle reading and writing are influential.

Method and analysis

The data was collected in September 2018. We sent the survey to second year and greater business administration students at the Tikkurila and Hyvinkää campuses. The later year students were selected because they already have project-based learning experience. In total, 33 responses were received in time. The survey had questions with yes/no, Likert scaling (1-5) and open format. With all these elements we wanted to analyse: 1. how the dimensions of the learning cycle were applied in the project environment, and 2. how reading and writing influenced the learning.

While designing our survey, we incorporated the elements of Kolb's learning cycle to test its suitability when applied to project learning environments. We then analysed the responses received in the context of the key elements of Kolb's learning cycle.

Results

We first analysed the relevance of Kolb's learning cycle categories and their interpretation in the project environment. We then reflected on the influences of reading and writing on these categories.

Concrete experiences – Abstractive conceptualisation

All the participants had experiences of projects as projects are part of their Business Administration studies at the Tikkurila and Hyvinkää campuses. According to the data, 91% of the students participating explained that they have learnt new professional vocabulary in the projects, 85% of students claimed they have learnt about the theoretical context the project was linked to, and 82% of the students claimed they have learnt about the interlinkage of different contexts.

Analysing the examples of professional vocabulary, theoretical contexts and interlinking of different contexts, we found that the data covered widely the subjects in their curriculum. We divided the examples into five themes: operational knowledge, structural knowledge, reflection, extension and uncategorised group. The data had examples of professional vocabulary in all groups. Specific expressions such as volatility, validity, niche, agile and ingress explained that the projects typically focus on particular challenges the partners face. Examples of operational words formulated the biggest group of examples. Expressions such as 'business plan', 'marketing plan', 'facilitating tools', 'marketing research' and 'bookkeeping' indicate that the projects focus on practical doing. The third group of example words were structural, such as 7p model, marketing strategy, marketing mix, qualitative and quantitative research and service design refers the projects covered both practical level and theoretical level. There were few uncategorized words, 'professional business language' being an example.

Analysing the answers of what broader contexts the projects had, most of the given examples were associated with the practical level of the projects. Activities such as sales promotion, publishing process, market analysis, budgeting and creating a new service concept were mentioned as a learning outcome. On the other hand, the students gave examples that were associated with the abstract level of grasping the knowledge. 'Asian tourists in Finland', 'vision' and 'empowering the participation of grass-roots democracy' were examples of abstractive conceptualising the students had grasped knowledge of in the projects.

Few answers interlinked the different broader concepts in the projects. The students explained that the projects have cast light on the big picture through smaller initiatives: "how to run a company, for example, how to advertise, organise bookkeeping, etc". Another example of associated concepts was "when organising an event there is communication, internal and external, marketing to the target group, scheduling, delegating the tasks, possibly budgeting". In addition, the structure of the project

was reflected: “The big picture was designated with the team so that everything we did would stay within the frames of the customer request, and so we checked the theoretical background, too. In the theoretical background, it is important to select a couple of main levels and then deepen them from different viewpoints.”

Reflective observation – Active experimentation

In total, 79% of the students maintained that they have learnt to utilise the knowledge they gathered from performing the projects. In the data, there were three examples of reflecting the learning process in the projects. One comment emphasised the different sources of information: “In the projects, there were lecturers from the same field”. In the reflections, the dynamic quality of the projects was emphasised. The activities, theoretical background and the target were seen as reciprocal. “In marketing projects, we have prepared the marketing plan and also planned the big picture. In that way you can increase the knowledge of the customer company/ context X.” Also the following comment: “It helps everybody [in the team] if you divide the tasks at the beginning of the project and so build the structure of it [the project]. Depending on the project, the importance of different contexts varies, but the target is, in general, to make the customer happy”, to explain the dynamic characteristics to the projects with a customer assignment.

The learning cycle in the project environment

In conclusion, after analysing the data, we argue that the learning cycle is a relevant viewpoint in a project environment. However, further definitions are needed (see Figure 2).

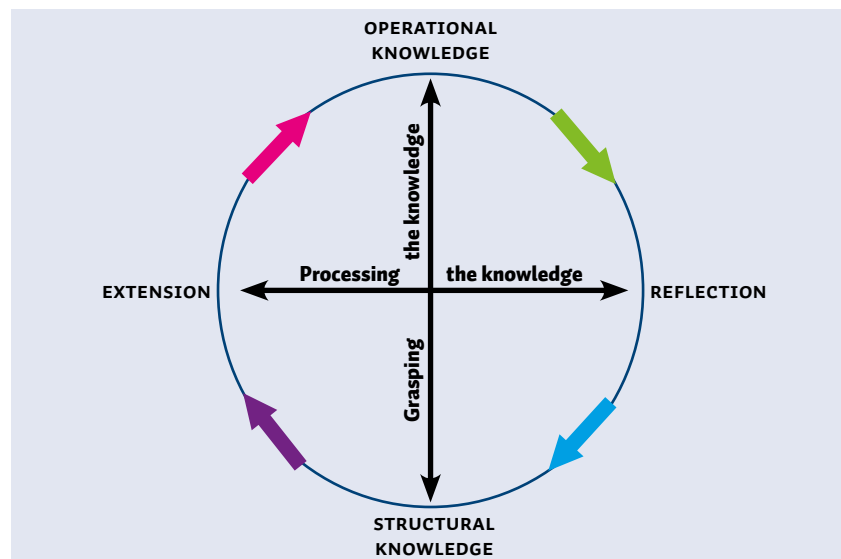


Figure 2. The learning cycle in the project environment.

The projects per se are active doing—concrete experiences are taken for granted. Therefore, in project environments that dimension was defined as operational knowledge. Accordingly, the abstract conceptualising was defined as structural knowledge, which emphasises the constructive and structural dimensions of knowledge.

In the data, comprehending the projects as processes was explained as a learning outcome. This is interpreted as reflection. Defining reflective observations as reflection, we maintain the dynamics that are typical for the projects. The last dimension, active experimentation, is interpreted as extended knowledge. Extension is a key element in the learning cycle. In the project environment, the knowledge transformation is twofold. Completing the projects provides knowledge of: a) the individual activities the whole project consists of, and b) the theoretical concepts that are associated with the project. Therefore, extended knowledge, that is utilising the knowledge of the projects, can also refer to the process and to the content.

The role of reading and writing in the project learning cycle

According to the results, the students considered both reading and writing as supportive for their learning. On a scale of 1 to 5, where 1 is “not at all” and 5 “very much”, reading had the biggest influence on grasping the knowledge of professional vocabulary (mean 4.1). However, the means were between 3.7 to 4.1, and the data is too small to draw valid conclusions (see Figure 3).

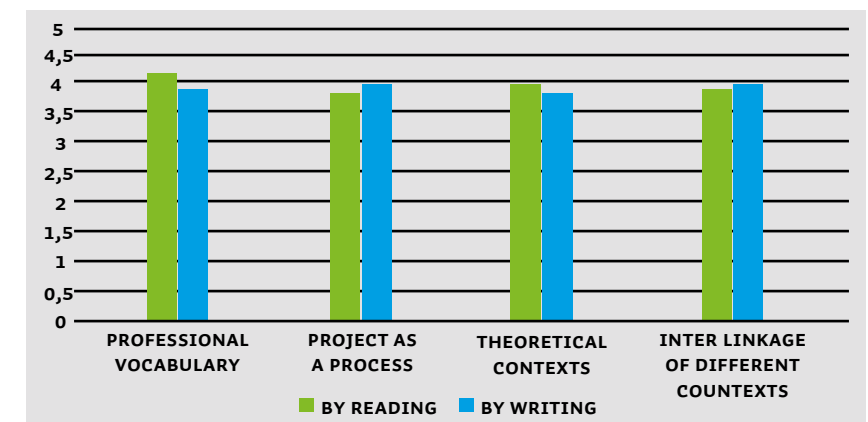


Figure 3. The influences of reading and writing in project learning.

We studied the open questions about the influences of **reading in the projects**. There were a few comments that reading helped to grasp operational knowledge, “professional language and other theories of project topics”. Rather, the comments associated reading with structural knowledge, “[I read about] adequate knowledge. The theories behind the phenomenon, you have to understand their purpose to be able to use them”. In the learning process, the difference between operational and

structural knowledge is not very clear, “[I read] how to utilise and analyse the key figures and why some key figures are analysed in the first place”. In that example, ‘utilising’ referred to operational knowledge and ‘reasoning’ to structural knowledge.

One comment reflected the theoretical viewpoint of projects, “Team working skills were the most interesting to me. Great tests of what kinds of members the team has and their characters.”

A few comments focused on the extension of project knowledge. The students claimed to read and benchmark similar projects before they start to perform their own: “I look for examples of how others have done these things and, based on that, start to design my own project.”

However, in the project environment, reading serves in several elements during the process. “Normally, in the projects I first search for information, such as benchmarking the case and what the current model looks like. When there is a draft, I search for details and deepen the knowledge. Finally, there will be information and repeating the spots the project has dismantled.”



Writing in the projects affected mostly operational knowledge. The students listed the written material they had performed, such as writing articles, plans, articles, diary, narratives and reports. One comment reflected on the influences of writing on the learning: “Writing teaches me more than anything else”. One comment analysed the role of writing when structuring the knowledge: “In all projects, the theoretical basis has produced new knowledge and the report has helped me to comprehend more the results we got.”

Even though the comments about writing focused on operational knowledge, we cannot argue that writing would not influence the whole learning cycle.

Discussion

Learning in a project environment is a process. The elements in the process could be interpreted as Kolb’s (1984) learning cycle. According to the data, the learning cycle is an appropriate visualisation of the process in the project environment. The projects have a clear start and end, and pursuing the target creates the dynamism—it keeps the process going. However, it is important to observe that the learning process does not equal the project process. Learning starts before the project, and experiences from one project are reflected in performing the following projects. According to the data, extending the knowledge that was grasped from the performed project, does not happen automatically. The data suggested that students struggled to reapply the knowledge gained from one project when encountering new situations. From the pedagogical point of view, it is important to empower students to reflect on and extend the results actively.

Reading serves the learning process in the project environment. Advanced students can apply their performance from a practical level, learning by doing, to the abstract level, learning by comprehending. That is, the students know when to apply theoretical approaches to concrete experiences. However, from the pedagogical point of view, the lecturers should empower the process more intensively. According to our data, the practical-theoretical dialogue has not stabilised in the project environment. Writing in the projects is a familiar element to the students. However, the students were not aware of learning by writing. Understanding and recognising the elements of learning is important to the students in order to build their professionalism. Writing as an activity, especially writing in different styles and forms, serve this requirement. We argue that there should be an increased pedagogical focus on writing tasks in the project environment.

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Teija-Kaisa Aholaakko & Reija Korhonen

DEVELOPMENTAL EVALUATION OF COMPETENCE-BASED ASSESSMENT

Abstract

The assessment of learning outcomes gained during additional education according to Learning by Developing approach is challenging. The tailor-made competencies construct a partial and practical assessment model when compared with competence models for formal education. This article introduces developmental evaluation of a personalised competence-based assessment tool co-created during additional nursing education. The tool was constructed with students, working life partners and professionals at three universities of applied sciences. Statistically significant improvement was measured in four competence areas. The overall internal consistency of the scale was high.

Keywords: personalised assessment, competence-based assessment, continuing education

Introduction

In higher education practice, there is a need for the further development of competence-based continuous personalised assessment focused on integrating knowledge, skills values and attitudes (Baartman et al., 2006, Baartman et al., 2007; Davies, 2008; Auvinen et al., 2010; Gulikers, Baartman & Biemans, 2010; Aholaakko & Ahonen 2016). The diverse foci of competence assessment necessitate the combining

of different methods (Baartman et al., 2006 & 2007). In the Learning by Developing (LbD) pedagogical approach, learning is related to five concepts: creativity, authenticity, partnership, experiencing and research orientation (Raij 2007;2013). Those parts enlarge the learning of individuals and communities and facilitate the building of new knowledge. The LbD action model focuses on the development of authentic partnerships where students, teachers and working life partners collaborate in a project. They share experiences, reflect the practice of their own and others related to real life and acquire new tools as concepts producing new knowledge.

This article applies the three LbD concepts of creativity, authenticity and research orientation (Raij 2007;2013), and other elements can also be seen. The article focuses on creating something new and evaluating a competence-based assessment tool for nursing education. In this article, authenticity is linked to a real working life partner, Helsinki University Hospital Area (HUUH), where the students work during their studies. In the context of the surgical patient care, the reflective tool enables identification and deepens understanding about the individuals' learning. The strong working life connection also makes possible the development of surgical nursing in the work community. The demands of the research orientation arise from the university of applied sciences context. Pragmatism together with the LbD action model is useful and good a basis for the philosophy of higher education pedagogy (Tautila & Raij 2011). Research-orientated learning is seen to change the world as a developing process that enhances practices.

In this article, the development of competence assessment combined the elements of testing culture and assessment culture (Baartman et al., 2007) linked to real life settings and situations (Im & Meleis, 1999) in assessing the required technical skills, cognitive abilities and knowledge of surgical nursing developers. According to Meretoja (2003), nurses have several roles: they help and teach patients and their relatives, colleagues and health care students; they diagnose patients' needs and symptoms and manage situations, even very demanding ones; and they plan, implement and evaluate therapeutic interventions according to the assessments of their own and other health care professionals. In their working role, nurses ensure the quality of the care and develop patient care in multidisciplinary teams. The most problematic areas in competence assessment in nursing education are clinical competencies, generic versus specific competencies, and divergent values among stakeholders (Pijl-Zieber et al., 2014).

The continuous professional development (CPD) in health and social care and the requirements in patient safety create demands expanding the competencies of nursing personnel (EU Council, 2009; STM, 2009 & 2013; WHO 2009; STM 2018). These demands and internal needs to improve professional and clinical practice motivated nurses to participate in CPD (Brekelmans, Maassen, Poell, Weststrate & Geurdes, 2016). "The Developer of Surgical Patient Care" education planned and implemented to respond to these needs. Divergent needs of stakeholders (Pijl-Zieber et al., 2014) tackled by continuous development of the generic and substance specific competencies and their assessment.

The purpose of this developmental evaluation was to construct an assessment tool, "The Reflection Profile for the Developer of Surgical Patient Care". The aim was to evaluate the use of the tool in the competence-based assessment during continuous nursing education.

The study questions were:

1. Was "The Reflection Profile" a reliable instrument in competence-based self-assessment?
2. Was there improvement in the competencies of the nurses as a result of the 30 credits part-time education?

Methodology

Research settings

Two "Developer of Surgical Patient Care" programmes funded by the Ministry of Education and Culture in Finland realised in the years 2010–2011 and 2012 within the Finnish Federation of Universities of Applied Sciences (FUAS). The 30-credit programme was constructed to support the needs of both students and their work places. A personalized learning contract included a focused clinical development project made between the employer, employee and educators. The development project constructed a contextual clinical framework for the continuum of the continuous education. The Learning by Developing (LbD) action model (Kallioinen, 2008; Raij, 2007;2013; 2014; Rauhala, 2014) served as a pedagogical strategy during the education. The "Reflection Profile" was used in improving the transparency of the process and outcome assessment during the education, and to decrease the subjectivity of it (Baartman et al., 2007; Aholaakko et al., 2010; Aholaakko et al., 2013). Sixty-six and sixty-eight students in 2010 and 2012, respectively, started the part-time education.

Study instrument

The results of the current Helsinki University Hospital Area (HUUH) competence studies (2009) served as a starting point in the development of The Reflection Profile in 2010. The substance-specific competence development and assessment was based on the works of Meretoja's research groups (Meretoja, 2003; Meretoja & Leino-Kilpi, 2003; Meretoja et al., 2004a; Meretoja et al., 2004b; Meretoja et al., 2009; Numminen et al., 2013; Meretoja et al., 2015) among nursing staff in the Helsinki University Hospital Area (HUUH). The criteria for competence areas was reviewed and detailed with working life partners to meet the regional needs of three UAS partners. The criteria for the competence assessment was operationalized according to Clinical (12 criteria), Guidance and Consulting (3 criteria), Decision-making (4 criteria), and Development and Assessment competence (3 criteria) areas (Table 1). The 22 criteria were based on the European Qualification Framework (EQF) at level six.

Table 1. The Reflection Profile for measuring the competencies of developer of surgical patient care.

The Developer of Surgical Patient Care is able to:	Based on research, recommendation and practical evidence:	Based on research, recommendation and practical evidence and regional development:	Based on research, recommendation and practical evidence and regional, innovative and critical development:
Clinical competencies:	<p>“When I am carrying out of the medical treatment my understanding in the education grown. Now, I am paying attention individually to the patient’s special needs and responsibilities.”</p> <p>“I want to get new information about the nursing so that I can develop as a nurse.”</p> <p>“The elderly patient and drug abuser patient are very challenging and need special know-how in medication.”</p> <p>“The purpose of education is to update and strengthen your own information.”</p> <p>“Utilizing peer support in one’s own work”</p>	<p>“Specification for the need of the care, setting of objectives and planning of the surgical patient’s nursing strengthened.”</p> <p>“I have an achieved an advanced learning will. I pay more attention to the patient’s medication therapy, pain management and evaluation as well as documentation of it.”</p> <p>“I learnt comprehensive nursing work for the elderly hip fracture patient in the ward.”</p> <p>“I learnt patient safety knowledge, in particular, aseptic expertise gained during training”</p>	<p>“The follow-up, control and reporting of infections developed hugely in the department.”</p> <p>““During reporting my development process I have looked for much research information and I have compared the information with the practices at our own ward basing on display. In the department many good discussions and ideas have been created about how the ward could develop the elderly surgical patient care.”</p> <p>“Close co-operation with the physicians improved patient safety in the department.”</p>
care surgical patients in complicated and unanticipated situations			
define the needs of the surgical patient care			
set aims for the surgical patient care			
plan the surgical patient care			
implement the surgical patient care			
assess the surgical patient care			
document the surgical patient care			
respond to the special needs of the surgical patient in medication			
respond to the special needs of the surgical patient in pain management			
respond to the special needs of the elderly surgical patient			
implement risk management			
plan, implement and assess infection prevention and control			
Guidance and consulting competencies:	<p>“The awareness of the service systems is low in our ward because our patients are in the ward only for an acute phase.”</p>	<p>“I understood a patient instruction and patient control in a new way during the education.”</p> <p>“(During the education) I learnt to use information technology in patient guidance based on evidence based nursing”</p>	<p>“With the education, I have reached the understanding about the significance and usability of the electric patient guidance material in a surgical ward.”</p>
implement evidence in individualised guidance of the surgical patient and his/her relatives			
support the surgical patient self-care within the regional services			
use information technology in guidance	<p>“Decision-making competence is emphasized in my work as a responsible nurse in the department”</p>	<p>“I learnt to take responsibility for nursing expertise and to act as a patient representative in interprofessional patient situations.”</p>	<p>“The education provided the opportunity to part time concentration on the infection prevention and at the working unit of your own.”</p>
take professional responsibility in nursing related decision making			
take responsibility in consultations requiring nursing expertise in multi-professional situations			
take training responsibility in situations requiring nursing expertise in multi-professional teams			
Development and assessment competencies:	<p>“I would like to learn how to search for research in my own work to develop in research and searching knowledge and utilising it in surgical patient nursing.”</p>	<p>“I can search for information about the databases and I can draw up the development which is in accordance with the patient instructions.”</p> <p>“I learnt to use recommendations part of my clinical work.”</p>	<p>” As an outcome of the education, I got more responsibility as a vice nursing manager at my own ward. I am developing the nursing care at my ward with the teams.”</p>
assess nursing theories and principles in surgical patient care			
search and use recommendations, guidelines and research during the development processes			
publish development activities and critical professional discussions			

Data collection

All the nursing educators of the two programmes participated in the first data collection and development of “The Reflection Profile” as part of the natural development of education in the three UASs. The second data collection was completed in two UASs. Informed consent to the study was requested from all the students. Of the 66 students in 2010, 55 (83%) participated in the data collection, and of the 68 students in 2012, 25 (37%) participated. Study permission was gained from all participating FUAS institutes.

Data analysis

For the 2010 assessment, a three-level scale (Table 1) was used. In 2012, the “zero level” for measuring surgical patient care development based on clinical experience only was added. The data of the two programmes was analyzed separately due to the scale differences. First, the descriptive statistics were analyzed. Second, the summated variables by means was constructed according to the four competence areas due to the varying number of items. Third, Cronbach’s α -values for summated variables was calculated to assess the internal consistency of the scales. The 0.6 levels Cronbach’s α -values was considered good and 0.8 levels very good. The mean differences of the skewed data was analyzed by Wilcoxon Signed-Rank tests to assess the progress of the students in the four competence areas. Finally, the second author selected the relevant quotations from The Reflection Profiles of the study participants to describe the students’ self-reflections (Table 1). The first author ensured the selections. With this the aim was to improve the transparency, comparability and reproducibility of the decisions made in the assessments (Baartman et al., 2007).

Results

In the 2010–2011 education, 40 of the students were from primary health care working in wards, and 15 from specialised care wards in both the public and private sectors. In the 2012 study, six participants worked in primary health care and 19 in specialised care.

The internal consistency of the tool was assessed by measuring the reliability of both the overall scale and of each of the four competence areas. The overall α -values for the internal reliability of both three- and four-level competence scales were high (Table 2). None of 22 items was deleted for content reasons. Deletion of items would not increase the α -values remarkably. In the 2010 and 2011 measurements, the α -values for Clinical competencies were highest. The lowest α -value was in Guidance and Consulting competencies in 2011.

The overall internal scale reliability improved in 2012. The reliability of two competence areas increased and two decreased in the 2012 measurement. In 2012, the α -values for Clinical competencies were the highest. The differences in the internal

Table 2. Scale reliability for three-level and four-level scales

Competence area	Cronbach's α
2010 – 2011 assessment by 3-level scale	.947
Clinical (12 items)	
Pre-education in 2010	.959
Post-education in 2011	.962
Guidance and Consulting (3 items)	
Pre-education in 2010	.669
Post-education in 2011	.852
Decision-making (4 items)	
Pre-education in 2010	.821
Post-education in 2011	.874
Development and Assessment (3 items)	
Pre-education in 2010	.674
Post-education in 2011	.883
2012 assessment by 4-level scale	.975
Clinical (12 items)	
Pre-education	.985
Post-education	.980
Guidance and Consulting (3 items)	
Pre-education	.872
Post-education	.928
Decision-making (4 items)	
Pre-education	.968
Post-education	.962
Development and Assessment (3 items)	
Pre-education	.962
Post-education	.964

reliability of the competence areas varied less than in 2010 and 2011. The α -values of Development and Assessment competencies were the highest. The broadest difference was in the α -values of Guidance and Consulting competencies similar in 2010 and 2011.

The results showed statistically significant improvement in self-reported competencies after both instances of education (Table 3) in all competence areas. At the beginning of the education in 2010, the self-reported competencies measured by mean values of summated variables were all low (1.10–1.28). The competencies were strongest in the Clinical competence area and lowest in the Development and Assessment competence area. In the 2011 post-education measurement, the mean values increased (1.95–2.17). The development was strongest in the Development and Assessment competence area followed by the Clinical and Decision-making competence area. The progress in the Guidance and Consulting competence area was modest.

At the beginning of the education in 2012, the self-reported competencies were measured according to the summated variables used in 2010 and 2011 using a four-level scale. The mean values were all low (0.80–0.96). The self-reported competencies were strongest in the Decision-making competence area. In the post-education measurement in 2012, the mean values were increased (1.50–1.64). The development was strongest in the Guidance and Consulting competence area. It was weakest in the Decision-making competence area.

Table 3. Self-assessed competencies of post-graduated nurses participating in “Developer of the Surgical Patient Care”-education in 2010-2011 (n=55) and 2012 (n=25).

Competence area	Mean	SD	Median	Min	Max	Mean difference	Significance of mean difference*
2010 – 2011 assessment by 3-level scale							
Clinical							
Pre-education (n=43)	1.28	0.406	1.00	1.00	2.17		
Post-education (n=47)	2.17	0.579	2.25	1.00	3.00	+ 0.89	.000
Guidance and Consulting							
Pre-education (n=43)	1.17	0.312	1.00	1.00	2.33		
Post-education (n=47)	1.95	0.625	2.00	1.00	3.00	+0.78	.000
Decision-making							
Pre-education (n=43)	1.26	0.384	1.00	1.00	2.50		
Post-education (n=47)	2.13	0.610	2.25	1.00	3.00	+ 0.87	.000
Development and Assessment							
Pre-education (n=45)	1.10	0.274	1.00	1.00	2.33		
Post-education (n=49)	2.04	0.676	2.00	1.00	3.00	+ 0.94	.000
2012 assessment by 4-level scale							
Clinical							
Pre-education (n=25)	0.81	0.599	0.92	0.00	2.17		
Post-education (n=24)	1.52	0.708	1.37	0.00	3.00	+ 0.71	.000
Guidance and Consulting							
Pre-education (n=23)	0.81	0.549	1.00	0.00	2.00		
Post-education (n=22)	1.64	0.860	1.33	0.00	3.00	+ 0.83	.000
Decision-making							
Pre-education (n=22)	0.96	0.825	1.00	0.00	3.00		
Post-education (n=21)	1.64	0.935	1.50	0.00	3.00	+ 0.68	.000
Development and Assessment							
Pre-education (n=23)	0.80	0.702	1.00	0.00	3.00		
Post-education (n=22)	1.50	0.847	1.167	0.00	3.00	+ 0.70	.002

Maximum mean value 3.00; scale 1-3 in 2010 and 2011 and 0-3 in 2012; * Mean differences analyzed by Wilcoxon Sign Ranks-test

Discussion

According to Kajander-Unkuri et al. (2013 a), it is important to follow up the competence development of students during education. The use of “The Reflection Profile” was found to be useful in the personalised process and outcome assessment supporting the professional growth of an individual student in line with the previously stated competencies. Improved professional competencies support well-being at work and constructs a base for ethically high-level patient care and committed personnel (Meretoja; Leino-Kilpi; Numminen; Kajander-Unkuri; Kuokkanen; Flinkman & Ruoppa 2015). It also improved the transparency of the assessment, and decreased the subjectivity of it. Despite all the challenges, it was found to be possible to measure the improvement in competencies as the outcomes and effectiveness of the continuous education. The assessments were conducted in an authentic context, mostly being the work placement context of the students, and facilitated making the decisions about whether the students were able to perform the critical job situations at the required level specified in the qualification profile (Gulikers, Baartman & Biemans, 2010). In this developmental evaluation, the teachers also improved their development competencies and their substance competencies (Wién & Salminen 2016).

The co-creation of “The Reflection Profile” realised the development of competence-based assessment integrating research results (Meretoja et al., 2003a; 2003b; 2004a; 2004b; 2009) and local needs in specific settings and situations (Im & Meleis, 1999). The results of this developmental evaluation showed statistically significant improvement in measured competencies in two student groups after the education. The improvement in competencies was found within both groups in all competence areas. It may be that the working settings of the students influenced their competencies in the surgical patient care before education but this was not on the focus of this study.

It may be that there were differences in the students’ ability to use The Reflection Profile. They reported low levels in all four competence areas in both groups before the education. The lowest competence area was the Development and Assessment. According to Pijl-Zieber et al. (2014), this reflects challenges in the self-assessment of generic competencies. The students in this study found the measurement of the generic competencies separated from the clinical competencies challenging. Verbally they reflected their learning mainly through the clinical practices. The results reported on the competence evaluation in the HUH area hospitals support these findings (Meretoja et al., 2009; Meretoja et al. 2015). In 2011, the Development and Assessment competencies improved the most, indicating the importance of this continuous education enabling the students to recognize clinical challenges for evidence-based development.

In this competence assessment, a three-level scale was used first, and later a four-level scale. This makes the comparison of the results challenging. The variation in the levels of the measurement scales and the low number of respondents might have an influence on the results and the reliability of the values. In the second group assessment, the clinical decision-making included as part of the competence scale. It was assessed as zero (0) because the clinical reasoning is not included in the EQF 6 assessment criteria. By ranking it as zero, it aimed to have no effect on the mean values but respect the presence of the practical situations and contexts in the self-reflection of the students. The criteria used in this assessment were more detailed than those used in the studies of Meretoja et al. (2003a; 2003b; 2004a; 2004b; 2009) measured by a Visual Analog Scale (VAS). In future research, it would be interesting to compare the continuous VAS scale with the four-level scale to test and improve the reliability of “The Reflection Profile” according to both the testing and assessment culture (Baartman et al., 2007). It was not possible to evaluate the reproducibility of the assessments by the working life partners due to the lack of documented feedback for the students.

The achieved results provide a judgement for implementing “The Reflection Profile” in competence-based assessment as part of systematic educational development. In future use, it is important to implement the more careful psychometric and educational validation of the scales. Testing within larger study groups would also be beneficial in improving and ensuring the comparability and reproducibility of the assessments. The findings of this study indicate a need for critically inspecting the operationalisation of EQF 6-level competence assessment by using a combination of different evaluation methods (Baartman et al., 2006, Baartman et al., 2007). The competence based assessment criteria are demanding when applied in an individual study unit. In an LbD learning context, they may support the competence-based assessment reaching more objectivity and transparency as well as providing feedback for all the stakeholders, students’ work life partners and teachers during the learning process. In the future, the criteria-based tools may be implemented in assessing and comparing the outcomes and processes of CPD in health care education at the institutional and national level.

Author contributions

Study Design: Aholaakko, T.-K. 2; Data Collection: Korhonen, R., Ahonen, O., Tuominen, M. & Maksimainen, A.-N.; Quantitative analysis: Aholaakko, T.-K. Qualitative analysis: Korhonen, R.; Manuscript Preparation: Aholaakko, T.-K. & Korhonen, R.

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Satu Bethell

THE ROLE OF CREATIVITY IN SOCIAL WELFARE PRACTICE AND EDUCATION

Abstract

This article discusses the use of creativity and art-based methods as an integral part of social services education and social welfare practice. The role of creativity is reflected on, not only as art-based methods, such as visual arts, dance, music or drama, etc., for working with clients, but also as a more generic mind-set in which creativity is seen as a method intended to facilitate creative thinking among group members. Creativity is seen as the readiness to view the changing situations of a client from various angles and the ability to engage in the diverse life situations of a client.

Laurea's Learning by Development model provides a framework in which students' learning processes are supported, both on an individual level and a structural level, so that their individualized and work-based study curricula facilitate the adaptation of metacognitive learning skills in order to identify and strengthen students' professional and personal competencies.

Today's social service professionals not only need to master the technical aspects of the professional role but they also need to have an understanding of many metacognitive skills, such as the ability to tolerate uncertainty, emotional awareness and the use of intuition in order to adjust to increasingly changing social situations in social service practice. The article will explore the concept of creativity as an essential part of the students' learning process in higher education to develop their social, personal and emotional 'capital' in future social welfare practice. The article also explores the role of creativity as a means for developing tolerance for uncertainty and empowerment.

Keywords: creativity, empowerment, reciprocity, emotional learning, tolerance for ambiguity, uncertainty, learning by developing

The role of creativity in social welfare practice and education

Art-based methods, such as visual arts, music, dance and movement and drama, have been taught at Laurea for over 25 years as methods for working with clients. Work-based projects have been integrated into art-based methods courses since the beginning of 2000. By following Laurea's pedagogical model of Learning by Developing (LbD), art-based solutions have been created and designed with service users at their workplaces. This opens up a genuine and direct pathway to authentic experiences, sensations, discourse, thoughts, attitudes and conceptions. Research shows that artistic activities expose students to a diversity of ideas that challenge them with different perspectives on the human condition (Anttonen et al. 2016).

Art-based projects have two main aims. First, the projects that are integrated as part of the elective studies are based on the students' own experiences and experiential learning as well as personal reflection, both on an individual and group level. This helps students to recognize the diversity of their own personal feelings, beliefs, skills and behaviour as well as the complexity of interpersonal relationships in a group situation. They learn to examine how individuals discern their own experiences and have an opportunity to get to know their physical, psychological and emotional boundaries. Second, students learn about different creative methods that can be used in social service practice. A comprehensive methodological base enables social care professionals to respond flexibly and creatively to the challenges facing service users and community members (Healy 2012, 231). Once students have encountered and explored these challenges in a potentially free and safe group in the school environment, they engage themselves in an LbD project of their own choice. In social services, most LbD projects, consisting of four to six creative workshops, are mostly carried out in kindergartens, elderly care homes, youth clubs, immigration centres or NGOs.

The transformative learning process in connection with the work life experience and creative learning process supports a broad, individualized and diverse curriculum needed to facilitate metacognitive learning. The model provides a framework in which a transformative learning process can be seen as an environment in which students' individual learning processes are supported on a structural level and students' professional and personal competencies can be identified and strengthened.

Work-related projects provide students with an opportunity for acting in society already during their studies. These authentic situations with clients facilitate the adoption of social and interpersonal skills, participation in decision making, understanding what choices can be made in different situations, responsibility and trust. The essence of 'knowing' has changed from the act of theoretical remembering and repeating to an ability to find and utilize information (Kallioinen 2014, 36).

The feedback on LbD projects, carried out by students during the courses, has been very encouraging and positive. Stakeholders have repeatedly given feedback on

how the physical platform of developing something in cooperation with students has been motivating and empowering for both the service users and for the social care professionals. The service users have valued low-threshold workshops based on their needs and wishes. According to Healy (2012, 232), social workers should seek to facilitate service users' and community members' involvement in defining the nature of the challenges facing them, identifying the strengths and capacities they bring to resolving those challenges, and working alongside them to create change. Even if the students enter the field with their own ideas and visions, the realization of the projects or workshops is always co-created in collaboration with the stakeholder. The needs and the requirements of the stakeholder/clients are always discussed at the beginning. In democratic dialogue, every person in a group, community or project team should be given the possibility to be active. Equality for all members is the basis of participatory art in groups. This means that every person has something to give to others and has an equal opportunity to participate (Anttonen et al. 2016).

According to Jackson and Burgess (2005) much of the creativity of social service professionals is directed to understanding and resolving or mediating the problems of their clients and securing the resources and support necessary to improve the conditions and situations of their clients. These processes often include complex social problems that arise in unique, difficult and challenging circumstances. In addition, there is never just one right way of resolving problems. Just as every creative process is unique, so is every client and life situation with many possible process outcomes. The solutions need to be looked at and researched from many different perspectives before they can be solved. Imagination is required to find suitable solutions for diverse problems. As every client is unique, creativity in social work practice is about the ability to hear and understand the life situation and different life conditions of the client. Creativity can be used to create suitable conditions for a client to tell their story, and for their story to be heard and understood by others who can help resolve the problem (Jackson and Burgess 2005).

In today's socially complex world people are constantly confronted by situations they might have never been confronted with before. Working life calls for competencies that enable people to be flexible and innovative. Challenges in social service practice are increasingly complex and multi-layered and professionals are constantly required to find new and imaginative solutions for the many diverse problems of their clients. In future, there is a need for professionals who not only master the technical aspects of the role but are also oriented by the profession's unique person-in-situation paradigm and integrate both the psychological and the social worlds of clients to foster human growth and change (Berzoff and Drisko 2015). With the changing nature of service users and a wide range of different social and cultural backgrounds, we need to be able to discuss and share ideas and thoughts with others more than ever before and recognize the different needs of people with different backgrounds.

For students, the use of art-based methods as part of their LbD projects has helped them to naturally engage in relationships with a whole range of people; also those whose cultural backgrounds or behaviours might otherwise be complex to

understand without a shared language or whose communication modes are different to their own. Visual arts, acting, dancing, playing or making sounds in a group does not necessarily require a shared language.

Anttonen et al. (2016) quote Matrasso (1999) in *The Social Impacts of the Arts* on how the greatest social impact of participation in the arts arises from the ability of the arts to help people question and think critically about their own experiences and those of others. According to Anttonen et al., this does not only happen in discussion groups but also with all the danger, magic, colours, feelings, excitement, metaphors, symbolism and creativity that the arts can offer:

Empowerment lies within the act of creativity; and, through sharing creativity, understanding and social inclusiveness are promoted. (Anttonen et al. 2016)

According to Berzoff and Drisko (2015) there is an ever-increasing need for a sufficiently sophisticated repertoire of emotional responses to adjust to a more or less infinite range of changing circumstances within the field of social services. They argue that in order to help and to empower service users in complex life situations, social care professionals must have the ability to demonstrate genuine warmth and empathy and ability to use wit and humour to diffuse a difficult situation or reframe a situation understood by those involved. Kallioinen (2014, 37) also argues that tacit knowledge cannot be internalized by reading texts as it resides in the experiences, thoughts, attitudes and conceptions of individuals and is latently rooted.

A readiness to recognize one's feelings, needs, beliefs and thoughts from those of the client's is essential in order to adjust to changing social situations and judge what responses are appropriate to a given set of circumstances. The expertise of future professionals does not only include the ability to discuss and share ideas and thoughts with others but also the capacity to act in a situation (Raij 2014; Sveiby 1997). In social services, this means that we need to focus more on transformative learning processes where we can help students to first become aware of their own inner motives, emotions, needs, strengths and challenges so that they can recognize them in a client.

As mentioned before, the nature of social care work changes as the needs of the clients change with different cultural, sexual and religious expectations of the clients. According to Trevithick (2000), the complex nature of social work is due to the fact that it involves working across differences of class, race, gender, age, disability, sexual orientation, religion, culture, health, geography, expectations and outlook on life. Differences can be seen in the different ways that problems are presented, communicated and perceived by individuals and in terms of the solutions sought (Trevithick 2000, 6). Kokkonen and Almonkari (2015, 32) argue that one of the communication requirements of modern working life includes the ability to create and maintain interpersonal relationships. Expertise is no longer something that an individual can create and enhance alone, but rather an ability to create a team and a community in which each individual's personal areas of expertise complement the knowledge and skills of others.



PHOTO BY SATU BETHELL

The impact of art-based courses in Laurea has proven to be far more than just finding new working methods with service users. In their learning diaries, the students mention how creative workshops have supported their sense of empowerment, conveyed a feeling of human dignity and respect, belief in their own abilities and hope for the possibility of change. Here is a comment from one of the students, who was facing a very distressing situation with the safety of his family during the course:

Even [when] not practising and just by watching the methods and seeing how everyone was taking part and the joy while practising different creative methods started to bring back some hope and reduce the level of depression and anxiety. Being part of the class and part of a group of people encouraged me to talk about my fears and worries to the people around me and that definitely helped me and was one of the reasons to get out of the situation. (Bakar 2018)

Participation often leads to the feeling of being empowered. Reciprocity and trust in relationships as elements of interaction have an empowering effect (Törrönen et al 2013). Seeing and experiencing diverse ways of doing things increases tolerance for others and helps to understand different ways of creating and thinking. Connecting with others in a creative way, such as by painting on the same big piece of paper, moving around with closed eyes or by using drums instead of human voices, can make students aware of not just their own inner sensations and feelings but also increase their sensitivity to others. Learning to communicate with others by using colours, body language or musical instruments has made students aware of the power of non-verbal communication and the messages we transmit bodily or

facially to our clients when working with them. Becoming aware of what one's own voice sounds or what kind of role one takes in a group has been eye-opening for many. Working in an art-based group teaches students and clients about empathy, solidarity and diversity in thinking.

As an icebreaker, I often ask new students to first draw something on their own piece of paper and then change places and continue drawing on someone else's paper and then again on someone else's. Besides having fun, the students often find this exercise liberating and empowering as they feel they can just enjoy the process of doing something together in a group. Creative workshops often give rise to feelings of joy and happiness. The sense of positive reciprocity is created through experiences of sharing and building trust. Doing something together gives rise to a feeling of trust and gives participants the sense of being part of something, which evokes an atmosphere of openness, freedom of action and encouragement, as well as a sense of security, trust, and equality (Siitonen 1999, 189,206). Students often say that while performing this activity they feel connected with the others in the group as everybody is open to sharing their work and, at the same time, sharing something of themselves. They enjoy continuing each other's 'thoughts' and seeing the new (visual) perspectives that others have introduced. According to Bourdieu's (1984) definition, human well-being is a combination of economic, cultural and social capital. The multi-dimensional concept of well-being can be understood specifically in connection with reciprocity as part of social capital, including interaction with people, with communities and with the society as a whole (Törrönen et al 2013).

Engagement in creative processes, where the outcome of the process is often not known beforehand, teaches both tolerance for ambiguity and acceptance of uncertainty in life. For example, in music sessions, the students are asked to create their own story in small groups by using percussion instruments and perform it in front of the classmates whose task is to try and guess what the story is about. As students are not given too much time to plan the story in advance, they often improvise while performing the story for the rest of the class. This is often nerve-wracking and exciting at the same time but, as the outcome is often quite exciting and fun, the students often relish the process of not knowing.

An example of a dance session is one that starts with easy and small movements leading up, step by step, to the whole class. Participants are asked to create their own movement and start dancing around the room searching for a partner who has a different kind of movement. After having found a partner, they combine the two movements and search for a different pair. Finally, they end up in a group of eight and create a choreography to perform in front of the whole class. Students often like this as the process leads gradually to something more complex. In the end, everyone is contributing something original to the end product. These kinds of exercises help the students realize how working with others does not just bring out their own creativity but how much more creative they can be when working with others and responding to different ideas.

According to Jackson and Burgess (2005), a creative approach includes a willingness to share one's experiences with the other group members as well as going through one's own personal process. When the given tasks are thought about through creative or social activities, the members feel encouraged and empowered to find their hidden competencies. A creative approach includes a dialogue that is always a sharing process, either between the participants or between the method or the material and the maker. Ideas and their justifications move between participants when the participants and facilitators express their concerns, values, worries and issues that they think are important. When possible conflicts and discrepancies are observed and discussed openly, they are not 'distractions' from the curriculum but an actual integral part of the process and learning material to be highlighted and worked through during the course (Anttonen et al. 2016, 60).

Laurea's LbD model provides a model in which we can integrate knowing, understanding, and acting and situation management. According to Raji (2014), the LbD model is seen as an integrated whole that combines: 1) knowledge written in theories and models, 2) knowledge embedded in skills and abilities, 3) moral knowledge and 4) experiential knowledge (gathered by acting and experiencing). The crucial factors in teaching are not only subject-specific competencies but also interaction skills, the ability to encounter colleagues, students and partners dialogically, and having the pedagogical competence (Kallioinen 2011). Creativity in LbD pedagogy supports the transformative learning process in students by allowing them to explore their own feelings and emotions and in so doing help them to recognize their social, personal and emotional 'capital' as a social service professional.

In order to encourage creativity, it has been found that individuals should not feel constrained and inhibited when it comes to exploring or developing new ideas. People should also feel free to experiment with different ideas, be comfortable with failure, feel that they are responsible for their own work, and that they have the power to structure their work (Amabile 1996; Woodman et al. 1993). Being allowed to experiment with thoughts and one's own inner feelings and to be allowed to make mistakes in a safe pedagogical environment without the fear of being ashamed or appearing foolish can lead to new perspectives or unrelated insights, illuminations or breakthroughs. Once students learn to be at ease with their own emotional turmoil or a wide range of different emotions, they are also capable of handling situations of uncertainty, uniqueness and conflict. Schön (1991, 16) argues that professionals from various fields should master their profession as 'an art' in which practitioners are skilled at "handling situations of uncertainty, uniqueness and conflict." He further incorporates Dewey by emphasizing that the arts are central to learning by doing as participants encounter uncertain processes that flow into an accomplishment of ends. Schön (1991, 17) goes on to discuss the importance of coaching and the prominence of experiencing 'first hand' for holistic comprehension, which is a central concept in the LbD model.

Creativity is not just about being creative in acting, playing an instrument or being able to paint or draw. It is about understanding and appreciating the many diverse outcomes of life. It is about making links between conventionally separate or previously unconnected ideas. A lot of research shows that creativity enhances characteristics such as independence, autonomy, self-discipline, tolerance for ambiguity, assertiveness, resourcefulness and self-confidence (Guildford 1950; Amabile 1996; Burton 2008; Csikszentmihalyi 1996; Gardner 1993). It is a mind-set that incorporates playfulness, empathy, sensitivity and self-awareness.

I would like to end with a direct quote from Schön (1991, 17) as it highlights the use of creativity in the LbD model:

...learning all forms of professional artistry depends, at least in part, on conditions similar to those created in the [art] studios and [music] conservatories: freedom to learn by doing in a setting relatively low in risk, with access to coaches ... [who] help [students] ... to see on their own behalf and in their own way what they need most to see.

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Jyrki Suomala

LEARNING BY DEVELOPING ACTION MODEL AS A SOURCE OF DIVERSE REASONING IN REAL-LIFE CONTEXTS

Abstract

The aim of universities is to give students the ability to adapt and change the future of society and working life. This is achieved by supporting students' learning, skill acquisition and reasoning skills. Traditionally, pedagogical solutions in universities have been grounded in language-based reasoning, memorizing and learning previously created knowledge and skills. On a practical level, learning in universities has involved listening, reading books and writing.

There is growing evidence that people can learn in more diverse ways than has been assumed in traditional university pedagogy. This article describes functions of the human mind and brain based on Chris Eliasmith's (2013) Semantic Pointer Model. The essential concept is semantic pointer representation that aggregates a variety of the brain's processes into coherent representation based on the goal of the learner. Language has an essential role in this process; however, other mental processes such as emotions, visual patterns, social rules and abstract ideas also have an essential role in semantic pointer representation.

This article describes the semantic pointer model, cognitive learning model, Learning by Developing (LbD) action model, detective reasoning model and compares these to one another. This article concludes that LbD forms a general framework in which the limitation of human cognition and brain as well as the demands of future society and work life can be compounded in a coherent way.

Introduction

Humans have a unique capacity to adapt to different natural and cultural environments. This adaptation requires the building of suitable mental representations, which help in learning and creating new concepts, skills, preferences, motivations, and emotional tendencies on the individual, social and cultural levels.

Whereas the traditional method of describing and explaining mental representations has been based on language analysis and formal logic, there is growing evidence that the description and explanation of human behaviour needs neuroscience (Eliasmith et al., 2012; Glimcher, 2011). Therefore, this article advances towards Learning by Development (LBD) from a neuroscience point of view.

The human brain considers the flow of information from internal and surrounding environments by using distributed mental representations. It has about 86 billion neurons (von Bartheld, Bahney, & Herculano-Houzel, 2016) and it is very likely the most complex organism in the known universe. By using these neurons the brain has the capability of representing a huge number of patterns; if each neuron can fire 100 times per second, then the number of potential firing patterns for that duration is $(2^{86})^{10000000000}$. This is far larger than the number of elementary particles (1080) in the universe. Thagard call this phenomenon “Dickinson’s theorem” after the poem written by Emily Dickinson: “The Brain is wider than the sky. For, put them side by side. The one the other will include. With ease, and you beside.” (Dickinson according to Thagard, 2011, p. 131). Therefore, the brain has the capacity to represent the sky, the person and the nature in general.

However, the problem with a system as complex as this is that the number of possible patterns becomes exceedingly large and the activation of the neurons needs a lot of energy. The cost of neural activity (measured in action potentials per second) is significant because nearly 20% of the energy we consume goes to support our brain even though it accounts for only about 3% of our body weight (Tymula & Glimcher, 2016). Consequently, the brain like any other complex dynamic system needs rules in order to organize the constant flow of information. A recent rationally imprecise behavioural model (Steverson, Brandenburger, & Glimcher, 2017) emphasized that a human behaves optimally when she or he balances the benefits of the choices they make against the costs of reducing the chance of error. By concentrating on the essential aspects of the environment a human can avoid a cognitive burden.

The essential question concerns how the human brain forms representations in the mind. Cognitive science has symbolism and connectionism as the dominant approaches to the problem of representations (Gärdenfors, 2004). Both approaches have relied on a preferred metaphor for understanding the representation in mind/brain. The symbolism starts from the assumption that mental representations should be modelled by Turing machines and that cognition is seen as essentially involving symbol manipulation (Gärdenfors, 2004). The symbolism relies on the

“mind as computer” metaphor (Eliasmith, 2013) and argues that cognitive systems have a symbolic “language of thought” (Fodor & Pylyshyn, 1988). The mind is like a computer programming language, expressing the rules that the system follows. A production system (Eliasmith, 2013) is the architectural implementation of this approach. According to symbolism, representations are a given set of predicates with a known denotation functioning on the basis of logical and syntactic operations (Fodor & Pylyshyn, 1988).

In contrast, connectionism explains mental representation by constructing models where associations between different kinds of information elements carry the main burden of representation (Eliasmith, 2013; Fodor & Pylyshyn, 1988). The essential research tool in connectionism is artificial neuron networks in which each node in the network performs input/output mapping. When grouped together in large networks, the activity of these nodes is interpreted as implementing mentally relevant behaviours. Connectionists have a tendency to see the mind as the brain and they often use the metaphor “mind as brain” (Eliasmith, 2013). Despite this view, the connectionism models and the symbolism models do not rely directly on neuroscientific data.

Although symbolism and connectionism have increased our understanding of mental representations and many artificial intelligence (AI) applications have been developed, there are still many empirical and theoretical problems concerning these models. First, these approaches lack the generality to handle the full range of representational combinations that include sensory, emotional, cognitive, social and contextual information (Thagard & Stewart, 2011). Most human concepts and their meanings are not fixed—for example, from the age of two a child can learn three to seven words every day. Therefore, a typical university student knows almost 20,000 words when they begin their studies. People can learn new words and other things during their lifetime. The symbolic and connectionist models cannot explain this dynamic learning process (Biemiller, 2005).

Second, language has an essential role in both the symbolic and in the connectionist approaches. According to this analytical view of concepts, the meaning of a concept is based on its necessary and sufficient conditions. Despite the fact that language skills give a person more flexibility in cognition and communication, it is only a small part of the whole of human behaviour. Human thinking and behaviour is multidimensional and emotional and many of its actions happen independent of conscious control and without concept/language processing.

Third, the symbolic and connectionist approaches to representation do not characterize behaviour in neural terms and they do not exploit findings and ideas about neuroscience (Blouw, Solodkin, Thagard, & Eliasmith, 2016). They have had little success in finding neural mechanisms that could cause human synchronization behaviour. Overall, these traditional models of mental representation are not able to describe and explain the function of the human brain that can help a person adapt flexibly in a constantly moving environment and learn novelties. Therefore,

it is not a surprise that more empirically credible models based on neuroscience about representations have been developed (Eliasmith et al., 2012; Gärdenfors, 2014; Kanerva, 1988; Lieto, Lebiere, & Oltramari, 2017). This paper concentrates especially on the Semantic Pointer Model (SPM) of human mental representation (Eliasmith et al., 2012; Suomala, 2017), but it goes beyond that model by considering learning by developing aspects of human behaviour. SPM was created by Eliasmith (Blouw et al., 2016; Eliasmith, 2013; Eliasmith et al., 2012) and can describe and explain different levels of representation to cover the full aspect of mental phenomena and is based on the most recent understanding of how the human brain works.

According to SPM, mental representations are based on topological, geometrical and vector-based notions. In addition, representation is organized by quality dimensions that are sorted into domains such as space, time, temperature, weight, colour and shape (Gärdenfors, 2014). Representations are dynamic and their meaning is not fixed; however, concepts could be integral. This paper concentrates to the semantic pointer. The next chapter describes SPA more specifically.

The following example describes how the idea of the semantic pointer works on a practical level. The first requirement for a neutrally credible mental representation is to specify how a pattern can be represented by a population of neurons (Thagard & Stewart, 2011). According to SPM, patterns of neural activity can be thought of as vectors. If a neural population contains N neurons, then its activity pattern can be represented as a sequence that contains N numbers (Kanerva, 1988; Thagard & Stewart, 2011). Each number stands for the firing rate of a neuron, and the range of the firing rate of the typical neurons in the cortex is from 8 times per second to the 100 times per second (i.e. Hertz=Hz). When the maximum firing rate of a neuron is 100 times per second, the rate of a neuron firing 54 times per second could be represented by the number .5. The vector (.5, .4, .3, .2, .1) corresponds to the firing rates of this neuron and four additional ones with slower firing rates (Thagard & Stewart, 2011). When we represent the pattern of activity of two neural populations by vectors A and B , we can then represent their combination by the convolution of A and B , which is a new vector corresponding to a third pattern of neural activity. This new vector has emergent properties that are not aggregates of either A and B vectors from which it is combined. Thagard and Stewart (2011, p. 8) concluded: "Hence, the convolution of vectors produces an emergent binding, one which is not simply the sum of the parts bound together."

SPM describes representations and their dynamic in credible ways. Whereas regions in the brain that concentrate on language processing are small, other mental processes and emotions have more capacity in the human brain. Thus the representation unit can include visual, auditory, conceptual, emotional and other mental properties at the same time. When an individual and groups learn by developing, they usually exploit all sorts of information based on visual, auditory and even tactile processing. This process is not limited to a language-based process only. A more detailed description and examples of SPM can be found in Suomala (2017). The next chapter describes learning from the cognitive perspective.

Learning as a generative activity

According to Fiorella and Mayer (2015) leaning is a generative activity. In this process, learners actively try to make sense of the instructional material. In this generative activity they Select the relevant aspects of the incoming material, Organize it into a coherent cognitive structure in working memory, and Integrate cognitive structures with relevant prior knowledge activated from long-term memory. This SOI model of generative learning focuses on three cognitive processes, which are selecting, organizing and integrating (Fiorella & Mayer, 2015).

Generative learning is learning by understanding, which results in meaningful learning outcomes. It differs from two other common forms of learning. Rote learning is based on memorizing, which results in rote learning outcomes, and associative learning is based on strengthening associations, which results in responses to well-learned stimuli (Fiorella & Mayer, 2015). Despite rote and associative learning having their own roles in everyday life and in the natural settings of learners, generative learning is a promising approach in current higher education because 21st century modern societies need problem-solvers and sense-makers in dynamic workplaces. Students need to develop transferable knowledge and skills (Pellegrino & Hilton, 2012). Generative learning supports creative problem-solving, critical thinking, complex communication and skills to construct evidence-based arguments because it supports transferable knowledge and skills (Fiorella & Mayer, 2015; Pellegrino & Hilton, 2012). Thus the goal of generative learning is to provide students with dynamic cognitive skills that help them to develop the society of the future.

In their book, Fiorella and Mayer (2015) found that there are eight learning strategies that foster generative learning. These are summarised as the following. In oral summary (1) students create a written or oral summary of the learning material. In mapping (2), students create a concept map, a knowledge map or a matrix organizer. In drawing (3), they create a drawing that depicts the text. In imaging (4), the students imagine a drawing that depicts the text. In self-testing (5), students form self-testing relating to learning material. In self-explaining (6), students create a written or oral explanation of the confusing parts of the learning material. In teaching (7), the students explain the learning material to others. Finally, in enacting (8), students move objects to act out the material (Fiorella & Mayer, 2015). Based on dozens of experiments, it is safe to say that these learning strategies are the most effective for meaningful and transferable cognitive skills.

However, there are also limitations to this cognitive approach. These recent insights into the cognitive mechanisms of learning have come from investigations in experiments where students need to learn the content of ready-made learning material. In these situations, participants typically try to learn some content presented to them on an individual level in the short term. Despite their success in explaining the cognitive learning strategies, it is still unknown how this model describes the learning process in a project-based learning situation, in which learning is usually

not based on short instruction material. In the Learning by Developing action model the key learning process is based on the search for new knowledge and solutions to the problem (Tautila & Raij, 2012). Even though neurophysiological and cognitive processes are always present in the learning, it is still unclear how these processes affect the LbD action model-based process. In the following chapter, I will describe the LbD action model more specifically.

Learning by Developing action model

In order to give the most progressive and future-oriented pedagogical support to its students, Laurea University of Applied Sciences (LUAS) has implemented the Learning by Developing (LbD) action model (Tautila & Raij, 2012). The LbD action model integrates regional development, pedagogy and R&D work into one frame of operations (Tautila & Raij, 2012). LbD focuses on a development project that is genuinely rooted in the real-life workspaces or the simulation of these spaces. Typically, it requires collaboration between lecturers, students, workplace experts and end users. An LbD project forms a learning environment in which progress is made through learning as individuals, in a community and the production of new knowledge (Raij, 2007).

Tautila and Raij (2012) describe the characteristics of the LbD action model in the following way. Typically, the starting point of an LbD project is a genuine, working life-related research and development project, in which lecturers, students, experts and clients as end users form authentic partnerships. The goal is that the learning process in LbD offers a possibility to acquire professional knowledge and skills. Therefore, LbD is a dynamic collaborative process in which inductive, deductive and abductive reasoning is typical. The participants in LbD projects are not only generative learners but also explorers and researchers in a dynamic learning environment. It also forms a platform for demonstrating the students' competence in a real-life environment. Moreover, learning takes place when participants acquire new habits and skills to face an ever-changing world (Tautila & Raij, 2012).

The defining characteristics of LbD are authenticity, partnership, trust, creativity and an investigative approach in which all partners participate as equals, sharing experiences and finding meanings in order to produce new knowledge in their varying roles and responsibilities (Tautila & Raij, 2012). Therefore, Learning by Developing is not only a learning process but also a reasoning and exploration process. It helps students constantly change their knowledge and skills according to a project's demands. At the same time, the LbD action model supports students to reinvent their skills, knowledge and even their identity again and again. The goal of LbD is to give students preparedness to cope with and change work life in the future.

Whereas the LbD action model is based on pragmatism (Tautila & Raij, 2012), the generative learning model is based on the results of psychological experiments (Fiorella & Mayer, 2015). Despite this difference, they also have some common features. First of all, understanding and sense-making are key for both approaches. Second, both

argue that learning should be transferable to other contexts. Consequently, learning in both models helps to develop general problem-solving skills applicable to many contexts. However, there are also critical differences between the models. First, the generative learning model regards learning as an individual cognitive process, whereas LbD regards it as a social, dynamic process. Second, the generative process learning model emphasizes the limitations of cognitive capacity during learning, whereas LbD encourages the creation of a natural and complex environment for learning. Finally, the generative learning model (Mayer, 2009) regards learning as a single, short-step process, ranging from 30 seconds to a few minutes, whereas LbD emphasizes long-term projects with many learning points, from several hours to many weeks (Ahonen, Meristö, Ranta & Tuohimaa, 2014).

It is difficult to avoid the mental capacity limitations of the human brain when trying to describe human learning. This capacity limitation has been solved in a generative learning model by helping students to select essential information from the environment. However, in a real project-based context, in which students develop and solve real problems with other students, lecturers and experts, it is difficult to constrain information to its essential features. Often, it is even impossible to know what essential information is in these complex environments. Therefore, learning according to LbD is more strategic than in generative learning. During LbD learners need to calculate the cost of searching for new information and estimate the value of the current information from a goal/problem point of view. On the other hand, learning according to the generative learning model needs strategic thinking (e.g. goal setting, information search strategy, etc.) because all learning materials are ready made by the teacher. However, LbD cannot underestimate the mental limitations of learners. Therefore, we need a more specific model for complex learning by combining the LbD model with a generative learning model and adding elements from modern neuroscience for this description.

The detective model as a source of reasoning in a real-life context

Both neurophysiological and cognitive research have increased our understanding of the structures and functions of the human mind and representations (Komer & Eliasmith, 2016). The LbD action model tries to help students learn in modern way, in a constantly changing society and work life. Despite the benefits of all of these approaches, there is still a gap between the neurophysiological and cognitive description of human behaviour and the project-based LbD model. The goal of this chapter is to build a bridge between these approaches by introducing the detective method of reasoning.

According to Hintikka (1987), the creation of new knowledge happens by a detective method. This method is the extension to classic logic, which operates on the level of already known information and cannot explain the creation of new knowledge. The search for a solution is based on prior knowledge of a detective and new information. Based on prior and new information a detective tries to build a coherent

view of the situation. New information is often fragmented and based on uncertain cues of environment. According to Hintikka and Hintikka (1983), a skilful detective, such as Sherlock Holmes, expands knowledge by asking reasonable questions. For example, Sherlock Holmes tries to find a solution to the theft of a famous trotter, Silver Blaze. Holmes concentrated on a dog that did not bark at night. Hintikka and Hintikka (1983) regard Holmes' reasoning in this case as a two-step presentation of questions. The first question is: "Did the dog in the barn bark?" The answer to this question is no. Based on this information, Holmes asks a second question: "Who is the only person the trained watchdog does not bark at?" The answer to this question is obvious, the dog's owner. In this way, Holmes solves the crime, the thief was the dog's owner. According to Hintikka and Hintikka (1983), just like Sherlock Holmes, scientists achieve new knowledge by answering suitable questions. Therefore, solving a crime is more like solving a jigsaw puzzle than clear logical applications. There are two cognitive tools in this jigsaw puzzle, deduction and questioning. Thus, if the deduction does not lead to the desired result, a detective or scientist or learner can ask another question. According to Hintikka (1987), questioning is the method for expanding a knowledge base in the creative process.

When a detective works, they collect diverse research material. Often, deduction and questioning are not enough to solve the problem (Suomala, Taatila, Siltala, & Keskinen, 2005). Based on diverse evidence, they try to solve the case. A detective needs to decide on the basis of incomplete information. In addition, the information about a crime is often fragmented and contradictory. Such reasoning is not inductive or deductive but abductive (Paavola, 2004; Thagard & Shelley, 1997). In these situations a detective needs to select information that is relevant from the point of view of solving the case.

Thagard (2009, p. 9) describes human reasoning in the following way: "But there is abundant evidence that thought requires mental representations such as concepts and images, and computational procedures such as spreading activation and pattern matching, that go beyond the kinds of structures and inference allowed in the logical framework." Therefore, abductive reasoning is consistent with the philosophy of LbD education by giving learners the possibility to collect diverse information during learning projects.

Thagard and Shelley (1997) introduce four arguments that support the idea, that scientific discovery follows the principles of abductive reasoning, not classic logic. First, scientific hypotheses and explanations are often layered. Second, during the discovery process, new concepts and hypotheses will often be created. Third, the discovery process could lead to situations in which previous scientific theories, models and beliefs will be refuted. Finally, scientific explanation and description is uncertain and perceptions and empirical evidence are not enough to explain the phenomena. In addition, auxiliary hypotheses and theoretical constructions are needed. Like reasoning in solving crimes, in real work life projects and in scientific discovery, realistic reasoning follows abductive reasoning. This kind of reasoning takes advantage of diverse sources of information that are not limited to language but use visual, tactile, emotional and other diverse sources of information.

Thus current view of the brain's processes, which is based on SPM, is compatible with abductive reasoning, in which the learner or some other agent tries to collect new information in order to solve problems. The brain forms mental models, which includes concepts, propositions, visual patterns, goals, actions and emotions (Blouw et al., 2016). Thus, the reasoning during the LbD process is mainly abductive in nature. In this process, the evidence could be verbal, visual, emotional, tactile and social in nature. The human brain could build versatile representations based on flexible semantic pointers, described mathematically as multidimensional vector space.

Conclusion

This article has described the basic principles of human learning from the perspectives of neuroscience, generative learning and abductive reasoning. As the LbD open model is a very general approach to organizing the learning and reasoning process in real-life situations, all common learning models can have specific roles in LbD. Studies of neuroscience and abductive reasoning have increased the understanding of the basic principles of human behaviour and learning. One of the most difficult tasks in each learning context is to find a suitable balance between the search for new information and trying to solve problems on the basis of information that is available now. This trade-off between search and application is typical for every project in a real-life context. Of course, LbD based projects typically have a clear timetable; however, within this schedule, it offers a lot of possibilities to search, learn and apply knowledge to the context in which the learning occurs.

In addition, generative learning could have a critical role in LbD. At the beginning of the process, it is fruitful to try and learn the basic principles of the problem. Usually it is possible to find ready-made visual, audio and textual materials from the content of the project. As the LbD project is almost always a group process, the sharing of information content teaches participants how to learn and acquire new information as effectively as possible. It is possible to organize LbD projects in such a way that specific touchpoints are dedicated to learning from previously created material. In addition, it could be beneficial if participants in the project learn the basic principles of generative learning in order to organize their presentation materials in the meetings in a way that follows the principles of generative learning. Experts in LbD action models need to understand how to present the results of a subproject as effectively as possible to other stakeholders in the project.

The LbD open model prepares students for modern society in which the content of work and information change constantly. However, LbD cannot solve the problem of the limitations of the human brain and cognition. Therefore, it is important to plan projects and teach students to follow the principles of human learning. By applying knowledge of human learning to projects, students learn how to effectively search for new knowledge as well as how to present new knowledge to other students and participants during the project.

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III

RESEARCH, DEVELOPMENT AND INNOVATION (RDI)

Tarja Meristö & Jukka Laitinen

CHALLENGES OF LbD IN THE CIRCLE PROJECT

Abstract

The most important task of water supply is to ensure the availability of clean water for everyone. In the future, clean water will be a critical commodity, and the scarcity or irregular availability of such commodities may give rise to conflict. CIRCLE is an ERDF-funded research project (9/2016–11/2018) that studies the future of water supply. The project partners are the Häme University of Applied Sciences (HAMK), Aalto University, SYKLI Environmental School of Finland, the Association for Water and Environment of Western Uusimaa (Luvy), and Laurea's FuturesLab CoFi. The objective is to enhance the recycling and re-use of energy and nutrients in the water service processes in an economically and environmentally sensible way. FuturesLab CoFi is in charge of the futures analysis of the project. The time span is until 2037. The analysis seeks to determine which factors influence the future of water supply, identify weak signals and prepare alternative scenarios.

This article analyses the challenges encountered in the LbD (Learning by Developing) operating model in the CIRCLE project, in which integration takes place for different student groups on several campuses. The aspects assessed include the integration of the results of the students' input in the research work as well as the roles of and cooperation between the regional and research stakeholders. This article also discusses the demands set on LbD by the international cooperation aspect of the project. Based on real-life experiences, the guidance offered to students by project stakeholders in order to ensure a high quality of LbD is quite time-consuming. Therefore, student guidance cannot be carried out solely within the timeframe reserved for project work but requires that hours are also allocated specifically for guidance. The management of the university of applied sciences should acknowledge this issue and provide clear guidelines to ensure better quality of LbD in the future.

Keywords: LbD challenges, student involvement, project coordination, future of water supply services

LbD in the CIRCLE project

In the futures section of the CIRCLE project that Laurea's FuturesLab is responsible for, LbD has taken the form of holistic cooperation between regional stakeholders, researchers and students. Interviews, workshop participation and guidance group work have been used to tap into the knowledge and competence of regional stakeholders and project partners. Researchers have collected futures information through the Delphi method and futures workshops, for example. Several student groups as well as individual students working on their theses have participated in the CIRCLE project.

In spring 2017, four students from the Business Management programme in Hyvinkää participated in information gathering in the CIRCLE project as part of their P2P project studies. They carried out media monitoring to map trends, weak signals and stakeholders in the sector. They complemented the results of media monitoring by interviewing CIRCLE project specialists from the SYKLI Environmental School of Finland and by attending an international water supply conference in Helsinki in spring 2017. A group of students also participated in an open seminar in the CIRCLE project in May 2017, presenting their results to project partners and seminar participants based on the posters they prepared.

Another group of students that participated in the LbD activities in the CIRCLE project consisted of Master's degree students from Tikkurila. In spring 2017, they participated in two study units ('Monitoring the Operating Environment' and 'Management of the Future'), in which they prepared trend cards and scenarios. One student from this group of Master degree students is working on a thesis related to CIRCLE project's subject area (Paaso 2018). As part of the thesis work, the student also joined project personnel to carry out a futures workshop in Tikkurila on 15 March 2018. In addition, a student from the Bachelor of Business Administration programme completed a thesis related to the project (Kärki 2017) on the Leppävaara campus at the end of 2017.

The focus of the LbD perspective in this article is on the students' project integration and the practical experiences related to it.

LbD challenges in the CIRCLE project

Based on our experience, LbD faces numerous challenges in the CIRCLE project, such as: the expectations of the student and the project are not aligned; the student's competence is not sufficient; the designated project instructor is not familiar with the goings-on of the campus and does not necessarily know the curriculum; international exchange students do not know the regional stakeholders or Finnish society; the teacher responsible for the study unit is not familiar with the project and its objectives; and the project integration carried out on various Laurea campuses results in excessive fragmentation of the project as a whole. We have grouped

these challenges and, by analysing their content, identified four types: guidance challenge, alignment challenge, coordination challenge and internationalisation challenge. The guidance challenge concerns the resources required by student guidance; the alignment challenge stems from the alignment of the student's learning outcome and the project's objectives; the coordination challenge involves the coordination of different stakeholder groups; and the internationalisation challenge is associated with implementing the international aspect of LbD in project work.

Guidance challenge

Providing guidance to students requires resources. The need of resources depends, for its part, on the student's background; in other words, whether the student has only recently started their studies or is a skilled, independent student who has already gained experience through studies or perhaps through work as well. The resources used for student guidance may vary on a case-by-case basis in project work. Providing students with guidance may be the responsibility of the project employee or the teaching personnel of the campus (such as a lecturer) only, for example. In some cases, guidance to the student may be provided by both the project personnel and a teacher working on campus.

The relationship between the guidance resources and the student's competence is described in Table 1. With regard to the guidance challenge, the most challenging situation is one in which the student is a novice requiring a lot of guidance and only a project employee is responsible for their guidance. With novice students, LbD work requires splitting the tasks related to the project into more easily absorbable portions. This requires a lot of resources from the project employee, which in turn decreases the resources available for the actual project work. In an ideal guidance situation, the student is competent and independent or at least a novice who is progressing well, and the guidance resources come from both the project and the campus teaching personnel, who also contributes to the project at least to some extent.

Table 1. Guidance challenge: student's competence vs. guidance resources

INSTRUCTOR	STUDENT	NOVICE	PROGRESSING NOVICE	SKILLED, INDEPENDENT
	INSTRUCTOR FROM CAMPUS, NOT INVOLVED IN THE PROJECT	A LOT OF EXTRA WORK IS REQUIRED TO FAMILIARISE THEMSELVES WITH THE PROJECT	THE INSTRUCTOR'S WORKLOAD DECREASES WHEN THE STUDENT CAN FAMILIARISE THEMSELVES WITH THE PROJECT INDEPENDENTLY	
INSTRUCTOR FROM CAMPUS AND FROM THE PROJECT	A LOT OF WORK, DIVISION OF WORK BETWEEN INSTRUCTORS IS IMPORTANT	AN IDEAL SITUATION FOR THE GUIDANCE OF STUDENTS		
INSTRUCTOR FROM THE PROJECT	THE MOST CHALLENGING GUIDANCE SITUATION	A SKILLED, INDEPENDENT STUDENT MAKES THE GUIDANCE SITUATION EASIER		

In that situation, the student, instructor and project employee all bear their own responsibility, and most of the time, this leads to the best outcome.

Alignment challenge

Another significant challenge in the LbD work is that students have their defined learning outcomes and the project has its defined objectives. These two do not always meet. In addition, regional stakeholders (e.g., companies) that participate in the project work have their own objectives, but these are often factored in at the project application stage.

The alignment challenge is also partly intertwined with the resource challenge, since aligning the objectives of the student and the project often requires resources. Different types of alignment challenge are provided in Figure 1.

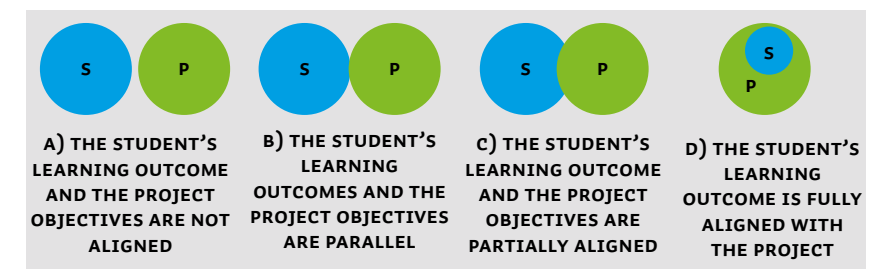


Figure 1. Alignment challenge: the student's learning outcome (=S) vs. project objectives (=P).

In the least favourable case (A), the student's learning outcome and the project objectives are not aligned, and LbD is not realised at all, or the student's outputs do not benefit the project and the student's involvement in the project is non-existent. In a better situation (B), the student's learning outcome and the project objectives are parallel. The project receives useful additional information from the student's thesis or other exercise related to their studies, even if it is not a full match with the project's core objectives. The student's assignment also receives a perspective that touches on real-life problems. In most cases, the student's learning outcome and the project objectives are partially aligned (C). In this case, the student's outputs benefit the project partially and their own assignment clearly incorporates the project perspective. In some cases, it is possible to fully align the student's learning outcome and the project objectives (D). With regard to the project, this is the most useful alternative, since the resources allocated to student guidance produce results that directly benefit the project, and the student has the opportunity to fully embrace the project perspective.

Coordination challenge

Often, different groups of stakeholders participate in the project work. In addition, students who participate in LbD may come from different disciplines and different education programmes, which may be located on different campuses. In addition to

Table 2. Types of coordination challenge related to LbD.

TYPES OF COORDINATION CHALLENGE
1. BETWEEN DIFFERENT INSTRUCTION GROUPS
2. BETWEEN DIFFERENT COURSES PROVIDED FOR THE SAME GROUP
3. BETWEEN DIFFERENT CAMPUSES
4. BETWEEN DIFFERENT REGIONAL STAKEHOLDERS
5. BETWEEN DIFFERENT MEMBERS OF PROJECT PERSONNEL

the groups of students, the project may also include individual students, some of whom may be Bachelor's degree students and others studying for a Master's degree. This heterogeneity of students requires coordination in order to prevent overlaps and, on the other hand, to also ensure an even quality of student outputs. Different types of coordination challenge related to LbD are provided in Table 2.

The first coordination challenge stems from the number and variety of instruction groups, which may even represent different fields of study. The participants in the CIRCLE project have been only Business Management students, but preventing overlaps has still required coordination. The second coordination challenge is created if the same group of students participates in the project integration through several different study units. In the CIRCLE project, for example, students from Tikkurila participated in the project work through both the 'Monitoring the Operating Environment' and the 'Managing of the Future' study units. Coordination between these study units was important in order to ensure that the students stayed motivated and were able to see the big picture. The third coordination challenge stems from student groups locating on different campuses. In this case as well, coordination aims to prevent overlaps but, on the other hand, also to promote communication between campuses through remote guidance, for example. The fourth and fifth coordination challenges concern the integration of the student outputs between different regional and project stakeholders. The resolution of these coordination challenges is, for their part, facilitated by the participation of students in project workshops and the interviews conducted by students for the project's regional stakeholders and project partners.

International challenges

The international activities in the CIRCLE project can be divided into four groups (Figure 2): data collection, presentation of results, promotion of cooperation and networking, and mapping the business/export opportunities.

Primarily, students have been participating in the international activities of the CIRCLE project through information gathering; for example, Business Management students in Hyvinkää attended an international water supply sector seminar organised in Helsinki in spring 2017 in order to collect information. In addition, data produced by students has been used in the reference materials of conference



Figure 2. International aspects in the CIRCLE project.

presentations and articles (e.g., Laitinen & Meristö (2018), Meristö & Laitinen (2018a, 2018b)). In order to involve students in all stages of the international activities, as is characteristic to LbD, students themselves should be motivated to promote the project activities, in addition to their course objectives, and, on the other hand, the project personnel/instructor should be able offer alternative paths for the students to advance their studies.

In addition, another challenge is that the period of time that it takes to complete a study unit of, for example, 5 credits, is reasonably short (usually only 3–4 months) whereas the duration of the entire CIRCLE project is 27 months. This is highlighted with international students, since the visits of exchange students are often short, compared to the project duration. On the other hand, even if international students were involved in the projects, the projects often serve the domestic needs (such as the CIRCLE project) and the language is Finnish, and this may be an issue. Thus reporting should be carried out in two languages, Finnish and English, but this would again require additional resources. Yet another challenge is that the timing of international events, such as conferences and seminars, is not always known when the project plan is being prepared or, at least, there is no certainty if the conference abstracts are approved. The flat rate portion of project funding in principle makes it possible to include international trips in the project. On the other hand, the flexibility of using that funding option is compromised if the events to be attended in the project need to be specified in detail at the application stage.

Conclusions and development proposals

The characteristics of LbD are authenticity, partnership, experiencing, research orientation and creativity (Raij 2014). The CIRCLE project is a research and development project, in which all these characteristics are realised: the project involves an institute of higher education is involved (research orientation) as well as stakeholders in the field in question (authenticity), and they, together with the students, have created new solutions and new competence through experiences (experiencing).

In order for LbD to succeed, it is important to define the study units and groups of students to be included in the project as early as during the project plan stage. The factors influencing this, for their part, include the teachers involved, the student group size, as well as the students' competence level. This is why lecturers should be allocated time for preparing the project to ensure successful planning.

In project preparation, the selection of project partners also impacts the opportunities to realise LbD in the project. The project partners' expectations concerning student work should also be determined. Student integration is easier if the project partners are located in the nearby areas, but it may be challenging if the partners are further away. Language issue may become a challenge with international project partners.

Once project funding is secured, recruiting lecturers for the project (even if the allocated number hours was small) would be an ideal situation in terms of student guidance. This would also increase continuity between the planning and implementation stages. In the implementation stage, students working on their theses should be encouraged to prepare international conference publications – in cooperation with the project personnel, for example.

LbD requires coordination, but, on the other hand, too much coordination should also be avoided. Doing so will leave room for flexibility with regard to the contents of different study units, for example. Although LbD incorporates numerous components and involves a large number of different student groups, proper planning and consistent implementation will help achieve a coherent end result that benefits all parties concerned (Ahonen et. al 2014).

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INTEGRATING LEARNING INTO RDI ACTIVITIES AND PROJECTS WITHIN THE CONTEXT OF 3UAS

Abstract

The acronym 3UAS means the strategic cooperation alliance, since 2017, of three universities of applied sciences: Laurea, Haaga-Helia and Metropolia. They all are located in the greater Helsinki Uusimaa region and the cooperation is also known as the Helsinki Metropolitan Universities of Applied Sciences. In total, there are approximately 35,000 students and nearly 2,000 staff members in the joint community.

The focus of 3UAS is on research, development and innovation activities – R&D Excellence – implemented often as projects and mostly in education activities – Learning Excellence – that are put into practice in high-quality, effective and efficient pedagogical ways. The basic tasks of the 3UAS cooperation are parts of the universities of applied sciences' natural core mission in continuously developing higher education and regional development, interwoven diversely, as seen in this article.

The article presents and gives illustrations of a small variety of contemporary solutions of three universities of applied sciences' methods of combining R&D Excellence with Learning Excellence. The article acts as an opening or a continuum of the discussion and as a basis for further integration development between them.

Introduction

The universities of applied sciences promote lifelong learning and extensive networking. According to the Universities of Applied Sciences Act (932/2014), section 4, there are diverse missions for them: (1) To provide higher education for professional expert jobs based on the requirements of working life and its development, and to support the professional growth of students; and (2) To carry out applied research, development and innovation activities that serve education, promote industry, business and regional development as well as regenerate the industrial structure of the region. Furthermore, in section 6 (ibid) the act determines that while carrying out its mission, the universities of applied sciences shall cooperate with business, industry and other sectors of the labour market, especially within its own region, with other Finnish and foreign higher education institutions as well as other education providers. While fulfilling these missions, universities of applied sciences turn them into a whole set of activities in which the cooperation becomes more than the sum of its original parts. Higher education results from RDI and vice versa. The combination of these tasks by 3UAS staff and their networks means that guided and scaffolded students can enjoy a vibrant learning environment in which to deepen their knowledge for working life equivalence. Universities of applied sciences continually nourish the surrounding region while being dependent on it in many ways.

3UAS' cooperation in integrating education and RDI activities requires a proper framework, methods and places to co-work and appropriate attitudes to increase the performance of the universities of applied sciences. Cooperation is being made for the extended 3UAS community as well as sustainable urban development and the overall well-being of people. One key themes of 3UAS R&D Excellence is to increase Learning Excellence integration that aims to produce expertise and information through projects for the staff and students. At the same time, 3UAS Learning Excellence seeks of future demand-driven competence paths from the latest working life skills, existing research data, its development applications and results as well as services and products innovation process outcomes. (3AMK 2018.) The research, development and innovation activities with their projects can provide authentic learning environments and up-to-date and future knowledge, skills and know-how. At the very least, this article serves as a description but, at best, it could act as an inspiration to benefit 3UAS that together can create new kinds of competencies and solutions by combining and finding ways to integrate their legislative missions. Besides externally funded projects, RDI is an entity that may be combined to diversify into different learning events.

The table 1 provides information on the sizes of 3UAS regarding the number of the Bachelor and Master degree students and the RDI credits completed in internships, thesis work, courses as well as projects (Vipunen). The table demonstrates that all universities of applied sciences are integrating education with RDI. It also raises the question of how systematically the integration process is carried out at the universities of applied sciences, and should the notation of RDI studies be more highlighted,

Table 1. Students and study credits in 3UAS and its RDI.

STUDENTS IN YEAR 2017	RDI STUDY CREDITS CONDUCTED BY THE DEGREE STUDENTS IN YEAR 2017
HAAGA-HELIA: 10 863	HAAGA-HELIA: 49 367
LAUREA: 7 515	LAUREA: 98 845
METROPOLIA: 16 506	METROPOLIA: 76 841

as there are differences between 3UAS. Furthermore, there seems to be a need to explore each other's education integration with RDI projects.

One size does not fit all solutions available

The Rectors' Conference of Finnish Universities of Applied Sciences (Arene) defines universities of applied sciences as comprehensive partners. In addition to being higher education organizations, they are research and development partners, innovators, service providers and development platforms offering their partners modern learning and research environments (Arene 2014, 3). The suitable match between education and research, development and innovation activities offer more diverse and creative possibilities for degree students at Bachelor and Master levels as well as comprehensive and multilevel lifelong learners beyond that. It can affect the learning in both parts in substance and in meta-competence areas and makes it possible to gain differentiated and powerful expertise. In addition to that, it ensures the competence and further development of staff. 3UAS R&D Excellence contributes to the pedagogy of each university of applied sciences, while it also aims to increase the impact of RDI activities.

In the following sections in this article, higher education and RDI integration examples from each of the 3UAS universities of applied sciences are presented. First, Haaga-Helia's RDI practices are presented. In Haaga-Helia's RDI, activities are integrated into learning through various assignments from RDI projects. Haaga-Helia links working life to the context of learning by applying and developing new knowledge, through experimentation and by striving for diversity and communality. Second, Metropolia's Bachelor's Degree engineering education case is presented. It has developed a long-term operating model that combines business development projects with education. The projects have been systematically added to the curricula throughout the study period. In MINNO[®] innovation projects, students in different fields collectively tackle and innovate the challenges of real working life. Learning in projects is based on community, interaction and students' competence. Third, Laurea provides a Master's Degree integration example and introduces the Learning by Development (LbD) action model, based on a pragmatic learning concept of learning that integrates the main duties of universities of applied sciences. In addition, the features of each cooperative universities of applied sciences' pedagogical approaches or methods are presented in brief. Finally, some new guidelines for

the integration of RDI and higher education within the context of 3UAS cooperation are sketched for the future.

Connecting RDI activities to the learning context - RDI priorities and integration practices at Haaga-Helia

Haaga-Helia University of Applied Science excels in sales, service and entrepreneurship. The profile has been further clarified through six core competence areas with focused expertise and know-how: Business Development, Entrepreneurship, Experiential Service Innovations, Value through Sales, Digital and Creative solutions, and Transformative Pedagogy. (Haaga-Helia UAS 2018.) RDI activities within the core competence areas are seen as a tool for strengthening the expertise of the organization and staff in selected areas. For teachers, RDI projects are an opportunity to network with business and partner universities and to develop their own expertise and teaching content in the light of new research knowledge. For students, RDI projects offer an inspirational learning environment with a possibility to develop their own expertise in genuine development challenges. A project environment creates working life contacts and develops research and development skills that are valuable for future employees.

At Haaga-Helia, the pedagogical aim is to connect working life to the learning context, by developing and applying new knowledge, through experimentation and by striving for diversity and communality. The Haaga-Helia pedagogy advocates an investigative and development-oriented approach to learning that refers to practical, communal and regenerative practices. This means that a development-oriented approach is integrated with student learning and co-creation knowledge development, in order to support excellence and competencies. The pedagogical approach creates a favourable basis for the integration of the research, development and innovation activities.

At present, Haaga-Helia continually seeks and develops best practices on integrating RDI with higher education, while RDI projects are linked to learning in various ways. The need for integration often starts when an RDI project team identifies a possibility or need that can be solved by student collaboration. When a teacher works as a project manager or as a member of a project team, developing their own expertise, connecting courses and learning assignments to the project follows naturally. The teacher easily identifies links between a course and the project and can quickly tailor learning assignments that support both the goals of the project and the course. When a project is managed by someone not teaching, the possible course cooperation and integration with studies becomes more random. An RDI project can enable a contemporary case to support learning and theory or alternatively the whole module can be created on project collaboration. In RDI cooperation, students can earn study credits through free elective studies or through project work recognition in mandatory studies. Thesis writing is a typical form of project cooperation at both Master's and Bachelor's level.

As a good example of a successful integration, Haaga-Helia business ICT students (n=42) developed new mobile applications for companies through an investigative and development-oriented process in the SCALA (Scalable mobile learning services for global markets) project, funded by Business Finland and the Ministry for Foreign Affairs (2016–2018). The assignment was commissioned by the international project team. For the Haaga-Helia software engineering students, the project assignment provided a challenging international real-life case that taught them professional design and engineering skills as part of their Coding -2 course, worth 10 ECTS. (Rainio 2018.) The commission proved to be a perfect match as it filled a need, was in line with course outcomes and aims and provided challenging learning for the students. The feedback from the course verified that all parties were satisfied. The international SCALA project enabled collaboration between teachers, researchers and students and developed competencies on both the individual and organizational levels.

Systematic strengthening of expertise in the core competence areas requires that RDI becomes effectively integrated with an increasing number of people. Building a common understanding of the characteristics and operational levels of RDI activities is also needed when running the business towards common goals. To develop research and development activities, particularly by participating in the preparation and implementation of large and competitive international RDI projects, has a great impact on the development of expertise on all levels. The greatest benefit is felt by students.

At Haaga-Helia the pedagogical model concerning the integration of RDI and learning is agile, combining various methods and practices. The aim in the future is to provide more flexible interfaces and more systematic and targeted integration practices in order to link the learning to the whole lifecycle of RDI projects. Meanwhile, teaching personnel are offered support through coaching, training and forums of dialogue within the theme of integrating RDI and learning. Integration of RDI and higher education is at the very core of Haaga-Helia's strategic development.

Metropolia innovation projects in engineering education a successful example of integration

Metropolia's pedagogical model is based on the understanding that the competence of the future will consist of learning in communities and through interaction. It also intends to take into account as much as possible the student's own experiences, background and ability to learn. This model is called the student's individual learning track. The learning track has a competence-based curriculum, which is interdisciplinary and inspiring, industry-based, industry-linked and student-oriented. This needs traditional, digital, blended and authentic learning environments and varied learning methods such as RDI-based, project-oriented, peer learning, joined development and reflective learning. Counselling is built into the individual learning track to boost the development of expertise at all stages of studies.



The development of the student's working life expertise is well timed and scheduled with clear objectives.

In engineering education at Metropolia University of Applied Sciences, cooperation between the university and industry has a long history. Already many years ago, students had paid training periods in industry—first, normally as a worker in production and later as a designer or developer in process or product development. From the educational point of view, it has been very important that the work students do during training reflects their professional know-how. For students, this kind of integration of industry development work with teaching has been very beneficial for at least for two reasons: to get a salary while learning and to get to know the company and vice versa. The compulsory training to earn a degree has previously taken a year, but now lasts for about half a year. When the training period shortened, compulsory projects have been put into operation in engineering curricula to get enough practical experience in addition to theoretical knowledge. For this reason, these projects are normally conducted in industry. Most of the projects in the curricula are within normal theoretical courses. However, after the 2014 reform of engineering curricula, there are also separate project courses of 5–10 ECTS.

In all of Metropolia's Bachelor's degree programmes there is a 10 ECTS innovation project that is planned to be done during the third or fourth year of studies. This project is called MINNO. It is organized so that 3rd or 4th year students from different degree programmes form a project group to solve or innovate some real-life problems. It is compulsory for every student at Metropolia before graduation.

For engineering students, the innovation projects have broadened their possibilities to cooperate with students from different degree programmes and in different subjects. In these multidisciplinary groups, the role of engineering students is to bring a technological view and solutions to the project. For engineering students, the most pleasing innovation projects are those that offer real-life problems. As they are used in engineering studies to get a salary for their training and bigger project works, they often expect to get a salary from innovation projects as well.

Some engineering students have completed projects also in RDI projects. So far, the real RDI projects in Metropolia's engineering education have arisen from a lecturer's own interests. These have been technological RDI projects mostly funded by Business Finland and some ministries, such as the Ministry of Agriculture and Forestry. In these projects, students have worked as research assistants. They have had this period accepted as training for their degree or then they have completed their final thesis work in these RDI projects.

The curricula of most engineering degree programmes at Metropolia offer great possibilities to also integrate RDI projects as companies' development projects with teaching. In engineering studies, the aim has not been to teach students to understand and take part in the whole RDI process. With their teacher they have taken care of the research project's workshops that have mainly been parts of the project where the research results were put into practice. So far, it hasn't been an aim to try to get students to understand how to apply funding or to publish the results, for example.

Metropolia has started to focus its RDI work and learning on global phenomena that need developments and solutions. For example, the three main issues that cause ecological problems globally are housing, transportation and food. Metropolia wants to take part in developing solutions to these problems. This will be done in innovation centres. Five innovation centres—Smarter Mobility, Clean and Sustainable Solutions, Customer Oriented Wellbeing and Health Services, Functional City for People and Data-driven Construction—will start in 2018 at Metropolia. Furthermore, in the 3UAS Learning Excellence cooperation area, Metropolia MINNO innovation project activity will be expanded together into 3INNO in Haaga-Helia, Laurea and Metropolia. Within this, business models will soon complement innovation projects.

Master's degree students learning integration with RDI projects at Laurea and the Learning by Developing action model

At Laurea University of Applied Sciences, RDI projects rely on the strategic research areas based on recognised and agreed expertise, future needs and ongoing degree programmes. They are centred on Security Governance, Holistic Health and Wellbeing, Service Design and Innovative Future Business Models, Promoting Entrepreneurship and Development of Education. Hence, RDI projects serve higher education and studies. As described earlier, RDI projects offer the possibility for teachers to update their knowledge and skills from various sectors in working life. Local or global project consortiums and other partners benefit from study integration when outcomes are implemented in the wider network. Furthermore, students can provide valuable insights and expertise to RDI. Studying in a project gives students a chance to study current themes that have not yet been included in the curriculum because of their novelty value. RDI work provides students with an authentic learning environment in which students are active learners by developing their own expertise.

At Laurea, Master's degree learning integration with RDI work is realized, for example, as:

1. Integrating the RDI project with the study course,
2. Offering RDI studies (related to RDI project) for Master's degree students as complementary competence modules,
3. The student's participation in the project preparation process, and
4. Thesis work for the RDI project.

Learning integration with RDI projects is easiest when integrating the project with the courses. Experiences of Haaga Helia are similar at Laurea: when a project manager does not teach, integration with studies becomes more difficult. Therefore, the integration process is created in collaboration with the teacher and the project manager. The project manager represents the working life expert and project consortium and the teacher has a pedagogical responsibility for a learning task. According to Raij (2013), the LbD action model is based on projects that are created together with working life representatives, lecturers, students, workplace experts and end users.

The examples described next are based on Master's degree students' learning integration with RDI projects. Learning tasks are developed consistently in the Learning by Developing (LbD) action model. According to Raij (2007, 20), the starting point in the LbD action model is to identify the learning environment's phenomena. For example, phenomena can relate the project's problem, development task or to the

innovation process. The aim of the learning environment is to achieve change, create, define and commercialize new products, develop and renew operational processes and new models in addition to reorganizing social practices. Students are working in the learning environment as developers by acquiring new knowledge and applying new tools while developing their own skills and expertise. Professionals - teachers and working life partners - work together with students in development work.

Based on the LbD action model, study assignments start with a project manager, who presents the current challenges in RDI project, identifying phenomena. At Laurea, the study assignment starts with a joint lecture by the teacher and the project manager who introduce the RDI project and its consortium as well as the learning assignment and the project's need behind the learning assignment.

The examples do not describe the integration with core competence modules and RDI projects but project studies related to the student's complementary competence modules. The teacher responsible for the learning tasks of RDI projects does not always have knowledge of the project's substance. Therefore, the project manager's involvement in the learning task's design, implementation and evaluation is important. The project manager evaluates the substance-related competence development and the applicability of the results to the project's activities.

The teacher's responsibility is to accept students from various degree programmes to the project study, describe learning outcomes, assessment scale and the schedule for the study assignment, and describe the learning objectives related to the study assignment. In addition, the teacher is responsible for planning the learning task to correspond with European Qualification Framework (EQF) 7, which is Master's degree level, and defining the key concepts, theories and methods that the student will know after completing the study assignment. This process makes studies in the RDI project transparent and consistent and helps Master's degree students to engage with the learning task. Moreover, it helps students to schedule their study plan, which is important as most of the students work full time.

Project studies are created with the LbD action model and exploit combinations of classroom and online teaching. Diep, Zhu, Struyven, & Blicke (2017, 473–475) and Halan (2005, 21–22) have described blended learning, which applies digital interactions and face-to-face teaching. Blended learning supports collaborative learning, interaction between teacher, student and collaborative partners as well as the student's self-direction and activity. It can also promote peer learning and peer feedback. Methods of blended learning fit well to the Master's degree student in the UAS. The learning process benefits from the sufficient guidance of students. It is experienced as an important success factor, while the RDI project may be seen as strange and unusual study-environment. To succeed in a learning assignment, students need discussion and interaction about the study task (Juvonen 2018, 2661). Digital guidance is organized to help students reflect on their study methods and plans and to ask for help from peers or from the teacher. Project studies also have their own digital learning platform where materials are shared.

Future 3UAS insights for the integration of RDI and higher education

During the last 15 years of development, first, since 2003, the research and development tasks, and then, since 2014, the innovation expectation have pushed relevant initiatives forward. Now, RDI activities at universities of applied sciences have entered into a new phase that relates to increasing competitive funding, highlighted especially in international networks (Arene 2014, 8). Besides developing their pedagogy and curricula, universities of applied sciences are more and more related to not only the regional development goals but also the European and even wider fund and grants arising for RDI projects for bigger ecosystems. Education and learning is an essential part of them.

Within 3UAS, the combination of knowledge, skills, know-how as well as nexus profiles and sectors form a new joint advantage for separate members and their regions. This enables a wide range of contributors to participate and end up with new realizations in joint excellence areas. The sustainability of the core functions is validated in the continuation of the research, development and innovation to and from educational activities. While project managers and workers need competence to succeed with RDI priorities, the funding and expectations of multiple stakeholders, higher education students need level-specific guidance and teaching to get the most out of the project structure and functions. Steering discussions are needed to find suitable ways of supporting abilities and talents to grow fully in their organizational and personal potentials.

It is exciting to recognize what kinds of competence and learning environment opportunities RDI projects create for students, teachers and other working life professionals of 3UAS. Now there are already around 25 ongoing joint 3UAS RDI projects. These serve many opportunities. Furthermore, the cooperation alliance is strategically concentrating on creating and gaining more shared initiatives between Haaga-Helia, Laurea and Metropolia through, for example, preparative 3UAS ProjectBooster rounds and through shared developing R&D Excellence focus groups. Besides growing the influential project portfolio for the regional development together, the joint 3UAS RDI projects serve as a communal co-creation, test and learning environment. Students have possibilities to reinvent future professional competence in more diverse ways, starting by participating even from applying funds, and turning the RDI projects' objectives into actions and results for them, the networks and community. Given the complex and challenging work environment, the RDI project with its objectives, actions, anticipated results and tracking as well as assessment serves as a genuine scheme for higher education and learning, both in formal and informal ways.

Conclusion

Future working life requires experts who have the ability to network and develop expertise in a changing world. The future review of the Finnish Ministry and Education (2018, 13) presents the creative economy, top research, RDI investments and intellectual property management as key success contributors to knowledge. From this point of view, students greatly benefit from the opportunity to work in international and multidisciplinary learning environments that RDI projects can also provide. This article has outlined some examples and views that can be developed further together, through combining the different settings and modes of operation and cultures. At Haaga-Helia, the integration between education with RDI projects benefits from confirming the structures and mainstreaming the good practices already done. At Metropolia, the existing structure and activities accounts from good matching and implementation with each other. At Laurea, searching for new perspectives to utilize the LbD action model helps to create interest and keep it managed, goal-oriented and widely exploited. At best, multidisciplinary RDI cooperation in 3UAS offers students a significant competitive advantage in the national and international labour market and attracts foreign students and staff to our region and networks.

In collaboration with 3UAS expertise in integrating projects with learning, the LbD action model can be developed towards LbD 2.0. The best from Metropolia's students' individual learning track and pedagogical model as well as the investigative and development-oriented approach to learning from Haaga-Helia offer added value to the LbD development process, which is part of Laurea's strategic development process. It will be seen how RDI projects support the development of future skills, such as problem-solving skills, teamwork skills, communication and critical as well as creative thinking in the long run, and how digitalization supports the LbD action model. However, the learning environments in 3UAS RDI co-operation seem to not yet be fully exploited in higher education studies, and thus offer opportunities for all who are willing. More evidence generated from data and results of 3UAS joint project collaboration will help to further develop integration and learning activities. It will be interesting to read other joint 3UAS articles on this topic.

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'Greater use should be made of the powerful new skill-development techniques which are experimental and creative in nature...Educators need to put students into situations...where they can practice managerial skills, not only interpersonal but also informational and decisional.' (Mintzberg, 1976: 53)

Kirsi Hyttinen & Róisín Smith

NAVIGATING THE EXPERIENTIAL LEARNING LANDSCAPE: ALTERNATIVE APPROACHES IN THE ACQUISITION OF SOFT SKILLS

Abstract

The importance of experiential learning in the development of soft skills cannot be underestimated. While educators, employers, and trainers all frequently emphasize the growing significance of professional and interpersonal skills, experiential learning in soft skills has yet to be systematically developed and evaluated. This paper seeks to address this imbalance by assessing the role of soft skills in experiential learning and exploring alternative approaches to learning. Learning skills through an immersive method and incorporating technology such as simulation and gaming, tends to create a rich and creative space for learning complex variables. However, these skills can be more challenging to acquire in terms of how skills are constructed through experiential learning techniques and more difficult to appraise. Moreover, we analyse the merits of such approaches as well as learning outcomes and argue that new approaches and more unconventional avenues for experiential learning should be explored and incorporated into education and training. This article is partly based on research conducted during the "Gaming for Peace" -project (funded by EU H2020 Programme) by two partner organisations from Finland (Master Degree Programmes in Laurea University of Applied Sciences) and Ireland (Maynooth University, Kennedy Institute) in 2017.

Keywords: learning soft skills, experiential learning, simulations, gaming, serious games, digital learning environments

Introduction

Learning through experience has become a familiar way of learning in educational and training environments. In some respects, the model of learning, passive learning and conventional formats which are essentially classroom-based are gradually being surpassed in favour of newer approaches to learning, including **'learning by doing'** and **'learning by reflection'**. The dominance of the digital sector and innovative approaches in the twenty first century has also led to new ways for incorporating experiential learning with technology. But what exactly is experiential learning and how can it be combined with technology to address soft skills? Experiential learning as investigational, new and exploratory in nature has been broadly defined as 'learning from experience or learning by doing. For instance, experiential education first immerses learners in an experience and then encourages reflection about the experience to develop new skills, new attitudes, or new ways of thinking' (Lewis and Williams, 1994: 5). David Kolb's (1978) theory of experiential learning has greatly contributed to the expanding philosophy of experiential education (Mughal and Zafar, 2011). Experiential learning is also built upon a foundation of interdisciplinary and constructivist learning and constructivist approaches to learning have also been influential in the field. 'Increasingly, mainstream cognitive approaches to learning have emphasised the assumptions of constructivism that understanding is gained through an active process of creating hypotheses and building new forms of understanding through activity' (de Freitas and Jameson, 2012: 19). Experiential Learning Theory (ELT) is a dynamic perspective to learning including dual dialects of action/reflection and experience/abstraction (Kolb & Kolb, 2009: 43). Therefore, connections are made between the active process and understanding, creating deeper levels of learning. Active learning, 'learning by doing' promotes understanding of the experience by involving the participants directly in the experience. Experiential learning requires an activity which must be performance based or action based.

This paper argues that in addition to technical and cognitive skills, individuals need a set of soft or social skills to be effective in their role. This includes more integrated skills, often referred to as the characteristic qualities and traits of leadership, adaptability, cooperation, communication, trust, teamwork among others. Can similar theories of experiential learning be applied to the technological tool of gaming, particularly in developing soft skills? The purpose of this study is to assess why scholars and practitioners are increasingly drawing on technological innovation, such as simulation and gaming to incorporate experiential learning techniques to acquire skills. 'The interest is mainly attributed to the perceived effectiveness of simulation games in learning and skills building' (Alsaaty, 2014). Distinctions could be made between acquiring skills or learning skills, as simply knowing a skill and

having knowledge about soft skills, does not equal skilled. Deliberate practice and experience, learning by doing, reflection on experiences, all can lead to the acquisition of skills. In this way, it is more than simply learning about soft skills. This demonstrates the significance of navigating through the experiential learning landscape in order to assess the development of soft skills.

Simulations and gaming have been used as a teaching tool in various environments, from business and managerial quarters to the humanitarian and healthcare sectors, but the acquisition of soft skills through simulation and learning is more difficult to quantify. We discuss the difficulties in defining both simulation / gaming and soft skills, and assess the contribution technology and alternative approaches can make in experiential learning and acquiring soft skills. The importance of navigating through experiential learning, understanding what elements can contribute to soft skills and learning, allows for opportunities to be explored while also questioning important challenges in the field. We argue that new approaches and more unconventional avenues for learning should be incorporated into education and training. However, this should be accompanied by sufficient and appropriate tools for measurement and for systematically evaluating these approaches.

The Experiential Learning Landscape and Technological Approaches

The variety of experiential learning processes in education and training appear infinite. Current academic literature and practice on the subject as well as alternative approaches to the learning landscape has rapidly expanded in recent decades. Through the experiential learning process the learner has a 'raw' experience, in contrast to mediated learning, a process in which material is synthesized and modified to shape the learning experience (Moon, 2004). This can be seen as an essential element to the use of technology and innovative approaches to learning, such as gaming which can reflect the 'raw experience' of learning in practice.

Experiential learning methodologies do not treat each subject as separate or unconnected. However, this poses potential impediments given the variety, the complexity of variables involved and the open interdisciplinary nature of this type of learning. Defining experimental and experiential learning therefore when combined with technology and the learning of soft skills equally poses challenges. All three elements must be considered when evaluating the outcomes. Therefore, this cannot be appraised or considered in a linear format or in a vacuum. Learning must represent real life experiences. 'Compartmentalized learning doesn't reflect the real world, while...the experiential classroom works to create an interdisciplinary learning experience that mimics real world learning' (Wurdinger, 2005: 24). In this instance, simulation and gaming can be appropriate formats to reflect the experiential learning of the 'real' world.

Notwithstanding this, simulation and gaming have proven notoriously difficult to define. For example, 'simulation/gaming encompasses an array of methods,

knowledge, practices, and theories, such as serious game, computerized simulation, modelling, agent-based modelling virtual reality, virtual world, experiential learning, game theory, role-play, case study, and debriefing' (Crookall, 2010: 899). As a consequence, we are defining gaming as an online technological tool that can be used for experiential learning, such as a serious game. Acquiring knowledge and skills through a serious game is a new and emerging field. This type of learning is often referred to as smart play. In addition to the entertaining qualities, fun and creativity elements of the game, it also has a purpose, i.e. educational values. Serious games are said to be games for learning, educating, and developing new skills, including soft skills. This type of gaming which includes simulations and virtual worlds, have the potential to be an important teaching tool because they are interactive, engaging and involve immersive activities (Ulicsak, & Wright, 2010).

Substantive literature, research and scholarship have pointed overwhelmingly in favour of gaming as an educational tool (Pivec and Dziabenko, 2004). Game based theories and simulations as 'active learning', have frequently been applied in the teaching of conflict analysis, conflict resolution, negotiation and mediation as well as other disciplines including the learning of soft skills. Zyda defines serious games as a mental contest, played with a computer in accordance with specific rules that uses entertainment to further government or corporate training, education, health, public policy, and strategic communication objectives (Zyda, 2005). However, as with e-learning / online learning, the industry is still developing in terms of experiential learning and skills, and suffers from many pitfalls and potential risks. Serious games are addressed under various different names, e.g. immersive learning simulation, digital game-based learning and gaming simulations which can lead to confusion about 'actual' learning goals and outcomes when it comes soft skills.

Technological Innovation: Soft Skills, Learning and Gaming

Similar to the definitions around gaming and serious games, scholarship and practice has not developed clarity when it comes to defining soft skills. While soft skills have been termed everything from communication skills to non-verbal skills, or from emotional skills and empathy to non-cognitive skills, definitions are continuously contested in the literature. The World Health Organisation (WHO) referred to them as life skills in the 1990s. The Organisation for Economic Co-operation and Development (OECD) has recently described them as 'Skills for Social Progress'. Soft skills are crosscutting behavioural and professional competencies and attitudes needed to effectively operate in working environments. Competency includes four pillars, which can be identified as personal characteristics, attitudes, knowledge and skills. If these pillars are combined, it will lead to high-quality performance (Dall'Amico & Verona, 2015: 8). One definition of soft skills comes from the winner of the Nobel Prize for Economics in 2000, James Heckman: 'Soft skills predict success in life'. In 2008, it was pointed out that modern organisations seem to value soft skills more than in the past, e.g. ability to learn, presentation skills, teamwork, interpersonal communication, initiative, creativity, entrepreneurship, leadership and management (European Centre for the Development of Vocational Training,

2008). 'A multitude of employer surveys, conducted over the past two decades, suggests that soft skills are as important to the success of our youth as the more traditional academic skills (U.S. Department of Labour, 2010, op. cit. Proctor and Justice, 2014)

Due to current trends, Information Technology (IT) tools and resources have significant influence on teaching and learning processes (Sevillano-García & Vázquez-Cano, 2015: 106-118). Serious games could therefore increasingly be constructed for developing soft skills in educational and training environments. Using technology as a teaching mechanism and learning a skill can have a positive and beneficial experience. 'The majority of studies discuss the beneficial impact of game-based learning (GBL) activities on knowledge acquisition and conceptual understanding, revealing positive cognitive outcomes in promoting knowledge concept learning and deeper content understanding' (Vlachopoulos & Makri, 2017). This can have significant benefits in educational settings. Research has indicated that the relationship between education and work should be highlighted to ensure the development of student's competences (Jääskelä et al, 2018: 131). Practical experience in learning is highlighted and thus essential. Based on the earlier theories, learning can happen through one's own experiences (Kolb, 1984: 21), through critical reflection (Mezirow, 1981) and in problem-based solving (Poikela & Poikela, 1999).

In problem-based learning (PBL) students learn by solving problems and reflecting on their experiences (Barrows and Tamblyn, 1980). Learning is normally related to politics, ideologies, knowledge employment, and different creative and interactive ways of living (Aspin & Chapman, 2007; Jarvis, 1998). Today, lifelong learning is described as high-individualized way of learning, which is guided by the changes, and new ways of life (Field, 2006: 77). When the classroom based learning is more structured and formal, informal learning is not typically classroom-based or structured and the learning is in the hands of the learner (Marsick, V., & Watkins, K. 2001). Separate from the teacher-centered pedagogy, the learner-centered pedagogy acknowledges students' needs, ability and learning styles (Weimer, 2013). Also Learning by Developing (LbD) learning approach looks for the active learner role in the learning process. Imaginary scenarios can facilitate learning. Considering the learning objectives of the European Qualification Framework (EQF), the relevance of competencies can be addressed. Soft skills are representing one pillar of competency leading towards high-quality performance (European Qualification Framework; Dall'Amico, & Simonetta, 2015). It is clear that future professionals, especially working in international contexts, should be embedded with soft skills already in higher education studies. Experiential learning approaches should also include the goal of blended learning and the learning perspective taking place through digital learning solutions.

Moreover, it seems logical to observe that with the onslaught of newer and more effective ways of online learning, including serious games, that the acquisition of soft skills should also be encompassed in these technological advancements. For instance, Farrell (2005) observed that a simulation game in an international business

course was a highly beneficial learning tool compared to traditional teaching methods (e.g., textbook and cases). This method allowed students to develop skills in teamwork but also engaged student interest in the subject matter (Farrell, 2005). Reid, Brown, and Tabibzadeh (2012) pointed out that simulation programs provide the best learning platform. In addition, de Freitas and Routledge (2013) have noted that firstly, 'studies have been undertaken which show the potential for learning soft skills and leadership skills in game environments; secondly, 'games are powerful training and educational tools for motivating and engaging learners, and reaching hard-to-reach learner groups' and thirdly, 'leadership and soft skills need to be taught differently from hard skills.' If leadership needs to be developed differently from hard skills, then alternative approaches in experiential learning using technology could be incorporated. In line with the open nature and interdisciplinary approach of experiential learning, 'learning by doing', serious games provide a platform for 'learning by simulation', simulating a real life experience in order to enhance skills. In fact, the EU H2020 Gaming for Peace (GAP) –project which is funded by the European Commission - is developing a digital game so that participants can experience scenarios through role-playing, thus increasing their understanding of soft skills.

Navigating the Experiential Learning Landscape: Opportunities and Challenges

Even with the opportunities that technology can provide, researchers have seen the implementation of a technology-supported collaborative learning environment as a challenge (Zheng et al, 2015). Dalsgaard (2006) argued that support a social constructivist approach to e-learning by providing students with personal tools and by engaging them in social networks, thus allowing learners to direct their own problem-solving process. Nevertheless, this requires the implementation of learning in social software tools. Dalsgaard pointed out that traditional e-learning should move beyond Learning Management Systems (LMSs). Ideally, the online learning components are combined or blended or hybrid methods including face-to-face instruction, in order to provide more learning outcomes (Means et al, 2009). The digital learning environment can enable experiential learning setting incorporating a multitude of situational scenarios (GAP-project, 2017: 9).

Learning that involves the digital world could be considered as part of an overall learning platform to develop and enhance skills, and should be further explored and encouraged but this should not be developed in isolation. For instance, learning that requires elements of games based learning and simulations immerse the player in the game itself and engagement in the decision-making process of the game requires the player to learn the consequences of their decisions. It is therefore an active learning process. Technological solutions may benefit teaching and bring new tools for learning methods. However, what does all this mean for the development or acquisition of soft skills? Is it possible to enhance soft skills through serious games?

Despite promising research and the relevance of soft skills in twenty first century professional environments, systematic evaluation and measurement of experiential learning of soft skills remains in its infancy. Very few studies exist that discuss the opportunities and challenges in learning soft skills with technology. In fact, while experiential learning must be linked to learning based outcomes, evaluations of soft skills needs far more scrutiny and systematic analysis in order to understand the impact of these specific skills and competences when it comes to innovative approaches to learning with technology. Far too many complex variables exist when it comes to skills, including the context, the learners previous experience, the particular scenario developed, the design of the game, the learners' ability to understand what is being asked, the learner's ability to learn, and a general lack of knowledge and 'know-how' relating to skills, all pose potential problems in the acquisition of skills.

William Spady, an educational researcher who developed a philosophy around outcomes based education, suggests that the ability to demonstrate learning is key and that learning must be performance based and clearly demonstrated at the end of significant learning experiences. Is this possible in a serious game? How do we know skills have actually been acquired? Systematic evaluation and feedback may be key to this type of learning. 'They are not values, beliefs, attitudes, or psychological states of mind. Instead, outcomes are what learners can actually do with what they know and have learned, they are the tangible application of what has been learned. This means that outcomes are actions and performances that embody and reflect learner competence in using content, information, ideas, and tools successfully. Having learners do important things with what they know is a major step beyond knowing itself' (Spady, 1994; 13). Spady claims that significant content is essential, but that content alone is insufficient as an outcome. Rather, 'knowledge of content' must be manifested through a demonstration process of some kind.' In order to achieve this outcome, learners must be 'problem solvers, planners, creators, learners and thinkers, communicators etc., regardless of subject areas studied' (Lesch, 2012). However, these are all dimensions of soft skills which are not easily discernible or observable in a serious game. Furthermore, learning outcomes generally refer to what is observable and measurable in terms of **knowledge, skills and attitudes**.

Ideally, learning outcomes should: reflect broad conceptual knowledge and adaptive vocational and generic skills; reflect essential knowledge, skills or attitudes; focus on results of the learning experiences; reflect the desired end of the learning experience, not the means or the process; represent the minimum performances that must be achieved to successfully complete a course or programme (Lesch, 2012). The National Institute for Learning Outcomes Assessment (U.S.A.) claims that learning outcomes should clearly state the 'expected knowledge, skills, attitudes, competencies and habits of mind...that [participants] are expected to acquire. In a game based scenario, challenges must reflect the skills, therefore, how complicated is the scenario and using skills, how does the learner tackle them as well as in the 'competence' field, ... 'to what extent can the learner identify the gaps in their learning and take steps to fill those gaps' are important questions when assessing soft skills

(National Institute for Learning Outcomes Assessment (U.S.A.). However, it must be acknowledged that some attributes such as personal qualities, cannot easily be classified into concrete learning outcomes, even though learning is expected to take place. The OECD (Organisation for Economic Co-operation and Development) in *Measuring Improvements in Learning Outcomes* proposes a valued added model of measuring which provides a fair, precise and quantitative tool for assessing students' progress.

Learning effectiveness which is measured by performance achievement in the game is important in the design of soft skills and serious games. Notwithstanding this, it seems obvious that a generic 'one size fits all' standard of performance for learning outcomes and soft skills does not exist but that 'general' expectations of what a learner is capable of doing and demonstrating is relevant for learning outcomes. It should also be noted that outcomes are about performance, a performance which can be demonstrable, i.e. the focus is on the performance not the activity or task to be performed. Several learning tool evaluation sessions in the IECEU (*Improving the Effectiveness of Capabilities in EU conflict prevention*) and GAP (*Gaming for Peace*) shows that playing the game raises the awareness and thinking around soft skills and competences. Nevertheless, playing the game does not yet guarantee the action by the learner in a similar way in a real life context.

Numerous studies have pointed to a dearth of evidence regarding the design and delivery of gaming as a method for training soft skills. This opens up the possibilities for future research on the merits for acquiring soft skills and in educational settings. According to de Freitas, 'learning in the immersive worlds presents us with the ability to remember learning experiences for longer, engaging and motivating us as leaders' (de Freitas, 2014: 16). Whereas de Freitas points out, 'face to face' learning still represents the 'gold standard' in education (de Freitas, 2014: 16), we also have to consider how new tools and emerging technologies allow us to utilise and improve methods for enhancing soft skills in higher education. It should also be acknowledged that creating sophisticated storylines with multiple scenarios for roleplaying and challenges for enhancing soft skills can be more expensive and time consuming to create. This makes the goal of enhancing soft skills through gaming more problematical and must be taken into consideration in any game design. In addition, Problem-based learning methods are mainly implemented and studied in medical education (Neville, 2009), but could be further studied in the gamified digital environments as a learning and teaching method. Also, the Learning by Developing –model could bring new advantages for digital learning especially when considering blended methods throughout the processes.

Conclusion

There has been rapid expansion in technological innovations in recent decades. In the beginning of the twenty first century, online learning was described as complex, diverse, and rapidly evolving within education and training (Anderson & Elloumi,

2004). Dramatic advances in technology have been successful, inspiring new approaches to learning and ‘a space to reconsider, re-imagine, and re-invent learning environments able to prepare and excel each individual for effective life-long learning’ (Groff, 2013). Active learning and ‘learning by doing’ can transform education and is a critical component of preparing individuals for lifelong learning.

However, we are still at the frontiers in how best to explore and experiment with these new approaches, especially in determining how skills can be developed and enhanced further using technology as an experiential learning tool. While experiential learning through an immersive method such as gaming provides a rich and creative space for learning, more systematic studies and further research is required. Specific gaming techniques should be developed that evaluate learning outcomes with regard to soft skills and more appropriate tools should be designed for assessing whether soft skills are actually acquired. As with all new approaches to experiential and experimental learning, opportunities and challenges exist and there is potential as well as risks to serious games. While gaming tries to replicate a particular scenario, the lack of empirical studies on soft skills and gaming remains a critical drawback to a systematic evaluation.

Soft skills learning needs to be part of the professional expertise development of higher education studies ensuring that knowledge, experiences and critical reflection or reflective thinking are part of a learning process. Reflective thinking and reflection can also bring clarity for unclear situations (Moon, 2013). As previous studies show, the design and development of online learning requires a wide range of expertise in the development phase as well as the motivation of learners and trainers to use technology for learning. Saariluoma et al (2016: 148) argues that the motivation is seen rather relevant in explaining the use of technologies by humans. Before development of online solutions, it is suggested to conduct in depth analysis on the current needs and requirements, context as well as end users (Hytinen, 2017: 281). The experience could illustrate the strength of experiential learning of soft skills and competencies through role-play, problem-based learning in a scenario context. As such, this can relate to the advantages of the digital simulated learning environments.

As a conclusion, the development of online learning and education tools should follow the principles of experiential learning. This can be seen by the increasing number of new and innovative approaches in digital learning. In practice, blended online learning components should be combined with more traditional and face-to-face learning components. In addition, the challenge around learning games and virtual environments may stem from the lack of real-life experience. Therefore, the reflection and practice in real-life must be included at some level to curriculum and methods in education. The use of technological tools and open source avenues should be better piloted and studied in this regard. The more different communities of practice are engaged through test, review and feedback during the process, the more it will provide for the successful dissemination of digital learning tools among educational communities in the future.

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IV REGIONAL DEVELOPMENT

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DIGITIZING LEARNING BY DEVELOPMENT

Abstract

At Laurea UAS, working life orientation is geared by the Learning by Developing (LbD) pedagogical model. LbD courses have been implemented with companies and students, while technological development has increasingly enabled anytime-anywhere collaboration. Online degree programmes have become an attractive alternative for carrying out higher education studies and, like F2F learning, there is a strong need to integrate research, development and innovation (RDI) as part of online studies. This study opens up the way teachers see the opportunities for applying the LbD model in an online environment. Is the model as such applicable to learning that takes place 100 per cent online? There is a call for best practices on how to benefit from technology to make LbD projects a fruitful learning experience and to maximize their outcome.

Introduction

Online learning has become a standard alternative for studying in higher education (HE). HE institutions are offering an increasing number of online degree programmes and they have gained popularity due to the flexibility they offer. Learning online is especially practical for people who study alongside their full-time job. Very often, these people have gained working life experience and are motivated to develop their own workplaces. Therefore, there is a strong need to integrate authentic working life projects as part of online studies.

The Learning by Developing (LbD) pedagogical approach stems from the responsibility of UASs for regional development (LbD Guide, 2011). The LbD model relates to project-based learning and bears a resemblance to problem-based learning (PBL) in an authentic learning environment. Both models are based on real-world problems, but LbD focuses more on learning outcomes and is more student-centred (Raij 2013, 15). LbD projects offer an ecosystem in which students, workplace partners and teachers learn together. For the Laurea Master's Degree programme, a continuum for the LbD model has been developed. It is Learning by Researching and Developing (LbRD), which connects the scientific approach and research process (Ojasalo & Co, 2017).

Due to the opportunities and challenges digitalization offers to the LbD model, we found it necessary to ask the following questions:

- What kinds of opportunities and challenges does digitalization offer to the use of the LbD model in an online context?
- To what extent can the LbD model be carried out in an online course, taking advantage of modern information technology tools?

These questions are primarily approached from the point of view of lecturers.

Theoretical background

In the era of digitalization, students as well as teachers need new kinds of competencies, and learning itself also needs to undergo a transformation. It is especially important to develop pedagogical solutions that make use of digital opportunities and, at the same time, support active learning.

Just as digitalization offers companies opportunities to closely track consumer buying behaviour, it also helps to understand students' learning better if we follow the same analogy and see our students as customers (Farrington & Alizadeh, 2017; Peña-Ayala, 2017). When companies understand their customers better, they can offer more customer-pleasing products. Similarly, when teachers understand their students better, especially how they learn, using online learning environments, there's a great opportunity to improve the learning process and learning outcome. For companies, the new level of understanding often stems from Big Data; in higher education institutes, learning analytics helps the management and the teacher staff see the forest for the trees.

While the general acceptability of digitized books in HE is a work-in-progress among students (Joseph, 2015), the availability of electronic material has affected the course creation process. The abundance of available electronic material allows teachers to plan and implement versatile assignments for online learners and the need to create their own content has decreased.

The internet is bringing about a fundamental change in the way knowledge is created and disseminated. Previously, information flowed from teacher to student, but now it is multidirectional. Digitalization has created new demands on teachers' professional skills. In an authentic working life development project the teacher is the catalyst of an innovative process (Thorp & Goldstein, 2010, 13). The LbD model provides fertile ground to foster bottom-up interests and thus can be perceived as motivating. When facilitating an LbD project, the teachers needs to step out of their comfort zone in two ways. First, the project process and its outcome are, in many cases, not predictable and the teacher needs to adapt to changing situations quickly (Juvonen, 2018). Second, an authentic working life project today calls for the ability to operate making use of the tools found in the digital world. Shared expertise is characteristic of every stage of the LbD-based learning cycle. Advanced technology can make sharing open, efficient and easy to document.

One of the critical features of the LbD model is authenticity, which means that learning is based on a real-life development project (Raij, 2007, 22). In authentic learning, the new knowledge that students gain is based on problem-solving situations (Herrington & co, 2010). In the context of online learning this implies that a single authentic task or project plays a crucial role in an online course. The LbD model was created in the era when digitalization had not yet taken a strong role in education.

An earlier study by Marstio & Kivelä combined an LbD model with social networking services that contribute to collaborative learning, partnerships, creativity and innovativeness (Marstio & Kivelä, 2014). Figure 1 shows how the use of new technology together with social networking services may contribute to virtual empowerment.

When contemplating LbD online, it can be mirrored with the online learning models developed for online education, such as the five-stage model designed by Gilly Salmon. It describes a process for an online course in which learning is based on gradually building on the participant's previous experience. The model also strives to maximize participation and interaction between participants.

Gilly Salmon has designed this model for e-learning, which puts the emphasis on communication and interaction between the students on online courses. It contains five stages for online moderation: 1) Access and motivation, 2) Online socialization, 3) Information exchange, 4) Knowledge construction and 5) Development (Salmon, 2013). The model is based on scaffolding experience and knowledge, and then constructing new knowledge together. The role of the teacher changes throughout the online course from motivator to facilitator to coach and finally to evaluator.

In the following, the steps of Salmon's five-stage model are applied to a project-based online course, an LbD learning project, where contact with the lecturer takes place only online and where the students may or may not have physical contact with the work-life representative (referred as LbD Online).

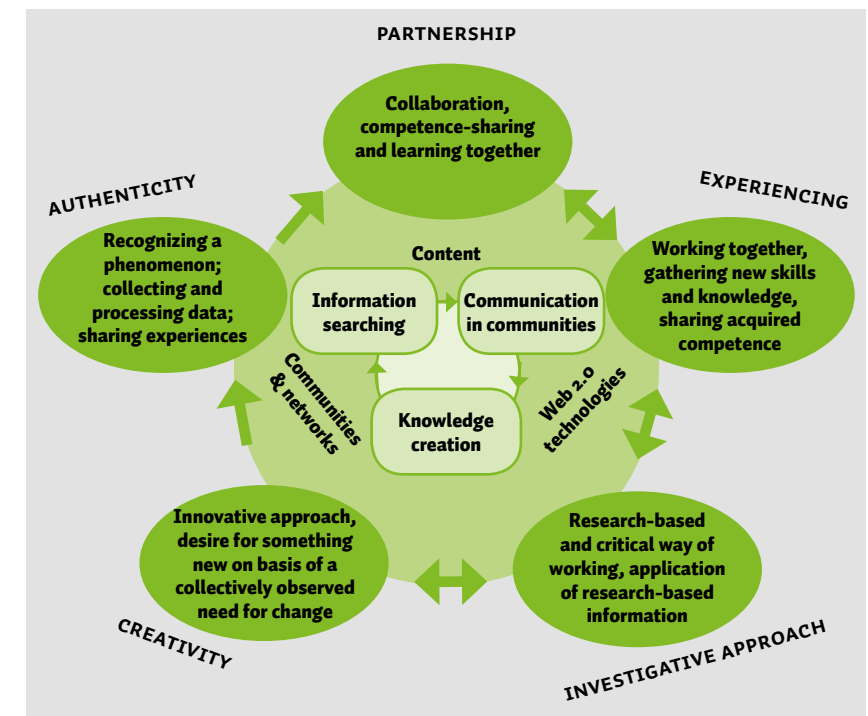


Figure 1. Combination of the LbD model with social networking services (Marstio & Kivelä, 2014)

Stages 1 and 2: Access and motivation and online socialization:

The first two steps of Salmon's model concentrate on helping the student to become comfortable with the learning platform, providing motivation and enabling the students to get to know each other. In an authentic LbD online project this refers to the kick-off stage where the students learn to know the project team members as well as the representatives of the partner organization. At this stage, it is very important to set the expectations and to engage the students and the partner company. There is also a need to encourage and support students in what can be unfamiliar and discomforting activities. Very often the project is motivated by a need for change, a desire for something new and, at the same time, uncertainty of where it will lead (Raij, 23, 2007). LbD is based on group work and therefore the formation of the working groups is an important part of this stage. It is also one of the challenges of LbD as the group dynamics do not always work (Vyokarnam & Co, 60, 2008). The technological aids at this stage comprise principally emails, online conferencing and a discussion area using an online platform. The role of the lecturer is to act as a motivator and facilitator.

Stage 3: Information exchange:

At stage 3 there is a strong focus on tasks and actions. The students communicate a lot at this stage and together deepen their understanding. It is about explaining and clarifying (theoretical) concepts. This is typically the research part of an LbD project.

At this stage, the students study the theory related to the project, seek information and interact with the partner organization (when necessary). Technological tools mainly include applications for online communications (e.g. WhatsApp, Slack, FB). Online meetings are also held. The role of the lecturer is to act as a coach, providing back-up in the background.

Stage 4: Knowledge construction:

The objective of this stage in Salmon's model is to broaden understanding, provide different viewpoints and examples and seek real-world examples and cases. In an LbD project, authenticity provides the most added value at this stage. Based on the previous phases of the learning cycle, the students are able to build new knowledge and broaden their understanding of the case. They can provide different viewpoints, perspectives and examples. The use of technological aids is primarily for online meetings. The role of the lecturer is to provide support, when needed, in weaving the results together and in summarizing them.

Stage 5: Development:

The final stage is about showing what has been learnt, reflecting on the knowledge built and sharing the learning experience among the students. In an LbD project this is typically the stage when the students present their results from the project to the partner organization, to the lecturer and to their peers. It is the moment when the project partner receives ideas and insights for development. The use of technological aids is primarily for online conferencing and videos. The lecturer's role is to act as an evaluator.

It can be concluded that, with certain limitations, the 5-stage model could serve as a functional framework for LbD Online. The importance of support for students during the early weeks of immersion into a project-based online course cannot be exaggerated (Herrington & Co, 2010, 95)

Methodology

To answer our research questions we used qualitative research consisting of interviews with eleven Laurea lecturers and two company representatives by using open-ended questions. The lecturers represented all fields of education at Laurea and they are all considered to be experienced in using the LbD approach in their teaching. There were four main areas that were considered in the interviews. These included the perception of the LbD model and the technological implications to its use, the lecturers' perception on applying the LbD model in online courses and finally their recommendations for better utilization of LbD teaching.

Results

The interviewed lecturers were asked how they would define the LbD model. The ample scale of interpretations shows that there are many ways to apply the model

in many different settings. All shared the view that LbD is about learning through doing, by carrying out real working-life projects. Some teachers saw LbD as being about innovative outcomes and new ideas. Others stressed practical experience and research orientation. As one lecturer put it, "In an LbD project, theory and practice are in discussion with each other."

Also, the aspect of togetherness was brought up in many responses—that the students are together seeking solutions to challenges facing the partner organization, on the basis of a knowledge base. It was pointed out that in the early stages of studies the role of the teacher is and should be strong as the project methodology is not necessarily known to the students. Students familiar with the LbD model can take more responsibility for carrying out the learning projects.

Positive and negative impacts of technological development on the LbD model

Many positive impacts were brought up in the interviews. Technological development has provided multiple ways to communicate and interact in an anywhere-anytime fashion. This offers new opportunities for students, educational institutes and companies participating in shared projects to better interaction and communication.

Physical presence is not a must anymore and independence in terms of time and place levels the field for everyone. Electronic resources are available to everyone, which allows for flexible scheduling, also internationally. Students are already heavily involved in the digital world through social media, so the digital learning environment, including the companies, can have a stronger linkage to the students' lives. All this creates a possibility to make use of new pedagogical solutions to improve the learning experience and outcome, and everyone will learn new digital skills.

Even though the list of positives is quite substantial, a doubt was also cast on the adoption of technological possibilities. The primary worries (challenges perceived) were:

- In an online environment, the possibility of misinterpreting the original intent and lack of shared vocabulary might pose a challenge, e.g. programmers communicating with marketing people.
- The startup of a project is more straightforward face-to-face.
- Technology takes too much attention away from the objectives of learning and teaching.
- The deployment of technology can be difficult, calls for training and takes time.
- Will physical presence become a future luxury?
- Difficulties due to the (possible) continuous change of the technology (tools).
- The technology must work.
- The feeling of co-operation has to exist online too.
- traditional (seated class) courses because of face-to-face encounters.

Perceptions on applying the LbD model in online courses

Generally, a positive attitude towards the possibility of moving all the education and training to an online environment prevailed. With certain reservations, the teachers had a positive view on integrating the LbD model in online education. Their concerns focused on pedagogical challenges such as the grouping of the students, facilitating efficient communication and guidance during the project. Also, the topic and complexity of the project were considered factors determining the possibility to work online.

The teachers were of the view that a well-organized kick-off contributed to the success of the project, comprising the grouping of the students, objectives and deadlines defined together with the project partner as well as the expected outcome. When facilitating the grouping of the students for project work, the teachers found it important to define clearly the role of each team member and to change these roles from one project to another.

A big challenge in applying LbD online in particular and online education in general is to transfer the feeling of the presence of the teacher from the classroom to the internet. The worry about the level of presence that can be demonstrated in an online environment was voiced during the interviews. In the classroom there is space for spontaneous questions and guidance can be adjusted easily to match needs. The

interviewed teachers felt that in online projects they had to be very proactive online in order to stay up to date with the development of the students' work. Some felt that the crucial parts of LbD projects, such as the initial meeting with all the participants, the project kick-off, should be implemented face-to-face. According to a previous study by Sanna Juvonen (2018), an efficient and meaningful communication is one of the most common challenges also in traditional LbD projects. Almost everything can be moved online but the verification of working interaction is a must.

The involvement of the working life partner in a project carried out online also depends on how well the company uses digital tools for communication. In Master's degree programmes where most of the students are active in working life, it is very common that students carry out the development project with their current employer. At Bachelor's level, it is common that the teacher identifies the partner organization(s) and is active in framing the research problem together with the partner organization.

The topic and complexity of an LbD project were considered as important factors when defining the suitability for online implementation. For example, a digital service development project can be carried out online, while a project related to a change process calls for F2F communication.

In general, the teachers felt that it is better to move the LbD learning model online at a later stage of the studies when the students have already learnt project management and know their peers. During the interviews it was also pointed out that the LbD model can be applied in many different ways. Not only as a part of tuition—for example, through traineeships and separate projects for which the student gains credits.

LbD projects can be challenging due to the expectations for high involvement of company representatives. The substance students are supposed to master could be outside the skillset of the teachers involved in the project. Instead, the company representative is expected to offer active mentoring and guidance. This could materialize, for example, in software projects because for teachers it is difficult to keep up with all the different programming languages.

The idea of learning 24/7 online might have some limitations when it comes to the participation of companies. Busy workdays affect the timeliness of commenting and replying to messages. Company participation often includes an element of charitable work and company representatives cannot be expected to commit time and effort on a daily or even weekly basis. This could affect the performance of the students (student groups), and teachers might not be able to compensate for the lack of company mentoring and guidance. Students advance in their studies during evenings and evenings could prove difficult with regard to reaching out to company representatives and even teachers. By nature, communication is closer to asynchronous than synchronous.



What could be done in order to better utilize LbD in teaching?

To have the option of better utilizing the LbD model in teaching, a few issues need to be addressed. Primarily the issues are project objectives versus learning objectives, the need for committed project partners, the disconnect between the university and the companies, clear specification of the project objectives and working methods.

Projects cannot dictate the content of courses. Each student has learning objectives stemming from the general course objectives. The course learning objectives should be in line with the industry expectations regarding the needed skills and knowledge. A versatile project base is required to guarantee our students' optimal knowledge and skill set development. The logical consequence is to double check that the planned substance is covered during the studies.

A need for committed project partners (companies) also exists. Companies who commit to mentoring and guiding students during the whole project are of high value. This is especially important when substance-related support is expected from the target company. It could prove difficult for teachers to compensate for this. Shorter project lifecycles might help companies to have a stronger presence in projects.

Bridging the gap between the university and companies is necessary. This could materialize by creating a network of LbD instructors (teachers) and focusing on genuine interaction between the university and the companies, for example.

Detailed specification of the project objectives is seen as an important part of a successful LbD project. Detailed specifics on the expectations for the final outcome will help students comprehend the overall project better. Also, good instructions on proper working methods in projects could positively affect the overall results and experience. For example, in version management, i.e. when a company representative is expected to comment on student work, it should be easy to find out which is the right document for commenting. These issues could be at least partly solved by introducing proven and good case examples for planning the teaching of LbD courses, training personnel for the new version of LbD (in the digital era) and offering supporting material for the use of new digital tools.

Discussion/Conclusions

This study shows that, with certain reservations, there is a positive view on integrating the LbD model in online education at Laurea. The challenges are pedagogical in the first place and related to technology in the second place.

As for the pedagogical aspect, teachers need to consider how to integrate digital technologies in pedagogically meaningful ways in order to facilitate efficient communication and guidance. All projects are different and, due to their complexity, the pedagogical process needs to be adjusted. Gilly Salmon's five-stage model offers an interesting alternative for framing a pedagogical script for an LbD project.

Apart from pedagogical and substance matter knowledge, the teacher also needs the ability to use various technological tools. LbD online calls for the use of new participatory learning technologies for sharing, channelling and publishing information. It is also necessary to keep a close eye on technological developments. The tools used, for example, to communicate with students and companies cannot change often and those tools need to be reliable and easy to use. We cannot expect company representatives to spend valuable time learning how to master new technologies. Preferably, we should use the same tools the companies use. It is worth noting that we do not have to use the latest technology, but we need to use technology that meets the requirements that satisfy all related parties.

It is obvious that new digital tools and environments can help run more efficient LbD projects. Even though the whole project would not be implemented online, online environments with learning management systems, communication tools, social media applications, etc., can strengthen communication, ease access to project materials/resources, help build substance-related skills and knowledge, and so on.

There is a direct need to find committed companies to partner in LbD projects. The preferred outcome would be to have partnering companies who, in addition to offering a target for the projects, also commit to mentoring and guiding the students during the whole project. Digital communication technologies can help solve issues, such as those related to physical presence and time management. In any case, a face-to-face component in any LbD project is recommended.

Technology enables anytime-anywhere co-operation. What is the best method for incorporating this into LbD projects? LbD 2.0, a DigiLbD-model, would be a continuation of Laurea's LbD model.

In addition, a call for best practices on how to benefit from technology to make LbD-projects a fruitful learning experience and to maximize their outcome exists. After the collection of experiences, it is time to launch LbD 2.0 and then train the staff in applying it.

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Jyri Rajamäki

LbD-BASED CYBERSECURITY RESEARCH, DEVELOPMENT, EDUCATION AND TRAINING IN HEALTHCARE

Abstract

Phenomena such as the Internet of Things and smart sensor systems in healthcare are advancing at such a fast pace that training on them must be provided even before completed and tested theories and models exist. This means that with regard to this kind of phenomena, basic research and teaching take place at the same time. The Learning by Developing (LbD) concept developed at Laurea has been integrating learning and developing with one another, with the main emphasis on learning, for more than ten years. This article presents an action model for integrating the higher education institution's teaching task to serve both basic and applied research without compromising the quality of teaching. The case example is the integration of the research into and development and teaching of cybersecurity in healthcare systems in two research projects being carried out at Laurea: SotePeda 24/7 and ECHO. This article introduces a systematic action model for integrating teaching/learning with research and development to enable competence development and creation of new knowledge basis for the field in question. The suggested topics for further research are the practical testing of the action model in the SotePeda 24/7 and ECHO projects, further development of the model and dissemination of the model to other fields of education and research as well as their multidisciplinary interfaces.

Introduction

In Finland, research institutions conduct high-quality research and vocational institutions provide high-quality vocational education. Universities and higher education institutions both conduct high-quality research and provide good teaching. Thus, it can be said that the high-quality universities and higher education institutions teach what they research and research what they teach. However, there are many new multi-disciplinary research projects that emerge on the interfaces between traditional fields of study, and transferring the results of research as such to teaching in any field of study is not easy. In addition, significant phenomena, such as the Internet of Things and smart sensor systems in healthcare, are advancing at such a fast pace that training on them must be provided even before completed and tested theories and models exist. This means that research and teaching with regard to these kinds of phenomena take place at the same time. The Learning by Developing (LbD) concept developed at Laurea has been integrating learning and developing with one another for more than ten years. This article presents an action model for integrating the higher education institution's teaching task to serve both basic and applied research without compromising the quality of teaching. The case example is the integration of the research into and development and teaching of cybersecurity in healthcare systems.

Healthcare is a vital component of Finland's critical infrastructure, yet it is one of the most vulnerable sectors for cyber attacks. To share the knowledge on information security processes and data protection procedures, educational and training schemes should be established for staff working in healthcare settings. However, training IT staff alone is not enough as many of cybersecurity threats are caused by human errors or a lack of awareness. Current awareness and training schemes are often implemented in silos, concentrating on one aspect of cybersecurity at a time. An LbD-based framework provides a holistic cyber resilience and security framework for developing and delivering a multilateral educational and training scheme based on a proactive approach to cybersecurity. The framework is built on the principle that education and training must be interactive, guided, meaningful and directly relevant to the operational environment of users. The framework addresses capacity mapping, cyber resilience level measuring, utilizing available and mapping missing resources, adaptive learning technologies and dynamic content delivery. An LbD-based framework launches an iterative process of awareness and training development with relevant stakeholders (end users' hospitals, healthcare authorities, cybersecurity training providers, industry members), evaluating the framework via joint exercises/workshops and further developing the framework.

The contents of this article are as follows: After the Introduction, Chapter "Cybersecurity of healthcare systems" discusses the cybersecurity of healthcare systems with a focus on hospitals as the target of cyber attacks and the emergence of the Internet of Things in healthcare. Chapter "Related Laurea's R&D projects" presents two research projects that have received funding and are being launched: a national project coordinated by Laurea that develops pedagogic solutions for social services

and healthcare aims to strengthen the competence of teachers, students and professionals of different sectors in the use, management and development of digital services and structures in the social services and healthcare sector, including cybersecurity; the international Horizon 2020 project, funded by the EU Commission, studies how the cybersecurity of systems in healthcare, among others, can be improved through cooperation and information exchange. Chapter "LbD action model for creating new information" describes the plans to integrate research and development as well as pedagogy in the aforementioned projects. Chapter "Summary and conclusions" provides a summary of this article and discusses topics for further research.

Cybersecurity of healthcare systems

Data processing in the healthcare sector is subject to special requirements. The integrity and availability of patient information are vital in terms of patient safety. On the other hand, the confidentiality of information must be secured in order to guarantee privacy protection and to prevent the illegal use of personal data. Proper functioning of the hospital environment is critical in terms of patient care, which is why the cybersecurity of the building automation of hospital buildings, among other things, is crucial (Finnish Communications Regulatory Authority, 2016).

In 2015, the European Union Agency for Network and Information Security (ENISA) published its study "Security and Resilience in eHealth" (ENISA, 2015) that focuses on eHealth information systems and infrastructures as well as on the relevant assets that are considered critical for both society and relevant stakeholder groups. This study can be seen as a description of the state of the art of how EU Member States perceive cybersecurity in their health systems, what are the specific approaches they follow, and what measures they take to protect these systems.

Healthcare faces conventional attacks such as hacking and viruses, equipment theft and distributed denial-of-service attacks (DDoS). These attacks have considerable effects on healthcare, where real-time access to services, such as patient information systems or electronic prescriptions, is often required. It is troubling that attacks are often only detected months after they have happened, which makes investigating them difficult and large volumes of data may already have ended up in the hands of criminals. Ransomware attacks are detected quickly, but restoring the normal operation of systems may in these cases, too, take several days depending on the size of the system, scope of the attack and the backup copy arrangements. (Lehto & Lehto, 2017).

According to the ENISA (2015), the most important cybersecurity challenges in eHealth infrastructures and systems are: 1) systems availability; 2) lack of interoperability; 3) access control and authentication; 4) data integrity; 5) network security; 6) security expertise and awareness; 7) data loss; 8) standardization, compliance and trust; 9) cross-border incidents; and 10) incidents management.

Lehto & Lehto (2017) studied cyber attacks against hospitals and other social services and healthcare stakeholders in 2013–2017. They collected and analysed 59 cases, among which ransomware attacks (16) as well as hacking and security breaches (22) were the most common. According to their study, finance sector companies continue to be the targets of attacks, but criminals have shifted their focus to healthcare due to patient information and other valuable information included in the sector's systems. Criminals may sell patient information, which is more valuable than the traditional credit card information due to the amount and type of data they contain. Ransomware attacks have also highlighted the importance of patient information systems in the operations of hospitals and, therefore, organisations are ready to pay a ransom in order to regain their information. The healthcare sector becoming the top target of security breaches can also be explained by the sector being considered "soft", in other words, hospitals are poorly prepared for cyber attacks. In the US, cybersecurity accounts for 5–15% of the IT costs of different sectors, but in the social services and healthcare sector the share is only 3% (Lehto & Lehto, 2017).

Due to these factors, hospitals and healthcare organisations should pay increased attention to cybersecurity. Large systems that include legacy components that cannot be updated are extremely vulnerable. An increasing number of attacks target specifically hospitals and patient information systems, and these are no longer the targets of extensive spamming campaigns only (Lehto & Lehto, 2017).

Averting all attacks is not possible, but at least basic information security must be in place and special attention should be paid to systems that are critical in terms of the operations, such as patient information. Many incidents result from the ignorance of personnel concerning information security, which leads to poor decisions. Personnel training is necessary to increase awareness and reduce the success rate of attacks. Many cybersecurity problems are not unique to healthcare, but their impact on operations and patient safety and care makes these organisations extremely vulnerable. Criminals also know the value of patient information and how critical this information is in terms of the operations, which makes it worth their while attacking these organisations. However, systematic cybersecurity training of personnel is a new thing. Often organisations do not have a clear understanding of what cybersecurity means in the hospital environment for different stakeholders, what kind of competence each stakeholder should have and how the training and practising of cybersecurity should be implemented.

Hospital as a target of attack

Malware (colloquially "computer viruses") mainly spread through hacked websites and online advertisements, e-mail and social media. Simply visiting a site where an attacker has managed to plant malicious software may cause the malware to be installed on the visitor's computer. Malware on an employee's computer may spread further to the organisation's network. (Finnish Communications Regulatory Authority, 2016).

The year 2015 was important for the healthcare sector in terms of data breaches. Of the approximately 300 cases reported to the US Office for Civil Rights (OCR), hacking IT systems accounted for 95 cases and 125 cases were caused by unauthorised access or disclosure. In 58 cases, equipment or records were stolen, 16 cases involved lost records and 7 cases were due to the improper destruction of data. (Lehto & Lehto, 2017).

When a healthcare organisation becomes a target of a cyber attack, the impact of the attack is extensive and affects: 1) the hospital's financial situation; 2) the hospital's reputation; 3) patient safety; 4) access to IT applications, which may prevent patient care; and 5) the privacy and safety of patients and employees (Lehto & Lehto, 2017). The US Food and Drug Administration (FDA) has analysed cybersecurity vulnerabilities and cases that may have a direct impact on medical devices or the functioning of the hospital's network, including: 1) medical devices connected to/ configured for the network and contaminated or crippled by malware; 2) malware in the hospital's computers, smartphones and tablets, targeting mobile devices through wireless technologies in order to access patient information, monitoring systems and implanted patient devices; 3) uncontrolled distribution of passwords, use of weak passwords, a strong password in software that should be accessible to special personnel (e.g. administration, technical or maintenance personnel); 4) unsuccessful dissemination of security updates and patches to software on medical devices and data networks as well as not addressing the vulnerabilities of legacy models of medical devices; and 5) security vulnerabilities in out-of-the-box software designed to secure devices or the network against unauthorised access, including written-out passwords or strong coded passwords or missing authentication, documented maintenance IDs in the maintenance manual or weak coding/SQL injection.

IoT in Healthcare

Healthcare and technology have always been connected, but in recent years the relationship has been significantly transformed due to the rapid growth of the Internet of Things (IoT) (Firouzi, et al., 2018). According to Grand View Research (2018), IoT in healthcare covering the markets of medical devices, systems, software, and services is expected to grow to a market size of \$300 billion by 2022. The popularity of wearable devices leads to personalized healthcare, increasing healthcare access and customization the likes of which we have never seen (Firouzi, et al., 2018). Data generated from sensors attached to users is made available to doctors, family and authorized parties giving them the ability to check the subject's vital signs from anywhere and at any time as well as performing intelligent decision making to assist healthcare workers (Azimi, et al., 2017). These advances, while exciting, should be adopted carefully as there are still legitimate concerns relating to consistency, safety, cost-effectiveness, and more. Many changes need to take place to make this technology viable in the medical field. According to Firouzi, et al. (2018) the most important thing is that hardware and software need to be engineered to work together to address novel IoT technologies and their role in the healthcare field (Firouzi, et al., 2018).

A vital aspect regarding the complete adoption of the Internet of Things in the real world is cybersecurity (Khan & Salah, 2018). The connectivity of many stand-alone healthcare IoT systems through the internet creates several challenges and possible threats. Indeed, the protection of IoT increases the task for security experts since it involves security provisioning services to billions of smart objects (Mozzaquatro, et al., 2018). This is valid also within healthcare IoT systems.

Related Laurea's R&D projects

According to European Commission (2017), “[A]wareness raising of staff working in healthcare settings on security and data privacy is important to reduce cybersecurity vulnerabilities and exposure. Training of IT staff working in healthcare settings is of high priority in order to enforce the knowledge on information security processes and data protection procedures. This may include proactive managerial and technological strategies to reduce vulnerabilities e.g. best practices to minimize the potential for becoming a victim of phishing and ransomware or strategies to respond to attacks. Appropriate training on the permitted use of patient health data/information according to the requirements of relevant data protection law(s) is also a priority.” For answering this HORIZON 2020 programme topic, Laurea University of Applied Sciences co-ordinated The PROSILIENCE project proposal (Rajamäki, et al., 2018). Unfortunately, this proposal was rejected, but the evaluation feedback overall shows that the proposal was on the right track when not limiting the scope only to IT personnel, and the suggested training framework and especially training providers certification were mentioned as especially relevant, and so Laurea UAS continued collaboration on developing training and education on cybersecurity for the healthcare sector. Later in 2018, two of Laurea's R&D projects that develop cybersecurity education and training in healthcare have been funded.

National “Pedagogical Solutions for Social and Healthcare Professionals 24/7”

A project called “Pedagogical Solutions for Social and Healthcare Professionals 24/7” (SotePeda 24/7) is boosting future digital skills for social and healthcare professionals. The project is funded by The Ministry of Education and Culture for 2018–2020, coordinated by Laurea UAS and including 23 Finnish Higher Education Institutions.

It offers new solutions by addressing the multidisciplinary skills of healthcare professionals. The project develops future digital competencies for social and healthcare professionals, and offers digital healthcare studies, pedagogical solutions, competence frameworks and study environments. The project will contribute to the development of digital skills and competencies of healthcare professionals. One very important skill will be cybersecurity.

Table 1. Identified health sector cybersecurity challenges (ECHO Project, 2018)

CHALLENGE NUMBER	CHALLENGE DESCRIPTION
1	IDENTIFICATION OF HEALTHCARE AND BIOTECH CYBERSECURITY ISSUES, SURVEY OF THE STATE OF THE ART AND SELECTION OF BEST PRACTICES; THE METHODOLOGY FOR THIS ANALYSIS WILL BE COHERENT WITH WHAT IS ALREADY APPLIED IN OTHER FORESIGHT INITIATIVES.
2	DEVELOPMENT, SELECTION, VALIDATION OF CYBERSECURITY TECHNOLOGIES AND SERVICES, SPECIFIC FOR THE HEALTHCARE ENVIRONMENT: GIVEN THE CHARACTERISTICS OF THE HEALTHCARE SECTOR, A KEY ASPECT WILL BE A SET OF UNSUPERVISED COUNTERMEASURES.
3	WHILE DEVELOPING OR LOCALIZING A COMPREHENSIVE MULTI-SECTORAL CYBER RISKS MANAGEMENT FRAMEWORK, ISSUES SPECIFIC TO HEALTHCARE WILL BE ANALYZED; IT SHOULD BE NOTED THAT SO FAR NO SPECIFIC FRAMEWORK HAS BEEN FULLY DEVELOPED AND ADOPTED FOR HEALTHCARE/LIFE SCIENCES IN THE EU, WHILE AN ATTEMPT IS UNDER WAY IN THE US.
4	PROTOTYPING AND VALIDATING A SPECIALIZED COMPETENCE AND RAPID RESPONSE CENTRE FOR HEALTHCARE AND LIFE SCIENCES WITHIN THE NETWORK OF THE ECHO MULTI-SECTORAL CSIRTS (COMPETENCIES, ORGANISATION, ARCHITECTURE, SERVICE MODEL, SUSTAINABILITY, DEDICATED TESTING FACILITIES/CYBER RANGE).
5	DEVELOPMENT OF A MODEL AND TOOLS FOR THE EVALUATION OF THE ECONOMIC IMPACT OF CYBER RISKS IN HEALTHCARE.
6	DEVELOPMENT OF CURRICULA AND LEARNING TOOLS TO TRAIN HEALTHCARE OPERATORS AND NEW PROFESSIONALS IN THE PREVENTION AND MANAGEMENT OF CYBER RISKS IN HEALTHCARE; DEVELOPMENT OF A COMMON EU SYLLABUS, (AIMING AT THE CERTIFICATION OF EU COURSES AND THE RECOGNITION OF PROFESSIONAL QUALIFICATIONS), AND OF INFORMATION/ EDUCATION TOOLS FOR A MORE GENERAL AUDIENCE (PATIENTS, HEALTHCARE PROFESSIONALS, CAREGIVERS, VISITORS). AGREEMENT ON A SET OF KEY SCENARIOS FOR DEMONSTRATION.
7	COMPLEXITY OF PERSONAL DATA PROTECTION AND PRIVACY CONSIDERATIONS IN A CONTEXT WHEREIN PATIENT DATA MAY BE STORED IN AND ACCESSED FROM MULTIPLE DISTRIBUTED LOCATIONS INTERCONNECTED VIA THE TELECOMMUNICATIONS (INCLUDING SATELLITE TELECOMMUNICATIONS) SECTOR AND LEVERAGING CLOUD TECHNOLOGIES FOR DATA STORAGE.
8	DEPENDENCY ON EMBEDDED IOT DEVICES INTERCONNECTED VIA ICT AND HAVING FEW STANDARDS FOR CYBERSECURITY CERTIFICATION TESTING OF IOT DEVICES WITHIN THE MANUFACTURING SECTOR STAGE.
9	DEPENDENCY ON THE EGOVERNMENT SERVICES SECTOR FOR ACCESS TO NATIONALLY SPONSORED MEDICAL COVERAGES, WHEREIN PERSONAL PATIENT INFORMATION MUST BE SHARED BETWEEN SECTORS AND ALSO WITH THE INSURANCE SECTOR FOR VALIDATION OF COVERAGE AND FINANCIAL SECTOR FOR PAYMENTS.
10	VALIDATION OF THE RESULTS THROUGH A VERTICAL DEMONSTRATOR, TAKING INTO CONSIDERATION INTER-SECTORAL AND CROSSSECTORAL ISSUES; HEALTHCARE ORGANISATIONS IN MORE COUNTRIES (IT, FI, HU, BG,...) WILL CONTRIBUTE TO THIS PHASE; THE RESULTS OF THE VALIDATION PHASE WILL BE CONSOLIDATED IN A PRELIMINARY RECOMMENDATION AND REFERRAL TO NATIONAL/EU STAKEHOLDERS FOR POLICY CONSIDERATION.

International Horizon 2020 Project “ECHO”

The HORIZON 2020 programme funded “ECHO - European network of Cybersecurity centres and competence Hub for innovation and Operations” project delivers an organized and coordinated approach to strengthen the proactive cyber defence of the European Union through effective and efficient multi-sector collaboration. A total of 30 ECHO partners from 16 nations will execute a four-year work plan to develop, model and demonstrate a network of cyber research and competence centres, with a centre of research and competence at the hub. The ECHO project has three multi-sector scenarios: healthcare, marine transportation and energy as critical infrastructure (ECHO Project, 2018).

The ECHO project stresses that the concept of “security” in healthcare goes beyond that of ICT or technical security (protection from unwanted access and system malfunctions), to include the issue of safety (risk of accidents for the patient and caregivers) and of privacy (protection of personal and medical data). In a healthcare context that is increasingly based on the interconnection of facilities and operators, the lack of adequate security procedures for the exchange of data between enterprise systems, medical devices and personal devices is a critical element that invests all levels within a healthcare organization (ECHO Project, 2018).

In the context of the ECHO project, the health sector scenario and demonstration cases include considerations for sector-specific and inter-sectoral challenges as shown in Table 1.

LbD action model for creating new information

This chapter describes a systematic, LbD-based action model for the creation of new information in an area that does not yet have established theories, models or training offering. In accordance with Figure 1, the action model is based on Yin’s (2009) model of designing and implementing a multiple-case study. Previously, this action model was utilised to develop competence in the Internet of Things and cyber-physical systems (Rajamäki, 2018) as well as in the critical infrastructure (Rajamäki & Ruoslahti, 2018).

This action model fully integrates teaching and research and development with one another. When education is being planned, a research question should also be formulated for which answers will be sought with the help of the competence of the students attending the training event. For example, the SotePeda 24/7 and ECHO projects seek to find answers to questions such as “What does cybersecurity mean in terms of the different stakeholders in the hospital environment?” and “How can the competence needs of different stakeholders regarding cybersecurity in healthcare systems be met in the future?”. More research questions can be derived from the development targets provided in Table 1.

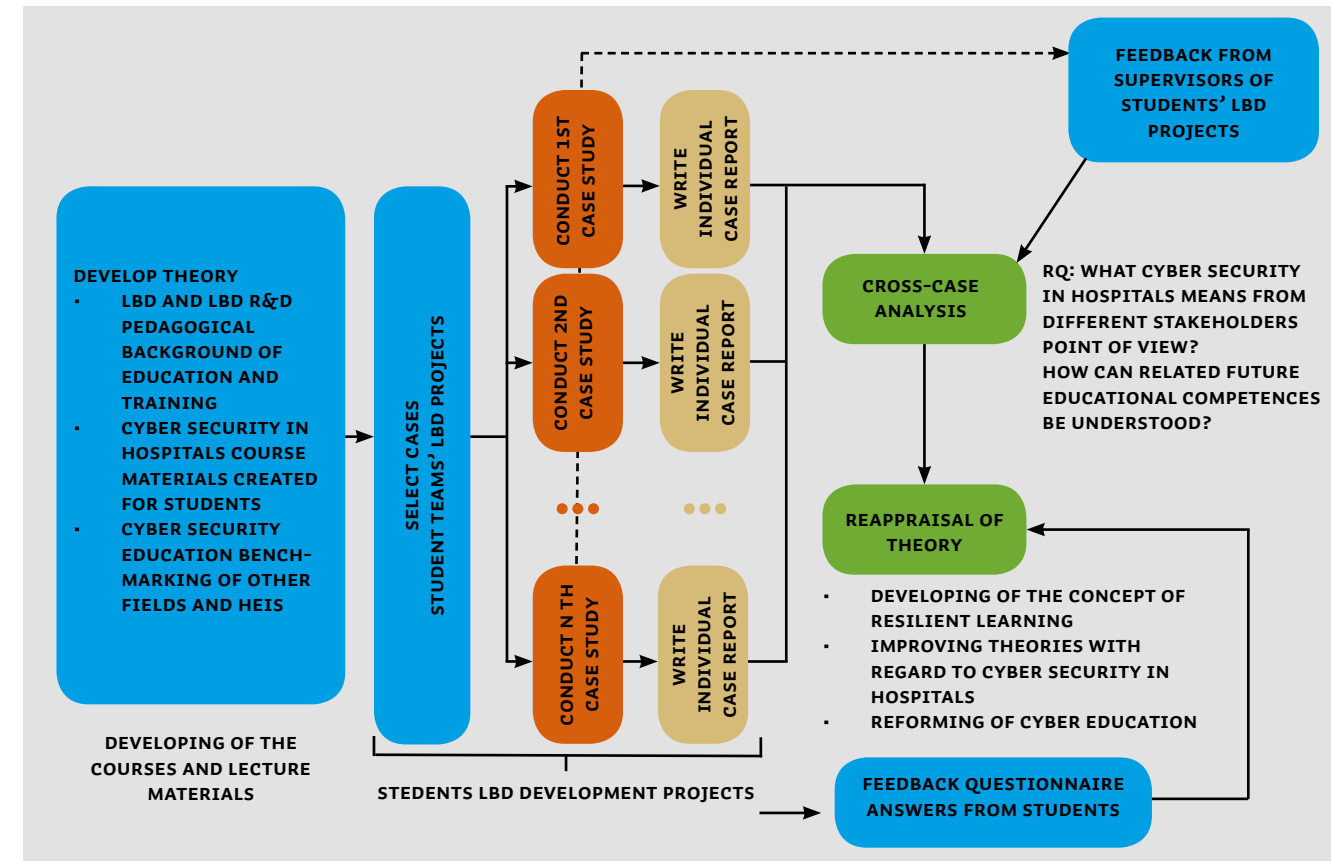


Figure 1. A systematic action model based on LbD for the creation of new information to improve cybersecurity

When a teaching and/or practice event is being planned for the development area that does not yet have an established teaching offering, theories are built at the same time. When the LbD or LbR&D (Pirinen, 2017) action model is introduced in a new area of operation, such as the development of cybersecurity competence in a hospital environment, a pedagogic LbD model is also being developed concurrently. This involves, among other things, benchmarking on how the development of learning has been implemented in other areas and other organisations; for example, how cybersecurity is developed in the financial sector and what kind of cybersecurity training has been provided in other educational organisations. The events organised usually include introductions. When a lecturer creates new teaching materials for a rapidly developing area, they familiarise themselves with the latest research data and, at the same time, create theoretical knowledge in the substance area.

All LbD-based learning programmes include a development exercise that students have prepared (together with the other actors). In this case, the SotePeda 24/7 and ECHO research projects provide the students' development exercises with “the big

picture”, of which the exercise is a small piece. At the same time, each of the students’ development exercises is one “case” in the multiple-case study that develops the region (see Figure 1). By distributing and reporting the results of the development exercises in accordance with the principles of open science, the results generated can be applied more extensively within the field in question.

In the systematic model that integrates teaching and R&D operations, the results of the students’ development exercises and any feedback received from the working life mentors will be cross-analysed and an answer will be sought to the research question defined for the implementation of the learning programme (see Figure 1). Since the students are often top experts if the development exercises have been chosen well, analysing the results will produce unprecedented knowledge in the field.

In the final stage, both the results of the cross-analysis and student feedback are applied and the following are developed: 1) the pedagogic LbD action model, 2) knowledge of the substance area (cybersecurity in the systems of healthcare), and 3) training in the substance area (further education of personnel and teaching in higher education institutions) in practice.

Summary and conclusions

Cybersecurity problems will increase in hospital environments where there are systems with legacy devices that use operating systems that are no longer supported. Hospitals also have systems and devices that can no longer be updated, either because updates are not available anymore or because these devices cannot be out of service due to updates. Additional challenges in hospital environments are created by personnel’s and patients’ own devices and the enormous number of devices used in examinations and patient monitoring that are brought to hospitals. These systems and devices open up many opportunities and interfaces for criminals to launch their attacks. On the other hand, the Internet of Things will revolutionise the use of sensors in patient care and other health promotion, but, at the same time, cybersecurity risks will multiply.

In order to solve the aforementioned problems, Laurea is conducting two research projects: SotePeda 24/7 and ECHO. This article presents a systematic action model for integrating teaching/learning with research and development to enable competence development and the creation of a new knowledge basis for the field in question. Previously, this action model was utilised to develop competence in the Internet of Things and cyber-physical systems (Rajamäki, 2018) as well as in the critical infrastructure (Rajamäki & Ruoslahti, 2018). Topics for further research include practical testing of the action model in the SotePeda 24/7 and ECHO projects, further development of the model and dissemination of the model to other fields of education and research as well as their multidisciplinary interfaces.

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Liisa Ranta & Tarja Meristö

WELL-BEING FORUM AS AN ENABLER OF THE LbD ACTION MODEL ON LAUREA’S LOHJA CAMPUS

Abstract

The LbD action model seamlessly incorporates applied research, regional development and education. Doing things together benefits all stakeholders in the ecosystem. A network in which stakeholders form an ecosystem based on trust and genuine cooperation is viewed as the basis of the LbD activities. This article views LbD through the well-being forum activities. The Well-Being Forum is a regional networking event held on Laurea’s campus in Lohja. The event has been organised twice a year since 2009. The forum includes four elements: project/research presentations, keynote addresses, facilitated small-group work, and mini trade fairs.

The article describes the forum’s role as a platform for and an enabler of LbD activities, in which RDI projects, regional stakeholders (residents and sector stakeholders), as well as students/ teachers meet regularly around well-being themes. The forum can also be considered as a factor securing the continuity of LbD, since the hyinvointivarkosto.fi site established to support the activities is a communication and interaction channel for different stakeholders. The article analyses the LbD implementations and experiences gained over the course of nearly 10 years and the results categorised by LbD element into RDI operations, regional development and education. The roles of the forum participants (e.g., a stakeholder as a regional

developer, researcher, or learner and the student as a learner, facilitator or researcher) are described per each of these areas in the operations.

The activities have been evaluated regularly and the feedback received has been exploited. Self-assessment has also been conducted on the opportunities to serve as a multi-disciplinary forum for LbD beyond the well-being network. This also involves the question of resource allocation by Laurea for the LbD activities on different campuses - without externally funded projects, the activities would not have been possible.

Keywords: Well-Being Forum, Regional co-operation, Continuity Challenge in Project Based Activity

Introduction

The tasks of the universities of applied sciences are teaching, applied research and regional development. A university of applied science supports, for its part, the future success of the region by educating skilled individuals, participating in regional development projects and providing new information to the region through international RDI projects as well. The LbD pedagogy at the Laurea University of Applied Sciences combines the three tasks of the university of applied sciences and integrates the different stakeholders to work for shared objectives and visions. The Learning by Developing (LbD) pedagogy requires the stakeholders to assume flexible roles that may also change and vary in different stages of cooperation (Ahonen et al. 2014).

In connection with the well-being theme, in particular, Laurea's campus in Lohja has been developing a regional forum model, in which different stakeholders meet across sector boundaries. The forum activities began with regional developers in 2009, when future scenarios were created for the region based on the preparations for the KOKO programme that was carried out for the Ministry of Economic Affairs and Employment (Kettunen & Meristö 2009) and the results were reviewed in the first regional Futures forum. The vision of this endeavour was well-being in Western Uusimaa, and thereafter, Well-being Forum was established as the name of the forum. The forum focused on well-being and was organised in the region twice per year. Since the beginning, the core of the Well-Being Forum has been the idea of bringing together not only companies and public sector stakeholders but also the third sector and individual citizens. Companies, society's stakeholders, organisations and individuals form the basis of the forum, and based on the first letters of the Finnish words describing each of these stakeholders, we named it the 4Y principle. Subsequently, the lively discussion concerning the health and social services reform, for example, has also included the involvement of the third sector and citizens and the citizens' freedom of choice.

The objective of the Well-Being Forums has been to serve as a platform for bringing together the region's stakeholders in the private, public (society) and third sectors

(associations and organisations) and the citizens of the region (individuals) under the 4Y principle. This joint encounter also works as an enabler of shared development of well-being. From Laurea's standpoint, the forums have also been viewed as enablers of the LbD action model, in which RDI projects, students and teachers, as well as regional stakeholders come together, share information and experiences and jointly create new information and insight. The purpose of the forum has been to combine RDI operations, regional development and education. The participants of RDI projects include researchers, teachers, students and regional developers, but often partners outside of the region, such as speakers from other parts of Finland and other countries, are involved, and this provides broader horizons to the forums. Students participate in the forums by, for example, presenting the results of development exercises or by conducting seminars to publish their theses as part of the forum. Students have also held separate newsflashes for regional stakeholders, such as entrepreneurs running small nursing facilities, on the stakeholders' premises.

The forum structure is built around lectures and workshops as well as mini trade fairs held in connection with the forum (Figure 1), enabling also stakeholders not yet involved in the projects to present their operations and bring up their views in the workshops.

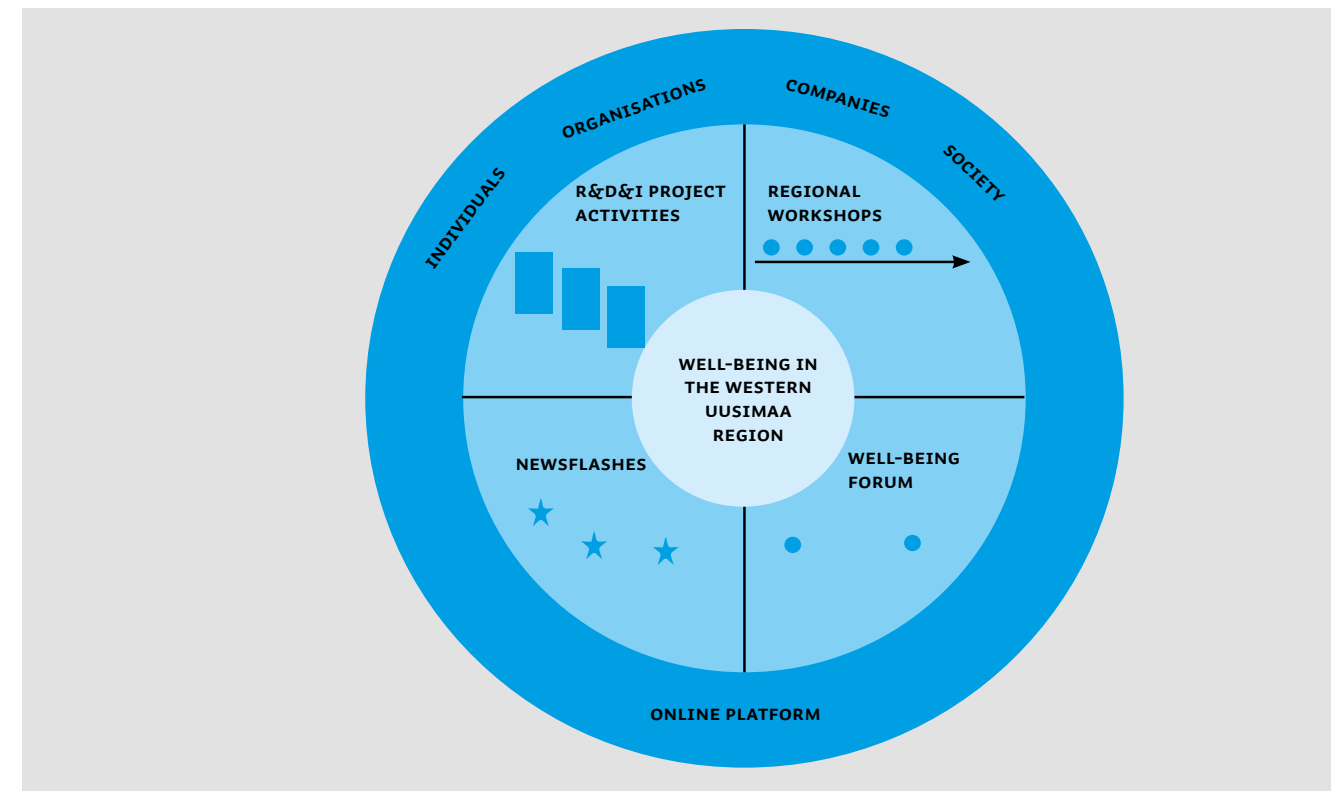


Figure 1. Well-Being Network and a Well-Being Forum (Meristö 2011; Meristö 2014)

The Well-Being Forum concept in practice

Stakeholders' actual well-being themes in the forums

The first Well-Being Forum was held in April 2011, with the themes of the 4Y principle bringing together different stakeholders and well-being as the common cause of the stakeholders. A forum has since been held every April. The second forum with the same theme was held in November of the same year, and April and November have later been established as the regular forum months. From time to time, the timing of the forums has been considered to be a challenge due to coinciding events in the region, despite the fact that efforts have been made to coordinate the forum dates with other events in the region and the dates have always been announced at the previous forum.

In 2011–2017, more than 600 stakeholders in the area registered for forums (Table 1), with associations and organisations being the most active participants (approximately 120).

The forum themes that organisational stakeholders have found the most interesting include the importance of cooperation and the role of voluntary work, future well-being, as well as accessibility and safety. Organisations delivered 13 keynote addresses in the forums over the past seven years.

The forum themes **that the public sector stakeholders** have found the most interesting include the final seminar of the Pumppu project, proactive approach and well-being of families, future well-being, as well as the utilisation of electronic services in the well-being sector. The number of public sector participants has been approximately 100, and stakeholders delivered 13 introductions in the forums.

Companies' interest to participate in the forums has been less popular. A total of 75 companies participated in the forums between 2011 and 2017. The themes that companies have found the most interesting include well-being technology supporting daily life, accessibility and safety, and future well-being. On the other hand, companies have been the most active in delivering addresses altogether 16 addresses as well as elevator pitches over the course of the years.

In addition, there have been seven unaffiliated participants, who wanted to take part in the forum as citizens of the region. **Citizens** delivered two addresses in forums.

Personnel and students from the educational institutions in the region have also participated in the forums. The most popular themes were the ZET project's utilisation of electronic services in the well-being sector (see Tuohimaa et al 2017), which included the opening of Laurea's Terveystori learning environment, as a well as functional workshops aimed at prospective students incorporated in a forum. The theme of this forum was accessibility and safety, and the forum workshops were organised in cooperation with the region's Deffa (Defibrillator) and Accessibility (Esteettömyys) projects.

Table 1. Themes of the well-being forums and nr of participants according to enrolment

FORUM NUMBER / DATE	FORUM'S THEME	MINI TRADE FAIR	ENROLMENT
1/SPRING 2011	WELL-BEING AS A SHARED CAUSE OF INDIVIDUALS, SOCIETY, COMPANIES AND ORGANISATIONS		39
2/AUTUMN 2011	WELL-BEING AS A SHARED CAUSE OF INDIVIDUALS, SOCIETY, COMPANIES AND ORGANISATIONS		21
3/SPRING 2012	SERVICE STRATEGIES AND THE SERVICE VOUCHER		36
4/AUTUMN 2012	WELL-BEING FORUM AND MINI TRADE FAIRS		58
5/SPRING 2013	IMPORTANCE OF COOPERATION AND THE ROLE OF VOLUNTARY WORK		38
6/AUTUMN 2013	FUTURE WELL-BEING	STAKEHOLDERS IN THE WESTERN UUSIMAA REGION: PRESENTATION OF ACTIVITIES	57
7/SPRING 2014	FINAL SEMINAR OF THE PUMPPU SUBPROJECT		50
8/AUTUMN 2014	PROJECTS IN THE WELL-BEING REGION AND LAUREA'S REGIONAL SERVICE MODEL	POSTER PRESENTATION	23
9/SPRING 2015	PROACTIVE APPROACH AND WELL-BEING OF FAMILIES		42
10/AUTUMN 2015	UTILISING ELECTRONIC SERVICES IN THE WELL-BEING SECTOR OPENING CEREMONY OF LAUREA'S LEARNING ENVIRONMENT (TERVEYSTORI)		58
11/SPRING 2016	ACCESSIBILITY AND SAFETY		37
12/AUTUMN 2016	WELL-BEING TECHNOLOGY SUPPORTING DAILY ACTIVITIES	STAKEHOLDERS IN THE WESTERN UUSIMAA REGION: PRESENTATION OF ACTIVITIES	45
13/SPRING 2017	WELL-BEING TECHNOLOGY SUPPORTING DAILY ACTIVITIES II: DEVELOPMENT OF USER-CENTRED SERVICES	PRESENTATION OF PRODUCTS OF WELL-BEING TECHNOLOGY COMPANIES	31
14/AUTUMN 2017	ACCESSIBILITY AND SAFETY	PRESENTATION OF WELL-BEING TECHNOLOGY PRODUCTS SUPPORTING COPING AT HOME	84
15/SPRING 2018	WELL-BEING AT WORK AND IN THE WORKING COMMUNITY IN FUTURE WORKING LIFE AND IN THE HEALTH AND SOCIAL SERVICES REFORM		NOT REALISES

The Hyvinvointiverkosto.fi website and mini trade fairs as a communication and interaction channel

In the early stage of the forum activities, in spring 2012, a need was identified for a shared platform for meetings and communication. An online workshop was organised through the Hyvinvointiverkosto site for the region's stakeholders as a part of the Tietotaitotalkoot project (see Kirves & Viherä 2009). The participants of the two-day online workshop designed and developed a website for well-being stakeholders. After the workshop, the website served as the network's virtual environment. Further development of the website was carried out in autumn 2012 as part of the EDRF-funded Pumppu project (2011–2014). A total of 18 stakeholders took part in the events. Some of the stakeholders attended both brainstorming sessions.

The websites created during the events provide the stakeholders with an opportunity to publish the well-being events in the region, introduce their own organisation using the 4Y principle, and provide information on the services they offer for the region's residents in their different life situations. Different life situations were divided into 22 categories on the website, and the region's stakeholders linked 37 services provided by their own organisations to these categories (some organisations offered services under several categories). In addition, information on the projects in the region could be added to the website. Laurea was responsible for the management of the website during the Pumppu project, but after the project ended, no organisation to take over the updating task could be found in the region, and currently the Hyvinvointiverkosto.fi site is unfortunately just a static meeting point.

The need for networking opportunities in a less structured setting was identified already in 2012, and the forum activities were developed further through the mini trade fair concept. Over the course of seven years, a total of five mini trade fairs were organised in connection with the forums as an opportunity for the region's stakeholders to present their operations, services and projects. These activities have enabled cooperation between stakeholders and also with the functions of the region's university of applied sciences. In addition to participating in the mini trade fairs, the stakeholders have had opportunities to deliver elevator pitches or present their business as part of the forum's programme.

The forums have also been brought closer to the stakeholders and residents. Forums have been held in public spaces, such as the library, in the region, but Laurea's campus has established itself as the venue in recent years. Due to the geographical distances in the Western Uusimaa region, forum participation through webinars and access to recordings of the addresses delivered or to lecture materials, have also been piloted.

Feedback collected at the forums has enabled the continuous development of the forum activities to meet the region's needs. The area's bilingualism has been taken into consideration in the collection of the feedback, though still needed improvements in practice. The feedback has been requested concerning the participants' experiences regarding the objectives, contents and implementation of the forums; the alignment of the forum content and the participants' expectations; the usefulness of the information received at the forum; and the participants' wishes concerning the themes and speakers in upcoming forums.

Well-Being Forums combining the roles in the LbD action model

Laurea's pedagogic action model of Learning by Developing (LbD) (Raij 2014) is based on students working in real-life workplace situations in an authentic operating environment together with partners. At Laurea, such learning opportunities have been provided by means of regional projects, for example, in which students

are assigned development tasks of different scope that they complete for regional stakeholders either as part of study units or as thesis work, but also by integrating students with Laurea's RDI projects, which often also include partners from Laurea's region of operation.

The Laurea University of Applied Sciences operates on several campuses in the Uusimaa region. Lohja is currently one of the six campuses. Without specific regional activation efforts, there is a risk of the region's stakeholders missing out on the project and student integration, as the volume of the operations concentrates on larger campuses, and stakeholders in Western Uusimaa cannot necessarily take the time off from their daily activities to participate in events on the campuses beyond longer distances in Espoo or Vantaa. Therefore, it has been important to create an action model in the Western Uusimaa region that applies an approach of local participation in LbD-based cooperation and development. The Well-Being Forum has been established to serve the region, education and applied research in accordance with the LbD principles, while, at the same time, combining the three tasks of the University of Applied Sciences (Figure 2).

During the past years, about 280 Laurea students and staff members have attended the forum; of them, approximately 50 have given keynote addresses or opening speeches and over 200 have been in the role of a participant. RDI activities as Laurea's externally funded projects have been included in 13 forums. The results of projects have been presented in the form of introductions, and in the workshops, forum participants have been engaged to develop the project's theme regionally. More than 50 RDI staff members have taken part in the forums, delivering nearly 20 introductions.

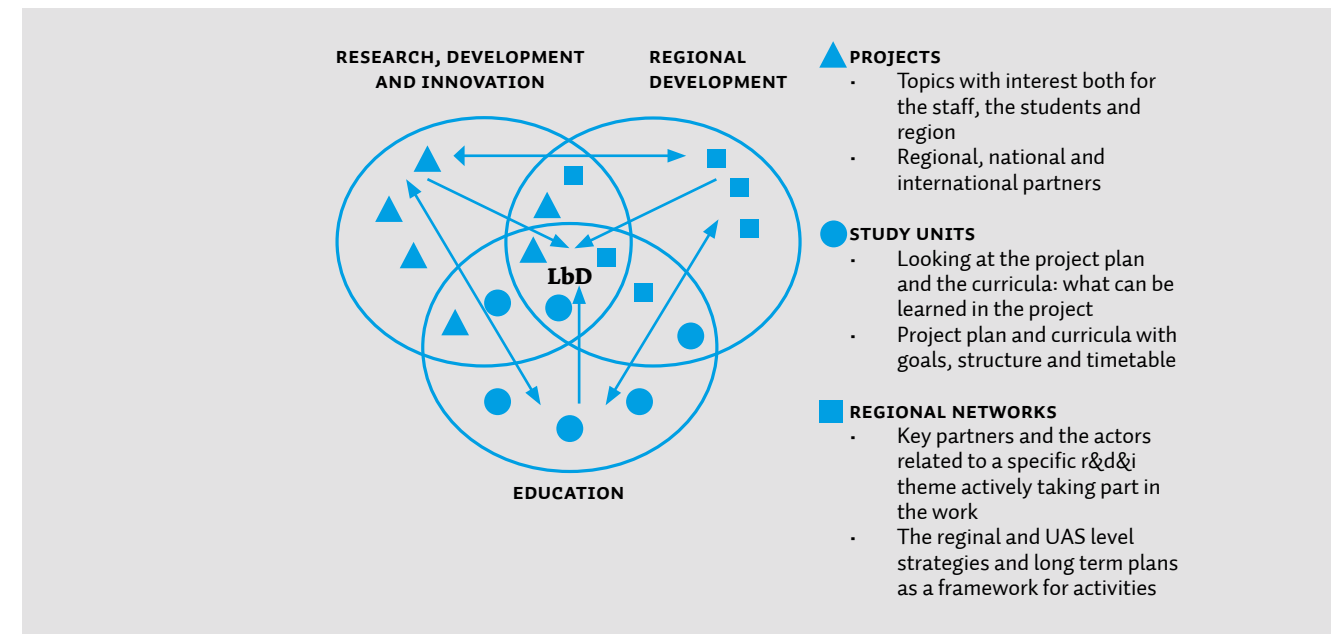


Figure 2. LbD at the intersection of the roles of universities of applied sciences (Ahonen et al 2014)

The region's own projects have been presented at two forums, but in these projects, Laurea's roles covered the regional service model and application marketing and Laurea was a regional partner. The theme of the forums has also been incorporated with teaching as much as possible, with students delivering addresses and running workshops as well.

Personnel of the nursing education on the campus has been in charge of forum coordination, with the exception of one forum that was coordinated jointly by the degree programmes of the campus, and another that was organised in cooperation with the regional associations.

In the initial forums, Laurea's students served as the organisers (the learners), but later on, the stakeholders of the project under which the forum is organised have taken on the arrangements. Students have participated in forums as the audience as part of the relevant study unit (the learner) and also delivered addresses related to their theses with the forum as their publishing seminar and presented the data collected in the project (the researcher, the regional developer), or have run workshops (the teacher, regional developer). The forums have been attended by students of all fields of study on the Lohja campus: Business Management, Nursing, and Social Services. More than 100 students have participated in the forums and 12 students have delivered introductions, too.

This article has analysed the weaknesses, strengths, threats and opportunities of the forum activities from the perspective of the three basic tasks of the University of Applied Sciences with a special focus on the LbD implementation. This analysis has been entered in the SWOT table (Table 2), categorised per basic task.

From the perspective of the RDI, the strength of the forum activities is their smooth integration with both teaching and regional development when all stakeholders participate in the activities. However, the project-based nature of the activities, including the forum's funding coming from projects, has been seen as a weakness. A threat in the activities is the lack of a shared communication channel, especially in recent years, as the RDI operations have primarily been centralised to Laurea's other campuses. Opportunities are provided by incorporating the forums with other events in the region and expanding the activities to other regions by means of webinar access to the forums.

From the perspective of teaching, the strength is the university's role as a provider of experts for the region's needs. The fact that the responsibility for the forum activities has primarily been borne by teachers and students of nursing is a weakness. It is important to involve all fields of study in the activities and to increase study unit integration and a more varied involvement of students in the actual forum activities and arrangements. In addition, forums and their topical themes should be seen as

SWOT ANALYSIS OF THE WELL-BEING FORUM ACTIVITIES	
<p>STRENGTHS</p> <p>RDI:</p> <ul style="list-style-type: none"> • RDI INTEGRATION <p>TEACHING:</p> <ul style="list-style-type: none"> • THE UNIVERSITY AS A PROVIDER OF EXPERTS <p>REGIONAL DEVELOPMENT:</p> <ul style="list-style-type: none"> • THE UNIVERSITY IN THE ROLE OF A DEVELOPER • THE 4Y PRINCIPLES AND CROSS-DISCIPLINARY NETWORKING 	<p>WEAKNESSES</p> <p>RDI:</p> <ul style="list-style-type: none"> • PROJECT-CENTERED OPERATIONS, DEPENDENT ON PROJECT <p>TEACHING:</p> <ul style="list-style-type: none"> • INTEGRATION FOCUS ON NURSING, NOT ALL OF DEGREE PROGRAMMES IN LOHJA CAMPUS (SHOULD INVOLVE ALL DEGREE PROGRAMMES) <p>REGIONAL DEVELOPMENT:</p> <ul style="list-style-type: none"> • MARKETING IS LACKING AND UNORGANIZED
<p>OPPORTUNITIES</p> <p>RDI:</p> <ul style="list-style-type: none"> • INTEGRATING FORUMS WITH THE EXISTING EVENTS • ESTABLISHING WEBINARS <p>TEACHING:</p> <ul style="list-style-type: none"> • STUDY UNIT INTEGRATION • ENGAGING STUDENTS IN THE FORUM OPERATIONS <p>REGIONAL DEVELOPMENT:</p> <ul style="list-style-type: none"> • LINKING THE FORUM ACTIVITIES WITH LAUREA'S OTHER REGIONAL DEVELOPMENT (REGIONAL ADVISORY BOARDS, REGIONAL MANAGERS/ DIRECTORS, APPLICATION INFORMATION/ RECRUITEMENT, ETC.) • BETTER UTILISATION AND MARKETING OF THE HYVINVOINTIVERKOSTO.FI SITE 	<p>THREATS</p> <p>RDI:</p> <ul style="list-style-type: none"> • A SHARED COMMUNICATION CHANNEL IS MISSING <p>TEACHING:</p> <ul style="list-style-type: none"> • CONTINUITY IS IN JEOPARDY IF RESOURCES ARE NOT ALLOCATED TO PART OF TEACHING AND STUDY UNIT INTEGRATION (CURRENTLY, ONLY PROJECT FUNDS) <p>REGIONAL DEVELOPMENT:</p> <ul style="list-style-type: none"> • UNSUCCESSFUL SCHEDULE COORDINATION WITH THE OTHER EVENTS IN THE REGION • THEMES DO NOT MATCH THE REGION'S NEEDS

Table 2. SWOT analysis of the Well-Being Forum activities with regard to the LbD-based activities

enablers of learning for students. With regard to teaching, the project integration through forums is also in jeopardy unless lecturers are allocated hours for it, since the project hours alone are not enough to ensure continuity.

From the perspective of regional development, Laurea has an important role as a regional developer through the forum activities: Laurea facilitates the cross-disciplinary networking of stakeholders by means of the 4Y principle, but marketing which is still lacking and unorganised is a weakness. Laurea's marketing and communication function surely offers new opportunities, if more extensive implementation of the forum concept is desired in Laurea's area of operation and, as part of that activity, inputs to develop and better utilise the hyvinvointiverkosto.fi site are needed. It would also be important to investigate the region's actual needs now and in the future in order to ensure that the threat of the themes not being aligned with the needs is prevented. The forum participants have always been asked to provide feedback on their preferred topics and speakers for future forums.

Recommendations and Conclusion

Based on the feedback received, the forums have been considered to be important for viewing actual issues from different perspectives. The forums have been thought-provoking, and the small group activities, in particular, have met the regional and personal expectations. On the other hand, the webinars have also been welcomed. Materials handed out at forums have been considered to be useful, and student participation as speakers has also been welcomed. Taking the bilingualism of the region into consideration has received positive feedback, and with this have to be worked on further.

Invoking genuine dialogue between different stakeholders has been seen as an area of improvement. A number of feedback comments have stated that the schedule of the forums is too tight or that the participants of the forum have, for the most part, been stakeholders from a specific sector. Developing the cooperation between the stakeholders and finding possible synergies have been considered to be important. Attendees would welcome addresses by local experts and decision-makers as well as examples of the latest innovations and current themes as well as ideas and future solutions to well-being challenges.

We have reviewed the SWOT analysis of the forum activities (table 2) and sought solutions to the challenges recognized there. The following table (Table 3) includes the recommendations we have put together for different actors in the RDI operations, education and regional development.

RECOMMENDATIONS TO ADDRESS THE CHALLENGES IDENTIFIED IN THE SWOT ANALYSIS	
<p>STRENGTHS</p> <p>RDI:</p> <ul style="list-style-type: none"> PROJECT MANAGER: MORE VALUE TO APPLIED RESEARCH <p>TEACHING:</p> <ul style="list-style-type: none"> SUPERVISOR/ PROJECT MANAGER: RESOURCES ALLOCATED TO PROJECT INTEGRATION <p>REGIONAL DEVELOPMENT:</p> <ul style="list-style-type: none"> MANAGEMENT: A LOCAL DIRECTOR SHOULD BE APPOINTED TO THE CAMPUS (E.G. THE RESIDENT DEVELOPMENT MANAGER) 	<p>WEAKNESSES</p> <p>RDI:</p> <ul style="list-style-type: none"> PARTIES PREPARING THE PROJECT: INCLUDING THE REGION'S THEMES AND PARTNERS <p>TEACHING:</p> <ul style="list-style-type: none"> DEVELOPMENT MANAGERS: RESOURCE ALLOCATION IN THE ENTIRE CAMPUS SHOULD BE INVOLVED IN COOPERATION, ALL DEGREE PROGRAMMES <p>REGIONAL DEVELOPMENT:</p> <ul style="list-style-type: none"> MARKETING/ COMMUNICATIO/ LAUREA EVENTS: PLANNING OF COMMUNICATION AND ENSURING COMMUNICATION IS SYSTEMATIC
<p>OPPORTUNITIES</p> <p>RDI:</p> <ul style="list-style-type: none"> RDI MANAGEMENT/ RDI TEAM: ROTATING THE POSITION OF THE FORUM'S COORDINATOR RESPONSIBLE, THE PROJECT MANAGER OF THE PROJECT <p>TEACHING:</p> <ul style="list-style-type: none"> UNIT MANAGEMENT/ DEVELOPMENT MANAGERS: DIFFERENT DEGREE PROGRAMMES TO BE RESPONSIBLE FOR THE FORUM ACTIVITIES <p>REGIONAL DEVELOPMENT:</p> <ul style="list-style-type: none"> LAUREA'S MANAGEMENT/ MARKETING/ COMMUNICATION: ADOPTING THE FORUM ACTIVITIES IN ALL AREAS IN LAUREA 	<p>THREATS</p> <p>RDI:</p> <ul style="list-style-type: none"> PARTIES PREPARING THE PROJECT: DRAWING FOCUS ON THE THEMES RDI TEAM: IMPLEMENTING A REGIONAL COMMUNICATION CHANNEL <p>TEACHING:</p> <ul style="list-style-type: none"> LECTURERS' SUPERVISORS: MORE INTEGRATION HOURS IN THE WORKING TIME PLAN <p>REGIONAL DEVELOPMENT:</p> <ul style="list-style-type: none"> FORUM COORDINATOR/ PROJECT MANAGERS: COORDINATING THE SCHEDULE WITH THE EVENTS IN THE REGION

Table 3. Recommendations to address the challenges identified in the SWOT analysis

From the perspective of the RDI operations, integrating applied research with both teaching and regional development is an opportunity to develop the region and to train skilled personnel with the region's needs in mind. At the same time, it reinforces the continuity of the forums and the activities of the stakeholders to carry out the forums. The project managers of projects play an important role in this integration. The partners in the region should be involved in projects at the project application stage to ensure that the projects and the activities at the forums would meet the needs of the region. This accountability of the project manager would also help split the responsibility for the forum activities, instead of one field of study being responsible for everything. The RDI personnel, teaching personnel and students alike should listen to the region and actively promote project ideas. Creating a shared communication channel would also facilitate this and help bring up development needs.

From the perspective of teaching, the integration of teaching and the opportunities for students to participate in the forum activities as part of their studies require that resources are systematically provided for personnel to plan such integration across degree programmes. The forums and their current topics should be viewed as platforms for development and improvement involving multiple actors and intended for students and the region.

From the perspective of regional development, the region's campus should have a holistic understanding of the region's development needs, and the region should provide one channel or contact person that could be contacted in cooperation needs. In addition, a better understanding of the region's existing projects and events would provide opportunities to bring the forum activities closer to the region's residents and stakeholders as part of the ongoing activities and offer a more functioning

Table 4. Roles and tasks in the Well-Being Forum and Examples of Positions in the LbD in Laurea UAS (adapted from Ahonen et al 2014)

ROLES IN LOCAL WELLBEING FORUM	TASKS IN FORUM	EXAMPLES OF POSITIONS IN THE LBD (R&D&I, EDUCATION, REGIONAL DEVELOPMENT)
THE FORUM COORDINATOR	FORUM PLANNING AND ADMINISTRATION, COMMUNICATION, MATERIALS AND MEDIA RELATIONS	THE PROJECT MANAGER, THE LECTURER OF THE CAMPUS
THE PROJECT COORDINATOR	PROJECT PLANNING AND ADMINISTRATION, COMMUNICATION, MATERIALS AND MEDIA RELATIONS ACCORDING TO THE NEEDS OF THE REGION	THE PROJECT MANAGER, THE PROJECT OFFICER, THE LECTURER
THE RESEARCHER	THEMATIC RESEARCH WORK AND EMPIRICAL KNOWLEDGE GENERATION, DISSEMINATION AND PUBLICATIONS	THE PROJECT OFFICER, THE PRINCIPAL LECTURER, THE LECTURER, THE STUDENT
THE TEACHER	LBD IMPLEMENTATION AND THE PEDAGOGIC APPROACH BETWEEN THE PROJECT AND THE FORUM BY CONNECTING PROJECT AND REGIONAL TARGETS TO THE CURRICULUM'S STUDY UNITS AND STUDENTS	THE LECTURER, THE PRINCIPAL LECTURER, THE PROJECT OFFICER, THE INFORMATION SPECIALIST
THE REGIONAL DEVELOPER	IMPROVING THE WELLBEING, THE COMPETENCES AND THE COMPETITIVENESS OF THE REGION, NETWORKING AND HAVING DIALOGUE IN THE REGION	THE REGIONAL ACTOR, THE LECTURER, THE PRINCIPAL LECTURER, THE PROJECT OFFICER, THE STUDENT, THE INFORMATION SPECIALIST
THE INFORMATION ENABLER	INFORMATION RETRIEVAL TEACHING HOW TO SEARCH FOR INFORMATION DISSEMINATION OF INFORMATION	THE INFORMATION SPECIALIST, THE LECTURER, THE REGIONAL ACTOR, THE STUDENT, THE RESEARCHER
THE ADMINISTRATIVE ENABLER	UNDERSTANDING OF THE DEVELOPMENT NEEDS IN THE REGION MANAGING RESOURCES AND FACILITATING LBD IMPLEMENTATION	THE MANAGER OF THE CAMPUS, THE DEVELOPMENT MANAGER, THE REGIONAL MANAGER, THE REGIONAL COOPERATION NETWORK
SUPPORTIVE ROLES	MARKETING AND COMMUNICATION, ICT-SUPPORT, ECONOMY SERVICES, LEGAL SERVICES	THE COMMUNICATION MANAGER, THE IT SPECIALIST, THE PROJECT ACCOUNTANT, FACILITY MANAGER, THE LAWYER, LOCAL MEDIA
THE LEARNER	PROFESSIONAL DEVELOPMENT	THE STUDENT, THE LECTURER, THE PARTNER, THE CITIZEN, THE REGIONAL ACTOR, THE PROJECT TEAM
THE PARTNER	ENABLING R&D&I ASSIGNMENTS AND PARTICIPATING IN THEM APPLYING RESULTS TO PRACTICE	PUBLIC AND PRIVATE SERVICE PROVIDERS, ASSOCIATIONS, THE CITIZEN
THE CITIZEN	PARTICIPATING IN THE R&D&I ASSIGNMENTS APPLYING RESULTS TO EVERYDAY LIFE	RESIDENTS, PATIENTS, ASSOCIATION MEMBERS, STUDENTS, STAFF
THE REGIONAL ACTOR	EXPLOITATION OF RESULTS ADVERTISING SERVICES OR PRODUCTS SHARING INFORMATION AND BEST PRACTICES	PUBLIC AND PRIVATE SERVICE PROVIDERS, ASSOCIATIONS, THE CITIZEN, STUDENTS, STAFF

platform for the project's shared activities. Marketing of the activities should be more systematic and continuous. Developing the forum concept into an activity that could be adopted more broadly at Laurea is a possibility and, as part of this expansion, the Hyvinvointiverkosto.fi site could be developed and utilised better.

In order to ensure that the forum activities continue to be LbD-based and combine the three tasks of the University of Applied Sciences in a productive manner, each actor must clarify their own roles and tasks in the well-being forum activities. The following table (Table 4) includes roles needed in the LbD implementation and describes the roles and tasks in the forum activities based on the current experience and the analyses of past forums.

It is essential to ensure functioning coordination in order to guarantee continuity. It is also important to select the themes of the forums and prepare the schedules according to the region's needs, as well as to include the forums in the curricula and the implementation thereof, instead of to only use the projects as their basis, in order to involve teachers and students from different fields of study. Communication in the region and among all the actors in the field should be linked to Laurea's official communication to ensure coverage. New technology and new working platforms should also be incorporated in the daily operations so that remote attendance as a speaker, audience member and workshop participant is easy and convenient.

The current experiences have been collected from Laurea's Lohja campus. The action model can be easily duplicated on other Laurea campuses as well. Knowing the current needs of the region and anticipating future ones must be ensured. With regard to teaching, the agility to address new needs emerging in the region must also be ensured. In order to ensure that the forum activities continue to be successful, the region's stakeholders must be involved in the RDI operations as early as the project preparation stage. It is possible to harness the standard element of the forum activities, in other words, workshops, in the co-creation of future projects, whereas up until now, the focus has been on working on the existing projects. This will be easier if a shared operating platform is in place (see the Figure 1 in the beginning).

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V
**FUTURE
COMPETENCES**

Soile Juujärvi

PRACTICAL PROBLEM SOLVING IN ENHANCING ETHICAL COMPETENCIES OF HEALTH AND SOCIAL CARE PROFESSIONALS

Abstract

The recent health and social services reform in Finland calls for developing pedagogical models that will create novel competences while updating old ones to meet challenges arising from working life. Ethical competence is one of the traditional qualities in caring professions that needs to be reinterpreted amidst changing circumstances. The aim of this paper is to elaborate a pilot study conducted to enhance ethical competencies of health and social care professionals through practical problem solving. Fifty-two master's degree students participated in pedagogical pilots in 2016 and 2017 as a part of the Competent Workforce for Future (COPE) project. The emergent pedagogical model was based the blended learning approach, which combines classroom teaching with online discussions of real-life dilemmas and which enabled participants to rehearse all ethical competencies: ethical sensitivity, moral problem solving, ethical motivation, and implementation skills. The wide pedagogical framework used was Integrative Pedagogy, in which students integrated theoretical knowledge (ethical theories), practical knowledge (personal experiences), self-regulative knowledge (self-assessment) and socio-cultural knowledge (good practices from workplaces) through online and classroom discussions. The learning outcomes were evaluated as "excellent" by students and teachers. Differences between the Learning by Developing (LbD) and Integrative Pedagogy (IP) models are discussed. While both the LbD and the IP emphasize practical problem-solving processes, the latter further specifies different forms of expertise knowledge in building new competencies for adult learners.

Ethical competence is one of the generic competences of health and social care professionals that is challenged by the recent health and social services reform in Finland. In times of large-scale transition, professional education holds the key position in updating old competences and developing new ones in effective ways. This article describes a pedagogical pilot carried out in the Master's degree programme at Laurea UAS with the aim of enhancing ethical competencies through practical problem solving.¹ The LbD model served as a general framework for the pilot with the emphasis on generating new competencies in collaboration with students as working-life partners. The students were already educated at bachelor degree level and had work experience of several years, thus representing the perspectives of both workers and students. Students with education at Master's degree level were qualified for positions as supervising managers, which are critical in managing change and developing work practices at the grassroots level. The present pilot study is a part of the consortium project COPE within which Laurea is responsible for developing innovative pedagogical methods and models for the needs of lifelong learning.

Four Component Model of Ethical Action

The concept of morals generally refers to the individual's natural conception of right and wrong, whereas ethics refers to moral choices to which the individual is consciously committed. Ethics is a systematic attempt to understand moral concepts, ethical rules and principles, virtues and values. Professional ethics looks at what is right and wrong, obligated and justified, good and bad, desirable and to be avoided in professional activities (Juujärvi, 2007). In professional decision-making, personal and professional morals are often intertwined. This article deals with the question of how pedagogy in adult education could promote ethical decision-making among caring professionals and thus the concepts of 'moral' and 'ethical' are used interchangeably. Ethics is a fundamental dimension in health and social care professions with the mission of helping others. It is rooted in both learning and personal development across a lifespan (Juujärvi & Helkama, in press).

The Four Component Model (FCM) developed by James Rest and his associates (1999) is the most widespread empirically established model explaining moral behaviour. According to FCM, moral action consists of four interrelated components: moral sensitivity, reasoning, motivation and character. All of these components are necessary for proper moral functioning; a deficiency in any component leads to deficient ethical behaviour. First, the professional needs to recognise an ethically wired issue in mundane everyday life: ethical problems are not always obvious but hidden in ambiguous situations. Second, they need to be able to reason about which line of action would be morally justifiable in the situation at hand. Third, they must have the willpower to prioritise ethical values over other values, such as pleasure or

¹ 'Competence' refers to the generic, integrated and internalized capability to deliver sustainable effective performance in a certain professional domain, whereas 'competency' means a coherent cluster of knowledge, skills and attitudes as part of competence (Mulder, 2014).

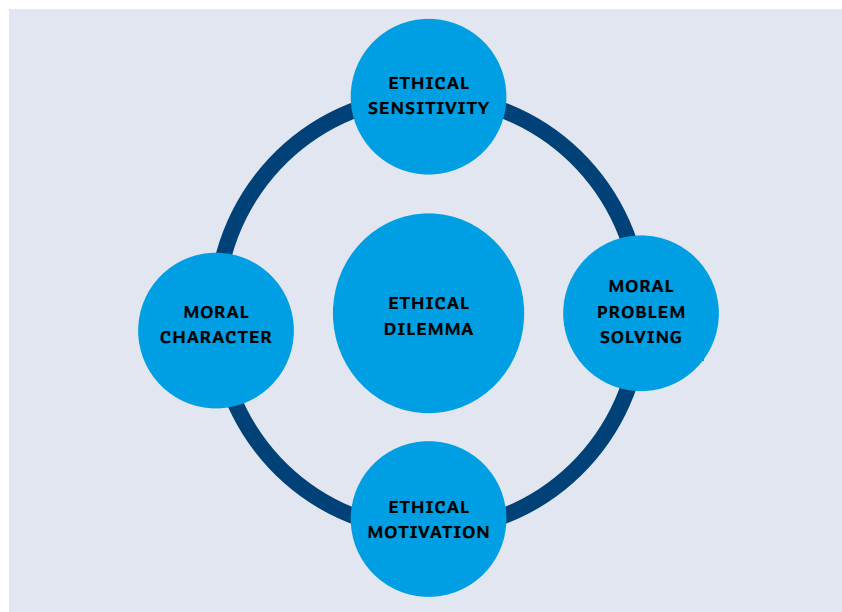


Figure 1. *The Four Component Model of Ethical Action*

self-protection. Fourth, they must have the moral character including courage, persistence and implementation skills to take an action they deem as right (Rest et al., 1999).

The model has been further advanced for the purpose of professional ethics and it has been used in building more effective ethics curricula in higher education programmes (see Figure 1, Rest & Narvaez, 1994). For example, FCM served as a framework for ethical competence in Laurea's competence-based curriculum (Juujärvi, 1997). The basic idea therein is to build a curriculum that aims to enhance appropriate attitudes, knowledge and skills in each component rather than clumping them together as a generic or meta-competence. According to FCM, there actually exist multiple ethical competencies instead of a just one. Effective ethics education generally requires that ethical concepts and theories are explicit content in curricula, teaching encourages students' critical reflection and engages them in thought-provoking discussions, and also provides peer support in learning processes (Bebeau, 2002; Mayhew & King, 2008).

Ethical Action and Decision-Making is a course designed to cover and enhance all of the above-mentioned components. The course was planned and implemented in the Master's degree programme of Management and Development of Social Rehabilitation in 2016 and 2017 at Laurea University of Applied Sciences. The main pedagogical intervention was the online dilemma discussion method that has previously been successfully experimented with social services students at bachelor degree level (Juujärvi & Pessa, 2008), and has been further developed for the purposes of adult education (Juujärvi & Pessa, 2013).

The present pilot is part of the COPE project that explores new competence needs in the transition of health and social services and develops innovative models to meet those competence needs from the perspective of lifelong learning (Keskimäki et al., 2016). The pressing demand behind the pilot is the recent health and social services reform in Finland that signifies a paradigmatic shift in the organisation of services requiring new knowledge, skills and competencies. Ethical competence is one of the generic competences that needs to be reinterpreted in changing circumstances (Kangasniemi et al., 2018). The pilot follows Laurea's pedagogical Learning by Developing (LbD) model as well as the model of Integrative Pedagogy (IP, Tynjälä, 2016), while it is based on a practical problem-solving process in authentic workplace contexts.

The remainder of this paper is organised as follows. Next, I explain in terms of FCM, how the emergent health and social care system would challenge the ethical competence of health and social care professionals. I then describe the rationale and implementation of the pedagogical pilot that is complemented with evaluations by student participants. Finally, I conclude on the outcomes and discuss them with reference to LbD and IP (Tynjälä, 2016). I was responsible for planning and teaching two sets of the pedagogical pilot in 2016–2017, and therefore, this article represents the action research approach.

The Health and Social Services Reform as a Trigger for Ethical Competence Development

Ethical sensitivity

The health and social services reform is an initiative undertaken by Prime Minister Juha Sipilä's government to restructure the organisation of public health care and social welfare services. The major drivers for the reform are increased costs due to a rapidly ageing population, economic disparity of municipal health and social care services and the unequal access of citizens to services. Consequently, the reform strives for more efficient and effective services, improved health, wellbeing and equality among citizens. Responsibility for providing public health care and social services should be assigned to autonomous regions. The guiding principle is to increase freedom of choice in services, while the citizen can choose a service provider from among a variety of authorised providers from the public, private or third sectors. Health and social services are supposed to be integrated packages adjusted to individual needs, and pathways within services will be faster and smoother. This means that services are offered according to individual needs, and citizens get help and support in choosing suitable services. Online services and service advisors will bear an important role in service management (Regional government, health and social services reform, 2018).

The vision of 'customer orientation' as described helps to understand the required change in professional orientation and practices. First, the professional needs to be

able to map clients' needs beyond their professional expertise to make an adequate assessment of the need for services. This requires skills in attentive listening and accurate empathy. According to Miller and Rollnick (2013), accurate empathy means an active effort to understand the other's internal perspective and to see the world through their eyes. Second, the professional needs to respond to the identified needs in an adequate way. This may necessitate inviting other professionals and service providers and even family members to join the process. The professional is responsible for directing the client to other appropriate services.

This is all about the component of **ethical sensitivity**, meaning the ability to recognise obvious as well as hidden ethical contradictions in the situation at hand. This requires awareness of the client's needs and rights and the ability to put oneself in another person's shoes. Ethical sensitivity also calls for consideration of how clients are affected by the consequences of each decision or action, and thus imagining future scenarios with regard to alternative lines of action (Bebeau, 2002). In other words, the professional needs to anticipate how the client will manage beyond the immediate situation, what kind of help or care they could get from other services available, or which would be the best alternative for them in the long run. Ethical sensitivity is closely aligned with the ethic of care that builds on the representation of a concrete situation as fully as possible and aims to respond to the accurate needs of others through activities of care (Gilligan, 1982; Juujärvi & Helkama, in press).

Moral problem solving

The second component, moral reasoning, also called moral judgment or **problem solving**, regards professionals as autonomous decision-makers. Professional decision-making is informed by evidence-based and experiential knowledge but also by professional values and ethical codes established by a professional community.



Ethics is a fundamental dimension of decision-making in the daily work of social and health care professionals dealing with issues of doing good and preventing harm, maintaining and enhancing fairness and justice.

Professionals' ethical decision-making is challenged in various ways by emerging health and social care models. The new system provides clients with freedom of choice with regard to services that means a shift towards customer orientation in practices. Freedom of choice matches the ethical principle of self-determination that is the primary value in the ethical codes of health and social care professions, meaning that the clients' autonomous decisions need to be respected regardless of professional opinions. The current model of individual choice has, however, originated from the values of consumerism and the neo-liberalist idea of the autonomous individual with unlimited capacities and resources for making choices (Barnes, 2011; Lloyd, 2011), rather than the full elaboration of self-determination as a guiding ethical principle. In reality, a large number of citizens have limited capacities and resources in independent decision-making (e.g. in terms of physical and psychological abilities, knowledge, access to information, digital skills, etc.). This calls for accepting, learning and mastering the ideas of social justice and empowerment relevant to advancing the interests of vulnerable client groups within the service system and in public processes.

In real-life, the ethical problem often arises when two values conflict with each other, and professional codes of ethics do not dictate which value should take precedence. Ethical concepts and theories help professionals to elaborate ethical values by giving theoretical justifications for those values and providing recommendations for solving problems encountered in practice. Therefore effective ethics education involves learning essential ethical theories, such as Kant's theory emphasizing moral obligations, human dignity and self-determination and utilitarianism emphasizing common good (Juujärvi, Myyry & Pessa, 2007). Ethical theories reveal and crystallize one's values and provide arguments for well-reasoned decision-making.

Ethical motivation and moral character (implementation skills)

The third component of ethical action, motivation, pertains to questions of professional identity and personal responsibility for ethical outcomes. Ethical behaviour is fuelled by the values professionals have internalised as part of their professional identities (Bebeau, 2002). In future scenarios of inter-professional work, professions should acknowledge one another's expertise and values (Kangasniemi et al., 2018). Health care and social services professionals emphasise somewhat different values. In addition, both professions tend to devalue the values of economic utility that drives the health and social services reform. Ethics education should therefore invite students to recognise, articulate and clarify values embedded in their lives and working practices.

The final component of moral character refers to characteristic dispositions such as courage, perseverance and self-control, and the skills needed in implementing

decisions (Walker, 2002). Moral character is required to perform complex tasks within the profession with integrity as well as to intervene in perceived unethical behaviour and practices in organisations (Bebeau, 2002). Professionals sometimes witness maltreatment and neglect of clients' rights in their workplaces and feel compelled to report them to the authorities or the public—a phenomenon called whistleblowing (Juujärvi, Myrsky & Pessa, 2007). It seems that the social rights of several vulnerable groups have been increasingly curtailed by current practices in health and social care (Nykänen et al., 2017). In order to take action, professionals need good planning and argumentation skills as well as encouragement and support from their peers. It is important to include the rehearsal of implementation skills in ethics education.

Pedagogical Methods

Online dilemma discussion as a method in ethics education

Dilemma discussion is a widespread method of ethics education that is rooted in the research of moral psychology. 'Dilemma' traditionally refers to a difficult moral problem in which two or more values are in conflict with each other, such as euthanasia, abortion or civil obedience; however, the typical moral problems people face in their daily lives are also called dilemmas. They can be cognitively simple but psychologically challenging, such as whether to report an offence committed by a boss or relative, or whether to reveal unpleasant facts to a friend or spouse (Wark & Krebs, 1996). Dilemma discussions usually refer to moderated discussions in face-to-face groups that revolve around specific moral dilemmas, in which students discuss and provide their arguments for what should be done in a particular situation. Dilemmas are designed to feature challenging cases and situations within a profession or in the situation, and they do not have unambiguous, socially accepted answers (Cain & Smith, 2009).

Dilemma discussions aim to rehearse and promote skills in moral problem solving that is a core element in ethical decision-making. These skills reflect moral reasoning development that progresses through successive developmental stages at the individual's speed from childhood to mature adulthood (see Juujärvi & Helkama, in press). This means that students' moral reasoning represent different developmental stages that provide a cognitive bedrock for their arguments. Discussions are effective when students learn higher-stage arguments and comprehensive viewpoints from their peers and teachers (Juujärvi & Pessa, 2008). In higher education, the aim is to advance students' so-called postconventional moral reasoning that equips students with critical apprehension of social injustices and unfair practices and helps them to question the maintenance of norms for their own sake (see Juujärvi & Helkama, in press). Grasping concepts of justice and fairness embedded in ethical theories thus induces growth in postconventional reasoning.

Dilemmas have usually been selected by teachers, which includes some limitations. Pre-selected dilemmas may match the ideals and complexity of professional practice, but they tend to remain abstract, not touching students' emotions and motivations, thus offering little challenge to take action in real-life. Juujärvi and Pessa (2008) experimented with online real-dilemma discussions and found that they enhanced both ethical sensitivity and moral problem solving among social services students. Real-life dilemmas may seem simple, but they tend to activate all components of ethical action. Consistent with this, Taatila and Raji (2012) emphasise that while real-life puzzles are resolved through dialogue, multiple viewpoints are discussed and the right solution results in actions. Therefore, the real-life dilemma method was chosen to promote practical problem solving.

While dilemma discussions was a thread running through the course, as a whole it represented the blended learning approach that combines online digital media with traditional classroom methods. The purpose of blended learning is to integrate classroom and networking interactions in a more effective way. Face-to-face encounters enable brainstorming and rapid interchanges on complex issues, whereas networked interactions enable reflection and sharing regardless of time or place (Graham, 2006). Online discussions are especially convenient to adult learners because they are not tied to a particular location. Cain and Smith (2009) noted that online dilemma discussions are effective because they lessen inhibitions in responding critically to others and engaging in sensitive topics. The time-delay aspect in asynchronous discussions allows all members to participate and reduces the possibility that only a few members dominate the discussion. Due to time-delay, students can reflect on and revise their thoughts and then articulate well-



reasoned responses to messages (see Cain and Smith, 2009). The few studies on online dilemma discussions so far (Juujärvi & Pessa, 2008; Cain & Smith, 2009) indicate that they are at least equally effective to face-to-face discussions in advancing students' moral reasoning.

The model of integrative pedagogy

In order to meet adult learners' needs, we used the model of integrative pedagogy (Tynjälä, 2016) in organising learning environments and planning pedagogical tools. According to the IP, students' learning takes place through practical problem solving by using different forms of professional knowledge: **theoretical** or conceptual, **practical** or experimental, **self-regulative** and **sociocultural** knowledge. The IP model emphasises that theoretical knowledge needs to be transformed in such ways that it applies to practice. In turn, practical knowledge acquired from work experience should be explicated and conceptualised with the aid of theoretical concepts and models (Tynjälä, Häkkinen & Hämäläinen, 2014). The main challenge facing adult education is to integrate theoretical and practical knowledge. Learners need encouragement to use conceptual tools (e.g. ethical theories, models and principles) while reflecting on their experiences, enabling them to rise to a more abstract level in their thinking (Tynjälä, 2016; Tynjälä et al., 2014). Self-regulative knowledge refers to metacognitive and reflective skills (Bereiter, 2002), encompassing attitudes and personal values. Finally, sociocultural knowledge is different from other forms of expertise knowledge because it is embedded in social practices and artefacts. One can have access to this form of knowledge only through participating in communities of practice (Tynjälä, 2016).

According to the IP model, the integration of different forms of knowledge requires certain pedagogical arrangements and mediating tools to interconnect them. Any learning task that helps learners to connect theory and practice and to reflect on their experiences may serve as a mediating tool (Tynjälä et al., 2014). In the present pilot, the real-life dilemma discussion was the main mediating tool that was purported to serve the integration of different forms of knowledge through shared reflection. We also paid special attention to self-regulative and sociocultural forms of knowledge. Self-regulative knowledge grows through self-assessment and feedback, resulting in heightened awareness of one's own personal values underlying thoughts and behaviour. Critical appraisal of one's own values may lead to revealing prejudices and stereotypes held towards clients or other professionals, which can only take place in emotionally safe groups. Tynjälä (2016) points out that emotions play a critical role in adult learning and, in professional expertise, they are often triggered by ethically sensitive issues. Sociocultural knowledge in turn involves unwritten rules and practices in workplaces that can be both beneficial and harmful. Students can learn a lot from hearing about each other's practices and innovate together better practices.

Implementation of the Course

Students and practical arrangements

Ethical Action and Decision-Making was an obligatory study unit in the Master's programme Management and Development of Social Rehabilitation. The participants in the two courses in 2016–2017 included 24 bachelors of social services, 13 nurses, 10 public health nurses and 5 physiotherapists (N = 52). Their average age was 37.1 (SD = 7.2) and they have 9.6 work years on average (SD = 5.3). In total, 83% of them reported to work as a part of a multi-professional network on a daily basis, and 10% reported to do so on a weekly basis.

At the beginning of the course, the students were informed that the course is part of the ongoing research project COPE and it has been approved by Laurea UAS and the Ethics Committee. Students signed the informed consent and 46 of them participated in both pre- and post-tests, including several measures. This paper reports the outcomes of course assessment based on the dimensions of professional expertise (Tynjälä, 2016).

The course had a learning environment on the digital platform Optima, where materials and instructions were shared and dilemma discussions took place. Students were mixed in groups of four to five people representing both social and health care services and various service providers (private, municipalities, third sector, state). In order to facilitate group-building, groups were composed by teachers, and warm-up exercises were used to get students familiar with each other. Updated objectives, learning content methods are shown in Table 1.

Table 1. Course objectives, content and methods

OBJECTIVES	STUDENT IS ABLE TO: <ul style="list-style-type: none"> • RECOGNISE ETHICAL PROBLEMS IN EVERYDAY WORKING LIFE • ANALYSE ETHICAL PROBLEMS FROM THE VIEWPOINT OF WORK COMMUNITIES AND SOCIETY • USE EVIDENCE-BASED KNOWLEDGE, PROFESSIONAL VALUES AND ETHICAL THEORIES IN PROFESSIONAL DECISION-MAKING • ACTIVELY PARTICIPATE IN DISCUSSIONS ON PROFESSIONAL VALUES AND ETHICAL ISSUES • MAKE WELL-REASONED INITIATIVES FOR DEVELOPING PRACTICES IN WORKING LIFE (UPDATED IN 2018)
CONTENTS	<ul style="list-style-type: none"> • COMPONENTS OF ETHICAL ACTION • PROFESSIONAL VALUES AND ETHICAL GUIDELINES • THE ETHICS OF CARE AND JUSTICE IN EVERYDAY PRACTICES • THEORIES OF SOCIAL ETHICS • INFORMATION MANAGEMENT IN SOCIAL SERVICES (2016)
METHODS	<ul style="list-style-type: none"> • LECTURES AND SMALL-GROUP EXERCISES • ONLINE DILEMMA DISCUSSION IN MULTI-PROFESSIONAL SMALL GROUPS • WRITTEN ANALYSIS OF A REAL-LIFE ETHICAL DILEMMA AND ACTION PLAN • DEBATE ON SOCIAL RIGHTS IN THE HEALTH AND SOCIAL SERVICES REFORM (2017)

The course was comprised of classroom teaching of 28 hours, online dilemma discussions and personal assignments. The classroom teaching was planned to cover essential theoretical viewpoints that provided a basis for both classroom exercises and online dilemma discussions. Interaction in the classroom was lively, argumentative and enthusiastic on both courses. As part of classroom teaching, the teachers gave further instructions to facilitate knowledge building in each online discussion group.

Online discussions

Online discussions were initiated by introducing a hypothetical dilemma concerning a young woman's decision-making involving abortion and were analysed according to the recent ethical guidelines of nurses and social welfare professionals (Finnish Nurses Association 2014; Talentia, 2017). The aim of this dilemma was to practise online discussion to make students comfortable with the format and allow time to create useful rules and practices for the group. After the exercise discussion, the groups were instructed to establish rules and a timetable for their work. Discussion of each real-life dilemma was initiated by writing a starting message into a thread, guided by the following instruction.

Describe a situation in working life that puzzled you and you were not sure what the right thing to do was. What issues caused you a problem in that situation and why? How did you act in that situation? Discuss your case in the online group discussion group.

Consider the situation from your viewpoint and the viewpoint of other people involved in the situation. What issues should be taken into consideration? What would have been the right thing to do?

Reflect on the case by referring to the professional ethics guidelines, personal and professional values and ethical theories. Search for relevant knowledge to support your decision-making.

The group discussion lasted over a period of two months, after which students wrote the analysis of their real-life dilemma and action plan according to the guidelines (Juujärvi, Myyry & Pessa, 2007). Students wrote 31 (SD = 19, course 1) and 34 (SD = 19, course 2) messages on average, even though the number of messages varied from 6 to 96. The activity between groups varied as well. The most active group delivered 257 messages, whereas the least active group delivered 36 messages (not including the teachers' messages). Two groups out of 14 encountered difficulties in establishing discussion because of passive or departing members and were helped by students who joined from other groups.

The quality and style of messages varied. In some groups, messages were long, analytical and stream-of-consciousness like, whereas in others they were short comments, replies and greetings. In the most active group, there was also a lot of socio-emotional messages, information exchange, and links to current sources of knowledge. Messages by teachers were shorter than those written by the students.

Teachers summarised viewpoints, asked direct questions, encouraged people to voice opinions and gave instructions for the written assignment.

The dilemmas raised by the students were diverse. To demonstrate their variety and actual character, the dilemmas raised by one group are described in Table 2. This group was remarkable in terms of activity. They shared the highest number of messages (f = 257) through which they explored the practices of each organisation, shared links to urgent information sources, and developed different lines of action as practical solutions to their problems. The quality of the conversation and written assignments was also high in terms of theoretical knowledge.

Students' learning was evaluated on the basis of the written assignment and participation in discussions according to the pre-established criteria for each grade. The learning outcomes varied from good to excellent, most students achieving grades 4 (very good) or 5 (excellent). Students' knowledge and skills were varied at the beginning of the course, which made it difficult to evaluate them on an equal basis. Those students who achieved the greatest gains in learning were not the ones who performed excellently in the written assignment. Students also progressed differently in developing action plans.

Table 2. Examples of real-life dilemmas of an online discussion group

<p>EVELYN works as a nurse at a day care centre. She was concerned about a couple in their eighties. The husband has Alzheimer's at an early stage and still has a driving license. The driving license is important to his masculine identity and necessary for daily and free-time activities, such as shopping, going to see the doctor and socialising. Evelyn has observed that the husband does not cope with driving perfectly anymore, but the couple ignore the issue. She wonders what her responsibilities are and how she should intervene in the situation.</p>
<p>MARC is a team manager for 12 nurses in an elderly persons' care institution. One of the employees is a young woman suffering with back pain, which causes absences from work. She has been referred to an examination with occupational health care that has, however, failed to find any apparent reason for the pain. The team's performance and spirit suffers due to her sick leave and work quality is lower. Marc has tried to talk to her, but she is blind to her situation and does not have any other future scenarios except for keeping her present job. Marc wonders how he can balance the interests of each party in the situation.</p>
<p>LAURA works as a counsellor at the municipal information office that has a large number of immigrants as visitors. The service is purported to support the settlement of citizens when they move to the municipality and counsellors can provide information in several languages upon request. Quite many immigrants go to the office frequently to ask for advice concerning daily matters. Laura has started to think about the option of using languages other than Finnish when serving the integration of immigrants into society in the long run.</p>
<p>SOPHIA works as a social counsellor in a rehabilitation ward. One of the patients, an old lady, persistently opposes discharge. Sophia has developed a trusting relationship with her and has discovered that the lady is frightened of being alone at home. Sophia thinks that the lady is depressed and needs professional help. There are no public mental health services in outpatient settings available to her. Sophia has tried, without success, to find other services and volunteers that could support the old lady in coping at home. She learned about services and practices in neighbouring municipalities and realised that services in her municipality are of low quality and not in the interests of the elderly.</p>

Students' assessment and feedback

In the online post-test questionnaire, the students were asked to assess how the course has advanced their helping on the five-point scale, ranging from very poorly (1) to 5 (very well). Ten items were designed to measure the dimensions of the integrative pedagogy. The mean scores for the items are displayed in Table 3.

Table 3. Students' (n=45) assessment on learning. Standard deviations are in brackets.

ITEM	MEAN
I HAVE BECOME COMPETENT IN USING SCIENTIFIC KNOWLEDGE TO SUPPORT PROFESSIONAL DECISION-MAKING	4.6 (0.5)
BRINGING MY PERSONAL EXPERIENCES AND THEORETICAL KNOWLEDGE TOGETHER HAS SUPPORTED MY LEARNING	4.4 (0.6)
I HAVE LEARNT TO UTILISE MULTI-PROFESSIONAL KNOWLEDGE	4.4 (0.7)
I RECOGNISE MY ATTITUDES AND VALUES BETTER NOW THAN BEFORE	4.4 (0.9)
I HAVE LEARNT TO ASSESS MYSELF BETTER THROUGH FEEDBACK FROM PEERS AND TEACHERS	4.3 (0.7)
DISCUSSION OF PERSONAL EXPERIENCES HAS ADVANCED MY LEARNING.	4.2 (0.6)
I HAVE LEARNT TO SOLVE ETHICAL PROBLEMS RELATED TO MY PROFESSIONAL FIELD	4.1 (0.7)
I HAVE LEARNT TO UNDERSTAND THE BASIC KNOWLEDGE OF OTHER PROFESSIONAL GROUPS	4.1 (0.7)
I HAVE LEARNT GOOD PRACTICES OF OTHER PROFESSIONAL GROUPS	4.1 (0.8)
REFLECTING ON WORK-RELATED PROBLEMS HAS ADVANCED MY LEARNING	3.8 (0.9)

The evaluations were over 4 (well) for all items except for the item "Reflecting on work-related problems has advanced my learning", which obtained the lowest scores. 2. Further scrutiny revealed that Course 2017 gave higher evaluations than Course 2016 (M = 4.5, SD = 0.6 vs. 3.7, SD = 0.8). The explanation might be that on Course 2016 several students raised dilemmas from the past that were already solved and thus not motivating enough to boost learning. Consequently, the students on Course 2017 were carefully instructed to choose an urgent difficult dilemma to stimulate lively and critical discussion.

Students' learning experiences

The students on Course 2017 were also asked to give anonymous open-ended feedback about the course. Their evaluations were exclusively positive and consistent with the results of the questionnaire. First of all, the students appreciated the

blended learning approach, combining classroom teaching with online dilemma discussions, because it compelled them to learn ethical theories.

Active and diverse online discussions have presented me with the opportunity to get acquainted with various ethical theories and debates.

One of main shared learning experiences was that ethical decision-making is a fundamental dimension of their expertise. The students realised that theoretical knowledge gave them cognitive tools to deal with challenging issues.

Ethical theories have provided a framework for my own work. Outreach youth work hasn't been around for long, and the goal is to work with young people and young adults in a weaker position. Exploring ethical theories, social rights and values as well as discussing ethical problems online has helped me better understand what my own work is based on. It is easier to explain and justify my own work methods now that I have found a sound theoretical foundation that isn't based only on the Youth Act.

The students were generally enthusiastic about online dilemma discussions and thought that they were both informative and emotionally rewarding. They were fascinated by the opportunity to learn from each other's expertise that was complementary to one's own expertise.

Multidisciplinary has added spice to this study unit. It urges us health service representatives to adopt a multidisciplinary approach when considering the patient's interests.

The students appreciated the inter-professional approach that was intentionally advanced by mixed groups. They praised the possibility of sharing different viewpoints and good practices.

The online discussions opened a window into the other participants' workplaces and the problems they were dealing with, but perhaps even more important for me was the multidisciplinary discussion incorporating different perspectives. These provided new thoughts and ideas for my own work community.

The students pointed out that the course has encouraged them to take action to improve practices in working life. They have acquired self-confidence and new skills to raise ethically sensitive issues in work communities. Some students have even established detailed action plans to advocate the rights of vulnerable groups.

I would just like to add that the studies and learning strengthened my actions among disabled people and steered my activities closer to the UN Convention on the Rights of Persons with Disabilities (2006), which urges us to convert words into actions and theories into practice.

For some students, the course offered considerable impact on the development of their professional identities. As one student jokingly put it:

I noticed that my own workplace faces numerous challenges. I will be seen as a trouble-maker who is thrown out of meetings and development events because no one wants to listen to my endless ideas, questioning and suggestions for improvement.

Conclusions

This paper describes a pedagogical pilot in adult education that has originated from the Learning by Developing Model (Taatala & Raji, 2012). While LbD is based on a practical problem-solving process, we anticipated that it would cover all components of ethical action: ethical sensitivity, problem-solving, motivation and implementation skills. In addition, we expected that solving real-life dilemmas would be beneficial in developing the new competencies needed under the ongoing transition in working life. According to Kangasniemi et al. (2018), ethical competence is one of the generic competences of health and social care professionals that needs to be updated within the scope of health and social services reform. Kangasniemi et al. (2018) further express their worries about the present educational trend of arranging ethics teaching through e-learning assignments with large student groups and minimal options for reflective discussion. To mitigate these worries, the emergent pedagogical model represents the blended learning approach that intentionally integrates classroom teaching (theoretical knowledge) and online dilemma discussions (experiential knowledge) to improve learning outcomes. Present findings suggest that the model was successful in developing new competencies through practical problem solving.

However, while we were planning the pedagogical framework for the pilot, we found the LbD insufficient to capture the full potential of adult learners. Integrative Pedagogy represents an approach to organising learning environments in such a way that it helps to specify and utilise different forms of expertise knowledge. In addition to theoretical and practical forms of knowledge, self-regulative and socio-cultural forms of knowledge are of the utmost importance in developing new competencies. In ethics education, self-regulative knowledge is connected with critical self-appraisal and reflective thinking and it especially contributes to implementation skills. Socio-cultural knowledge, in turn, helps to recognise the implicit values embedded in social practices in workplaces and organisations. According to IP, it is teachers' responsibility to design pedagogical tools mediating different forms of knowledge, while students must combine different forms of knowledge by using integrative thinking (Tynjälä et al., 2014; 2016). Students' positive assessments on their learning and excellent learning outcomes indicate that online dilemma discussions advanced especially the integration of practical and theoretical knowledge that has been a major concern with regard to adults' learning (Tynjälä, 2016). The online discussions also provided a forum for exploring and sharing socio-cultural knowledge from students' communities and organisations that is beneficial for developing the inter-professional practices required in future models of the health care and social services.

Integrative Pedagogy departs from the LbD model by pointing out the importance of theoretical knowledge for learning. LbD, it has been argued, is based on pragmatism according to which there are no fixed truths and facts given to students, who instead construct relevant theories through action (Taatala & Raji, 2012). As a consequence, each student may discover truths of their own depending on the contexts. Created working theories do not distinguish practical knowledge from theoretical knowledge, which makes the transference of knowledge to other contexts difficult. Within the scope of ethics education, philosophical theories of social ethics as well as theories based on empirical facts provide tools for integrative thinking. Shared theoretical concepts are important because they enable critical discussion of ethical issues. Taatala and Raji (2012) take further the critical stand against the teacher-dominated pedagogy that can, however, be the most efficient way of teaching complex subjects and topics in professional education. Direct teaching of theoretical knowledge does not preclude shared reflection and interaction with environments. New competencies are outcomes from unique learning processes.

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THE ROLE OF AN ePORTFOLIO IN LEARNING BY DEVELOPING

Abstract

According to Laurea's "vision for utilising digital technology", every student will compile a portfolio and demonstrate their competencies by the end of 2019. The use of a portfolio is expected to support lifelong learning, student employment and renew the world of work (Ojasalo 2017).

As Laurea already has one important starting point in pedagogy, it is worth asking the question: What is the role of a portfolio in the Learning by Developing (LbD) action model? In this article a preliminary analysis of the matter is conducted. We will analyse how a portfolio is related to the characteristics and stages of LbD. Furthermore, we will explore the matter from the perspectives of students, partners and lecturers.

In conclusion, we will summarise our recommendation for how a portfolio can be utilised in the LbD action model. We hope that this model can serve as a starting point for common discussions and development work to reach the aim set out in the vision.

Introduction

The Learning by Developing (LbD) action model is based on pragmatism and on the idea of gaining competencies in real-life action and being able to cope in an ever-changing world. Thinking is one action and testing beliefs by proving them in the action is how we learn in practice. Through action both the environment and people change. (see Raji 2014, 12–13.)

A portfolio is a tool meant to support lifelong and life-wide learning. As the phase of changes accelerates and the labour market changes (see Alasoini, Järvensivu and Mäkitalo 2012), it is likely that having a portfolio will become even more necessary during a career.

Moreover, a portfolio is a versatile tool that can be said to have two aspects: on the one hand, a portfolio can focus on the process and, on the other hand, it can focus on the results (see Barrett 2010). In fact, there are several different kinds of portfolio. At Laurea University of Applied Sciences, we are used to distinguishing between **a basic portfolio** for storing information, **a process portfolio** and **a showcase portfolio**.

In this article, we will first introduce the basic idea behind compiling a portfolio and then analyse how portfolios might support the LbD action model, which describes the learning process of our students. In the analysis, we utilise both the defining characteristics and the stages of the LbD action model identified in Raji's (2007) research. Our understanding and ideas have been formed during the ESF-funded Social Media and its Equipment as a Way to Working-life project.

A portfolio as a tool for personal development

Portfolios have a long history in the field of education. Today, ePortfolios make it easy to produce and collect all kinds of material online. So what is a eportfolio? It can be described as a digital collection of artifacts. A good academic portfolio also represents a student's learning process. By doing that, at its best, it produces a deeper understanding of the student's competencies. (University of Waterloo.)

In this article, we consider a portfolio primarily **as a personal learning environment (PLE)** that is used during studies to document learning, competencies and outcomes. In the PLE, a student can have several parallel portfolios from which to combine and copy content to create showcase portfolios. In a PLE, the starting point is that everything remains private until the student wants to share the content with someone. The idea is also that a portfolio is something that students can continue to update even after graduation. This is an important advantage as teacher-centric learning environments will be inaccessible after passing the study unit. A portfolio brings together what has been done and gained, whereas in a study unit-centric action model the outcomes are scattered and, unfortunately, often soon forgotten.

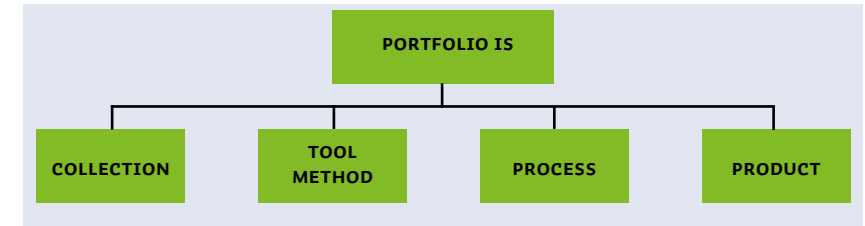


Figure 1. How a portfolio can be understood (Niikko 2000, 50–66).

As mentioned earlier, portfolios can be explored as a process or a product. According to Niikko (2000, 50–66), a portfolio can also be understood as a collection or as a tool or a method (see Figure 1).

Based on our experiences, it is our view that probably the most common way to see a portfolio is as a product. It is a collection of different documents from studies and projects. It is mostly the place to store those documents as students can document and compile articles, essays, videos, photos, posters, etc., to their own personal portfolio.

In our opinion, portfolios should be seen more as a process. A portfolio can be built during one study unit or it can be collected over the period of studies. During a portfolio process, students learn how to reflect on their whole learning process and skills. A portfolio can deepen learning and it encourages students to take responsibility for their own learning.

Apart from demonstrating what they have learned at school, a portfolio also offers a chance for students to document the learning they have acquired through extra-curricular activities and hobbies. Students can describe their hobbies in different ways, and show their social activity, for example, in voluntary work or in associations.

In Laurea's LbD action model, students' learning takes place within several types of development tasks. If a student starts to write down and describe their projects and development tasks in a portfolio, it is easier to identify and describe their own know-how. This is crucial especially at the end of the studies when the student starts to look for a job that corresponds with their education. Furthermore, it is extremely important for those students who do not have much work experience. It can also help the student find a placement.

Portfolios make it possible to present evidence for various types of competencies. According to Raji (2014, 11), competence is identified as "an integration of knowing, understanding, and acting and situation management". As it is important that the students are able to understand their abilities in the world of work (Raji 2014, 11), the process of curating a portfolio becomes important. By gradually upgrading and adding to it, all learning can be made visible, concrete and thus, capable of being assessed.

The idea of a portfolio and the defining characteristics of LbD are well-suited

Raij (2007) identified in her research five characteristics of LbD: authenticity, partnership, experiencing, creativity and an investigative approach.

The **authenticity** of the work-life-related learning situations is one starting point for LbD (see Raij 2007, 22). According to Vyakarnam, Illes, Kolmos and Madritsch (2008), authenticity is what differentiates LbD from problem-based learning. When the aim is that the learning situations resemble real working life, the study assignments should produce good evidence of relevant competencies. A portfolio can work as a proof that the student is able to identify and solve work-related problems and renew the world of work.

According to predictions, in the future only a few will work in currently existing occupations. A portfolio will be needed in the world of work and education that is increasingly scattered. As a result, learning abilities need to be emphasised. Another rising need is the ability to cope in new digital working environments. An ePortfolio provides evidence of a student's digital abilities.

As a portfolio is a tool for providing a showcase of genuine competencies, it is also a tool for recognising competencies gained outside the world of work. These competencies should be recognised in a competence-based assessment also when studies are completed as a study unit or as a project, not only when recognition of prior learning (RPL) is applied.

Partnership as a characteristic feature of LbD emphasises the role of others in the learning process (see Raij 2007, 22). Partnership can be described in the portfolio. Thus, a portfolio can provide a picture of a student's personal professional network.

It is also possible to create the portfolio in co-operation with a partner. For example, the partner can share useful materials to be included in the portfolio. Outcomes can be made visible for all parties (student(s), lecturer and partner) and this makes it possible to disseminate the outcomes and new competence. The partner can also provide feedback on the project plan or on the portfolio, or give personal recommendations.

According to Raij (2007, 23) **experiencing** is what provides the meaning for the action and is therefore the basis for developing competence or a trigger to search for new forms of actions. Experiencing will become visible while describing the learning process and perceptions in a portfolio. Without reflection new forms of action will not be formed even if we have experienced something (see Letters from Our Reflect Correspondent). A portfolio is a great place to discuss the relationship between theories and reality, which is emphasised in pragmatism. The theories acquired will support reflection and thus experiencing. In practice, knowledge embedded in skills and abilities can be expressed by presenting artifacts created during the LbD

process, and by describing how they were created. There are many ways to document experiences. For example videotaping can be used for many purposes.

Many generic competencies, such as critical thinking, writing skills, lifelong learning and creativity, will be developed during the portfolio process. One learning outcome in LbD is that the students learn how to take responsibility for their actions from the very beginning of the development task until the end, while also obtaining skills in decision making. All these abilities mentioned above should become visible in the student's portfolio. Based on a well-curated portfolio, it is easier for an outsider to understand what a graduate with a Bachelor's or Master's degree in the field of studies is capable of.

A portfolio is a tool that makes the different life phases visible and assessable. The overall portfolio can support career planning as it serves as a good starting point for discussion. The process of curating a portfolio individually and independently enhances the student's ability to take responsibility for their learning and career. It can be argued that a similar kind of attitude is needed to be successful in the studies based on LbD.

An **investigative approach** is at the heart of university learning (Raij 2007, 23). In a portfolio, a research orientation can be indicated in many ways: interesting or used sources can be listed or a research tool box gathered. The student can give examples on how they have applied the tools during their studies. The knowledge base can be summarised as a personal wiki. A showcase portfolio can provide evidence that the student has been able to choose relevant content and what kinds of sources they tend to rely on when searching for information. This kind of portfolio site can serve its purpose during further education or in demonstrating to the employer what kind of content the degree studies have included.

In LbD, **creativity** is needed to create something new or to make a change (Raij 2007, 23). A portfolio is a creative product. Creativity can be used to express one's personality, and the content can be created in various ways (text, pictures, audio, video, hyperlinks). In a blog (whether personal or published), the student is able to reflect on their learning and experiences more freely. This means all sorts of outcomes of LbD can be included in the portfolio. This includes showing how one's attitude develops during the studies; for example, normal assignments do not provide much room for expressing anxiety but in a process portfolio these kinds of attitudes can also be expressed and discussed. The difference between a portfolio produced and owned by a student and teacher instructed assignments is that the students can decide more freely on the content and what aspects they are willing to put more effort into.

A portfolio's role in the stages of LbD

Raij (2007) identified in her research the 10 stages of LbD. Describing an LbD development process fits well in a portfolio. Below we give some examples on how a

process portfolio could be compiled during an LbD project or development task and how it would support student learning. The ideas are summarised in Table 1.

Table 1. A summary of how an ePortfolio can be utilised in the different stages of LbD.

STAGES OF LBD (ACCORDING TO RAIJ 2014, 15)	EPORTFOLIO PRACTICES
A PERCEIVING A PHENOMENON; COLLECTING AND PROCESSING DATA; SHARING EXPERIENCES	<ul style="list-style-type: none"> GATHERING INFORMATION ON THE PHENOMENON IN THE PORTFOLIO SHARING THE PORTFOLIO WITH THE GUIDING LECTURER
B REFLECTING ON AND INTERPRETING THE MEANING OF KNOWLEDGE; COMPARISONS WITH EARLIER EXPERIENCES	<ul style="list-style-type: none"> SHARING THE PORTFOLIO SITES CREATED FOR OTHER STUDENTS REPORTING REFLECTIONS IN THE PORTFOLIO
C DEFINING A DEVELOPMENT PROJECT; IDENTIFYING AND DESCRIBING ACTIVITIES	<ul style="list-style-type: none"> DEFINING OR LINKING THE PROJECT PLAN IN THE PORTFOLIO DEFINING THE LEARNING OUTCOMES TO BE ASSESSED
D ACQUIRING NEW TOOLS AS CONCEPTS AND INSTRUMENTS FOR DOING	<ul style="list-style-type: none"> REPORTING AND REASONING ON WHAT TOOLS HAVE BEEN ACQUIRED LISTING TOOLS, ARTICLES, SUMMARIES OF THEORETICAL KNOWLEDGE, ETC.
E COOPERATING BY CREATING SOMETHING NEW. DEVELOPING FUNCTIONAL AND PROBLEM-SOLVING SKILLS	<ul style="list-style-type: none"> SAVING ALL PERSONAL PROJECT OUTCOMES AND THOSE CREATED TOGETHER IF AGREED REFLECTING ON ONE’S ROLE IN PRODUCING THE COMMON PROJECT OUTCOMES DISCUSSING THE PROJECT ONLINE OR REPORTING THE DISCUSSIONS IN MEMOS, ETC.
F ASSESSMENT OF THE PROCESSES OF A TASK AND ONE’S OWN LEARNING PROCESSES	<ul style="list-style-type: none"> REFLECTING ON THE PROJECT ASSESSING ROLE-SPECIFIC LEARNING OUTCOMES LECTURER’S COMMENTS ON HOW THE PROJECT IS PROCEEDING
G SHARING EXPERIENCES AND TESTING THEIR MEANINGS	<ul style="list-style-type: none"> SHARING MEMOS FROM THE DISCUSSIONS IN THE TEAM
H IDENTIFYING ACQUIRED COMPETENCIES AND THE LEVELS OF KNOWING, UNDERSTANDING, DOING AND SITUATION MANAGEMENT	<ul style="list-style-type: none"> SUMMARY OF WHAT HAS BEEN LEARNED VERSUS WHAT SHOULD HAVE BEEN LEARNED (IN RELATION TO ASSESSMENT CRITERIA)
I PRODUCING NEW KNOWLEDGE OF AND FOR PRACTICE; ASSESSING THE EFFECTS OF THE DEVELOPMENT PROJECT	<ul style="list-style-type: none"> REPORTING ON FINAL PROJECT OUTCOMES REFLECTION ON THE LEARNING PROCESS, LEARNING AND HOW TO UTILISE THE OUTCOMES ADDING FEEDBACK IN THE PORTFOLIO
J SHARING AND DUPLICATING OUTCOMES; EXPLOITING OUTCOMES	<ul style="list-style-type: none"> SHARING ACCESS RIGHTS TO THE PORTFOLIO OR MAKING IT (OR PARTS OF IT) PUBLIC

As noted by Raij (2014, 15), the stages can appear in a different order, depending on the case. When instructing students on how to compile their portfolios, a lot of space should be left for them to decide individually on the form of reporting, the actions and the content, to allow creativeness and different learning styles.

The first stage (A) is “perceiving a phenomenon”, which means collecting and processing data and sharing prior experiences. This can be supported by an ePortfolio in many ways:

Example 1. The students can gather the knowledge they have acquired in their own portfolio.

Example 2. The student group can form a common portfolio site (group) or a blog and compile all information there. Contact information and roles in the project group can be described in the site. The site could include a picture of the mind-map formed together after studying the topic first by themselves.

Example 3. It is also possible to have both if agreed with the parties: the individual sites are linked in the group page.

At this point, the portfolio sites—individual- or group-based—can be shared with the guiding lecturer, who can then follow the process through the portfolio site.

Stage B, “reflecting on and interpreting the meanings of knowledge”, can be supported by sharing the portfolio sites or blog texts created during the first stage.

Example 1. Reflective discussions can be held in a group orally and memos can then be added to the portfolio.

Example 2. Students can also reflect on the knowledge base in written form, such as adding comments to the portfolio site or in the group discussion forum.

Example 3. Flipped learning can be utilised: the students can make a list of questions based on the materials that will then be discussed with the guiding lecturer.

Example 4. Moral competencies can be addressed during a portfolio process at various occasions. For example, the lecturer can pay attention to the source choices made by the students and how references are made.

In the stage “defining a development project” (C), the students need to specify and plan their development project. Again, the plans can be stored and accessed through the portfolio site:

Example 1. If the plan needs to be edited together, it can be located in a cloud service (OneDrive, Google Drive, etc.) and the document link can then be added to the group portfolio.

Example 2. The plan is made in a project management tool, such as TRELLO, and linked to the portfolio.

At this point, it is important to connect the project and learning objectives with the expected learning outcomes described in the curriculum:

Example 3. At this point, the assessment criteria can be saved in a cloud service and linked to the personal portfolio. When the development work proceeds, those criteria that are already met can be marked either by the student or guiding lecturer.

“Acquiring new tools as concepts and instruments for doing” (D) and “co-operating by creating something new and developing functional and problem-solving skills” (E) can be reported in reflective texts published in the portfolio.

Example 1. One portfolio site can be used to store interesting professional tools and articles that support the development task. The choices can be explained in the portfolio.

Example 2. The student can create their own library by gathering the theoretical backgrounds written for different projects in his portfolio.

Example 3. Above all, the project outcomes can be stored and described in the portfolio as well as the student’s role in creating those.

In our opinion, the **“assessment of the processes of a task and one’s own learning process” (F)** should be continuous.

Example 1. In an LbD project, the students have the possibility to try different roles, which should be documented in the portfolio to keep track of different roles. For example, the project manager has the responsibility for monitoring the progress. It could be beneficial to keep a role-specific learning diary as management skills are evaluated in the third year of the bachelor studies during career planning studies at Laurea UAS.

Example 2. It is important that the guiding lecturer visit the portfolio(s) once in a while to see if the project is proceeding or not.

“Sharing experiences and testing their meaning” (G) is usually done in group meetings either together or without the lecturer.

Example 1. If the lecturer is not present, the memo, saved in the portfolio, can be used to document the discussion and participation and whether all the students are participating.

“Identifying acquired competencies and the levels of knowing, understanding, doing and situation management” (H) is a stage when, at the latest, the first discussions should take place where the process is reflected on against the learning outcomes described in the curriculum. Now that the whole process is documented in the portfolio, it is easier to recognise what has been learned (knowledge, skills, attitude, etc.). Also, unanticipated learning outcomes may occur in the LbD process as Raij points out (2014, 17). If so, these competencies can also be acknowledged and more credits given.

In the penultimate stage (I) new knowledge of and for practice is produced and the effects of the development project are assessed. There are again various ways to proceed:

Example 1. The student can record an audio pod or a video in which they reflect on the process, learning and how the results of the project can be utilised in the future. As LbD projects also develop general working life competencies (see Raij 2014), these can also be addressed during the assessment.

Example 2. As it might benefit the students in the future to have written recommendations, peer assessment, the lecturer’s and project client’s assessment can be done by commenting on the portfolio site, if agreed. Note that evaluation done by the lecturer is considered to be classified information and should not be available to other parties.

In the final stage (J), “sharing and duplicating outcomes”, the student group can decide on whether to make their process portfolio public or make a copy of the site and modify the content and publish a showcase portfolio. Before that, the link to the portfolio can be shared with the client to discuss which materials can be published and if the student is allowed to use the name of the firm as a reference in their portfolio. Students should also agree at this point if the group members are allowed to publish commonly produced artefacts in their own showcase portfolio. Of course, the authors need to always be told and permission given by the client.

Based on how the portfolio can support the progress of the development task and learning, the analysis above gives the lecturers a tool to decide pedagogically which stages are described in the student portfolio(s). What can always be added in the student’s own showcase portfolio is the description of the project and reflection of personal learning outcomes and development needs.

Conclusions on developing LbD and portfolio practices

The analyses above encourage us to make some suggestions for enhancing student learning and support the study process.

Portfolio (LbD) summons not only studies but life-wide learning

At Laurea, we can recognise at least two different interpretations of LbD. The first means that students learn in authentic working life projects or development tasks. The other interpretation is that LbD is a paradigm that comprises the whole study process. This means that, in addition to the projects, the students will learn basic tools (knowledge and skills) needed in the LbD projects also in more traditional classroom settings and workshops. The latter is how Raij has explained the model to Laurea staff in person.

When considering what kind of portfolio the student should be compiling during their studies, we believe that the content should comprise the whole study process (LbD), not just LbD projects. This means that at the beginning of the studies, students should introduce themselves to other students and/or guiding lecturer by creating a portfolio. In studies aimed at a degree, prior competencies should be described in order to decide if RPL could be applied by curating stronger evidence on the matter. Goals for personal development and studies should be set.

During studies, all kinds of evidence and reflection can be part of a portfolio. The content can be structured to reflect the content of the curriculum or curated more freely. All learning that takes place outside of the school premises, such as work placement or clinical studies, work-based learning or learning during voluntary work or student union activities, can be reported and the process even guided through a portfolio. In fact, as a life-wide tool, the content is not limited by education or LbD process. Ultimately, the content choices will be made by the student and reflect the values of the author. Hopefully, due to the process, the student is able to connect new content to earlier experiences and knowledge. When all this becomes visible, the student's self-confidence and self-knowledge are likely to increase and the student will understand the meaning and outcomes of the studies. The student's future belief will strengthen.

AIMS FOR THE STUDIES AND CAREER	REFLECTION ON STRENGTHS AND WEAKNESSES	FEEDBACK	PERSONAL TOOLBOX	REPORTING STUDENT UNION/VOLUNTARY WORK
PRIOR COMPETENCES (RPL)	FEELINGS	REFLECTIONS ON THE STUDIES AND LEARNING	RECOGNISING GENERIC COMPETENCIES	PERSONAL INSIGHTS AND INTERESTS
MEMOS FROM STUDY UNITS	THEORETICAL SUMMARIES	REPORTS	REPORTING PLACEMENT/CLINICAL STUDIES	DOCUMENTATION OF WORK-BASED LEARNING
CREATING SEPARATE PORTFOLIOS AND SUMMARISING IN A SHOWCASE				
GUIDING THE STUDIES AND COMPETENCE				

Figure 2. The portfolio should assemble the whole study process.

If we think about the student's motivation, the basis should be that the meaning is to support learning. We argue that it would increase the student's motivation if the portfolio could be utilised for the thesis as well. For example, at Häme University of Applied Sciences a thesis can be completed by analysing a common phenomenon raised from the projects and a portfolio is curated as part of the thesis to provide the evidence needed for the thesis (Thesis Guide 2017).

A portfolio is a tool for personal guidance

A pedagogical main conclusion made here is that if students compiled their own portfolios we would have a new and useful online tool for guiding students and making assessments. The emphasis should be shifted from teaching to guiding the personal development process. It needs to be remembered that we are talking about a student-owned portfolio process.

As a tool for guidance, a portfolio has more value than just supporting career guidance. As mentioned earlier, the unique feature of PLE is that it allows expression of personal concerns and feelings. To have the possibility to do this might as such be important for a student and help them to proceed towards finding a solution for their case. As inactivity will be instantly perceived when visiting the portfolio, it is possible to apply early intervention methods to support the student to continue the studies. In group work, the challenge has been to recognise more active students and especially so-called free riders in LbD projects. Again, a portfolio offers a good tool for this. The main argument for why a portfolio is needed is thus very pragmatic: to document student activities and being able to support the learning process.

A portfolio (LbD) challenges current pedagogical practices but also supports development

What we describe above means that a portfolio should be seen as a pedagogical tool, not only as a tool that has value for the student from the point of view of career management and the employment perspective. To see the value of developing pedagogy is at the heart of all future actions.

In the past, the LbD action model has been evaluated several times. Vyakarnam et al. (2008) concluded in their report that the LbD action model needs to be made more transparent. By integrating the use of a portfolio in the LbD action model, the different stages of the model can be made visible. This supports student guidance and competence evaluation, which were identified as development targets by the evaluators.

The follow-up evaluation in 2009 revealed the need for clarifying the purpose of the model and describing the model by using clearer student-centric language. Perhaps the LbD action model could be rewritten by describing it from the point of view of portfolio products. If compiling a portfolio is taken as a target of the education, it will also support the staff in discussing and finally creating a common view of what kind of portfolio would best suit the students and educational needs. The analysis above is intended to just be one inspiring example and below in Figure 3 we offer a simplified visual interpretation in which the various phases of the LbD action model have been combined under more generic steps (1–6).

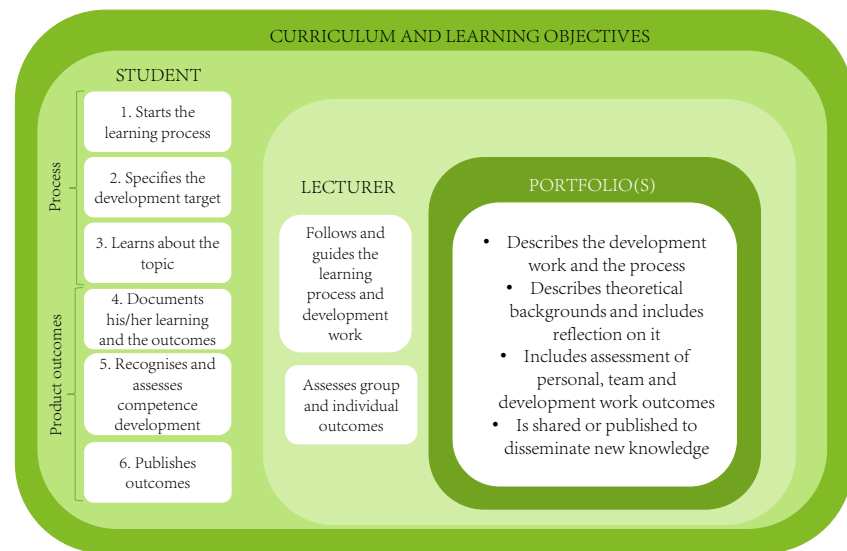


Figure 3. Portfolio Process in LbD

It is evident that new practices require a lot of work to be implemented, especially when the practice needs to be applied at the university level to offer all the benefits described above. In order to pass the main obstacles, they have been analysed (see Nykänen 2018). One of the claims confronted is that a portfolio would mean extra work for both students and staff. To solve this problem, we suggest that it should be carefully considered what is required from the students in order to support and guide the learning process and what evidence is used to assess the learning outcomes. This should relieve the pressure. Nevertheless, what should be assessed is the competencies, even if the assessment criteria provides insights into the viewpoints that allow us to perceive competence development. Hopefully, the learning assignments could also be planned better to serve the need to collect good artifacts in a showcase portfolio (Nykänen 2018, 190).

Furthermore, if we were able to analyse the content of the portfolios, we would have a lot of information on how the learning outcomes have been met. If we could discuss the students' portfolios together with the working life representatives, we would gain insights into what is valued and needed in the world of work in order to develop education. And, of course, we could see how LbD is applied at Laurea and how our students experience it. Therefore, it can be argued that portfolio practices could form an important basis for quality work.

Get started by compiling your own ePortfolio today

Any conclusions for staff development? Perhaps we could start by curating our own showcase portfolio to better understand the process and benefits. Many LbD cases have been described in this publication. Why not describe them in a portfolio and demonstrate our abilities as lecturers or project personnel? This would allow us to enhance our personal and Laurea brand. And perhaps we could recognise the talents that our staff have and be better at drafting the working hour plans and create partnerships or even revenue.

You can start by getting acquainted with the portfolio templates that we have created for both our students and staff. As a Laurea staff member, you can copy the template and start compiling content today.



Figure 4. Copy the portfolio templates.

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PEDAGOGICAL APPROACHES SUPPORTING THE NEEDS OF WORKING LIFE IN THE FUTURE

Abstract

As Universities of Applied Sciences are educating the working life experts of the future, the need for developing a pedagogical approach is an important focus. At the moment, the need for a new learning method has developed from single discipline learning to multidisciplinary learning at Kajaani University of Applied Sciences (KAMK). Knowledge, skills and attitudes are acquired by crossing boundaries and disciplines. A connection with working life is needed when students are expected to create something new or understand the complexities of the world through their studies. Students take responsibility for their own learning and actively strive to acquire target skills and knowledge.

The pedagogical model created at KAMK has significant similarities with the Learning by Developing (LbD) action model in use at Laurea UAS which also offers students possibilities to apply the knowledge and skills they are learning to real working life experiences by participating in projects. Teachers integrate courses with research and development projects in collaboration with project members and working life representatives, and students develop their skills in authentic projects by applying their knowledge in logical, intuitive and creative ways.

Pedagogical approaches have changed the role of teachers in both universities of applied sciences in a way that teachers are increasingly becoming learning experts and facilitators.

Team teaching is one form of teachership. Each participant is individually responsible for achieving the learning objectives and teacher's role is changing to one of coach.

This article presents a pedagogical approach to future working skills—the aims and results at KAMK and the skills students need in the future. A phenomenon-based approach is compared to the pedagogical action model (LbD). In its conclusion, the article introduces good practices that could be modified to other higher education institutions to help students grow professionally towards acquiring future working skills.

Keywords: pedagogical approach, project learning, learning by developing, future skills

Future working skills

According to the report “The Future of Jobs” (World Economic Forum 2016), there are different drivers of change in the world: demographic and socio-economic and also technological. The nature of work has already changed towards being more flexible. Climate change has already happened, and available natural resources are decreasing. The impact of mobile internet and cloud technology, big data, new energy supplies, the Internet of Things, 3D printing and robotics have already been felt. The solutions of smart systems in homes, factories and farms will help tackle problems ranging from supply chain management to climate change. Two job types in the future have been recognised. Data analysts will help companies make sense and derive insights from the torrent of data generated by technological disruptions, and sales representatives will explain companies' offerings to business. In addition, senior manager will be needed to steer companies through the upcoming changes.

Indeed, in addition to the drivers of change, there are also other impacts for work in the future. The power of individuals in the workplace has been recognised. HR needs to know if there are people who drive the company forward. Individual wellbeing is important for workers and every employee should be regarded as a partner. The work of one employee in social media could significantly impact the company's brand. Millennials want leadership to be less financially minded and more people-centric. Workplaces are expected to have a new organisation model. This means, for example, more flexible working time, working in teams and projects, workers are rewarded by outcomes and work is done wherever the employee wants (Bersin Insights Team 2018).

Besides, there is a real need for life-long learning if workers are to achieve fulfilling and rewarding careers. For companies, it will be critical to find the talent they need, usually in international environments, and to contribute to socially responsible approaches to the future of work (World Economic Forum 2017). “At a global level, only two regions—North America and Western Europe—have developed more than 70% of their human capital versus the ideal score. Three regions—Eastern Europe and Central Asia, East Asia and the Pacific and Latin America and the Caribbean—score in the 60% to 70% range, while the Middle East and North Africa, South Asia

and Sub-Saharan Africa have yet to cross the 60% threshold.” (World Economic Forum 2017) “In the US, over 95% of displaced workers could move into growing, usually higher income jobs. However, this requires that 70% of affected workers retrain in a new job or career.” (Zahidi 2018, etc.)

This re-education requires new types of life-long learning methods from universities and workplaces. For policymakers, the economy will be critical with regard to the tools needed to fuel inclusive economic growth and to ensure that companies can find workers with the skills needed (World Economic Forum 2017).

The jobs needed in 2025 include software developer, computer systems analyst and market researcher and marketing specialist. Also, the need for medical technicians, physical therapists and workplace ergonomics experts will increase because of the need for these increasingly important skills in an ageing society. “Social and emotional intelligence and understanding new media platforms and how to communicate effectively will be valuable skills.” (Hutt, 2016.)

The most important skills in 2020 will be, for example, complex problem solving, critical thinking, creativity, people management, coordinating with others and emotional intelligence. The problem is that the world is becoming increasingly complex (Gray, 2016). Traditional ways of teaching and learning are failing to prepare students for working life. In many universities, teachers are not equipped with new ways of teaching and learning and are therefore not open to working with real-life problems and external stakeholders. Without effective leadership, most innovation projects will fail (Ropes 2015). There is a need for new tools and methods. Instead of teaching, there should be more coaching. In addition, there should be more project-based learning, open innovation, co-creation and multidisciplinary collaboration, student-company co-operation and combining their innovation capabilities, ways of coming out of silos and solving systemic problems.

Further, skills for developing innovation skills are needed in addition to solving concrete working life problems. When thinking about new innovations, it is not always possible to name the stakeholders or the working life problems. “Innovation involves the deliberate application of information, imagination and initiative in deriving greater or different values from resources, and includes all the processes by which new ideas are generated and converted into useful products. In business, innovation often results when ideas are applied by the company in order to further satisfy the needs and expectations of customers.” (<http://www.businessdictionary.com/definition/innovation.html>) Project work where students solve concrete working life problems and develop new products for companies is always needed (Itkonen 2016). However, how can universities support skills for creating real and new things that are currently unknown but will be useful in the future? Skills that support future management and leadership are also needed in co-operation with companies and universities (Heikkinen 2016).

When new innovations are created, the leadership in universities and in companies should support the innovation work. All decisions should benefit customers and fulfil the company's mission. Collaboration is recognised as much more valuable than working alone. The leader encourages workers to be loyal, humble and flexible (Heikkinen 2016, Baker 2016, Weinlick 2018). When the leader or manager also works in a coaching role, they also learn new views and get a wider and more comprehensive perspective of their work (Heikkinen 2016).

Connect, create and coach at KAMK

As universities of applied sciences are educating future working life experts, the need for developing a pedagogical approach is an important focus. At the moment, the need for a new learning method has developed from single discipline learning to multidisciplinary learning at KAMK. The learning action model is conceptualised by a phenomenon-based approach and the background is the socio-constructivist learning concept. Phenomenon-based learning and teaching are based on comprehensive, real phenomena that are examined in genuine contexts by way of work-based orders and commissions. Knowledge, skills and attitudes are acquired by crossing boundaries and disciplines. Students take responsibility for their own learning and actively strive to acquire target skills and knowledge through team working. They apply knowledge during their studies, reinforcing the skills needed in working life (Auno et al. 2016).

The pedagogical approach at KAMK is known as connect, create and coach (cKAMK). A connection to working life is needed when students are expected to create something new or understand the complexities of the world through their studies. The basis for teachers' work is building by having active and confidential connections to working life. Connecting is important because students and teachers need to co-operate with companies and other working life organisations to solve real-life problems. The way to work with organisations at KAMK is project-based learning. In the first study year, all students participate in the project management course where they study project tools and project working in multidisciplinary teams. Team formation demands lots of notifications together with all the participants. It is very important for the teacher/coach to recognise on this level that team building is forming, storming, norming, performing, adjourning and transforming (Tuckman 1965). At the beginning of the project, attention is paid to various exercises to support teamwork: Who I am? Who are you? What do we have to do? How we do it? As well as to the aims for studying, teamwork rules and to the teams' tasks and roles. For the project as well as the timetable and resources are usually set by companies. Each role in the project, responsibility, tools for contacting and working together, reporting, how to contact companies, timetables, results and project evaluation have to be clarified.

In the second and third years, students start solve real-life problems in multidisciplinary teams. The focuses of these projects are smart solutions, which is KAMK's profile (Keränen & Mursula 2016). In these projects, students offer their own

competencies to create new innovations or solutions for companies or other working life organisations. For example, in a joint project with engineering (information systems), nursing and business students, the project can be about safe living at home. The nursing students, with the client, describe the need to the engineering student who builds the measuring tool for the client's home. The business student helps to price and productize the product. Creating is relevant when students with different competencies create something new in multidisciplinary teams (Itkonen 2016; Heikkinen 2017).

At KAMK, when students study in projects, the skills of teachers change from teaching to coaching. The ability of the teacher to be a coach and the students' ability to take responsibility for their own learning will become significant when the coaching method is used. In coaching, attitudes towards teaching as a method are seen as the coach-coaching relationship. The teacher is still an expert but no longer the source of all information. The main responsibility is to guide the students in the right direction to find the information they need. The coach facilitates the progress of students and guides the learning process by creating learning environments, asking questions, providing alternative solutions and helping problem solving and decision making. The tasks of the coach are to strengthen team spirit, promote collaboration and also to support the identity and growth of learners. Evaluation is done together with students and the processes and outcomes of the major tasks will be evaluated as well as the student's own activity, learning and development. The coaching teacher cooperates with the students and cooperates with working life and companies. At KAMK, every school's teachers are working, of course, in teams in their own schools as well as in multidisciplinary teams, which is also a new dimension of the coaching (Auno et al 2016; Antila 2017, 2017).

Learning by Developing at Laurea UAS

The pedagogical models at KAMK and at Laurea UAS have similarities as the LbD action model developed at Laurea UAS, aims to offer possibilities to students to apply the knowledge and skills to the authentic learning environments, projects. Teachers integrate learning with projects and teacher's role has changed to one more like coaching.

The LbD action model with its pragmatic learning philosophy has changed the teacher's role in a way similar to the phenomenon-based learning model. According to Taatila and Raji (2012), the teacher is behaving as a learning guide and mentor for the students, who create their own reality. Pragmatism makes students gather their own situational facts and create their own reality.

The pragmatically oriented LbD action model is based on projects that are created together with working life representatives, teachers, students, workplace experts as well as end users, and projects create authentic learning environment (Raji 2007). In the constructivist learning approach, learners build their picture of the



world by interpreting new information in relation to already existing knowledge. Constructivist pedagogy highlights the learner's active role and the importance of social interaction in learning (Tynjälä, 2005), while in the pragmatic approach, the student is placed in situations to experience problems personally (Taatila, 2014). The pragmatically oriented LbD action model is similar in many ways to constructivist-based learning theory, like the problem-based learning model. According to Ferrari & Mahalingham (1998), both models situate learning in complex problem-solving contexts and offer students opportunities to consider how the facts students are studying relate to the specific problems. In addition, motivation for learning increases since students are more motivated when they value what they are learning.

The LbD action model has developed for the needs of universities of applied sciences. According to the law, universities of applied sciences need to provide education, promote working life and regional development and carry out RDI activities that support education (Arene 2017). This pragmatic framework fits with the pedagogic philosophy at UAS, where learning creates new competencies for contemporary working life. The aim of the pragmatic framework is to translate useful knowledge of real-life problems in order to develop students for the expectations and needs of their regions (Taatila & Raij, 2012).

Research results related to learning in a professional context have led to the following identification knowledge types: 1) knowledge in theories and models, 2) knowledge embedded in skills and abilities, 3) moral knowledge and 4) experiential knowledge corresponding to the components of professional competence as knowing, understanding, doing and situation management as an integrated whole (Raij 2000). This kind of knowledge is needed in future work, but it challenges

students as learners. A learning environment where the previously mentioned knowledge types can be developed does not allow passive student participation. Kallioinen (2014) represents the priorities in the following way: The learning process, guidance, peer-reflection, professional and human growth and a research-oriented, developmental approach to work are needed in LbD, which supports the development of independent thought, an experiential study atmosphere and responsibility.

Towards future working skills

The role of the teacher is also changing in a way that teachers are increasingly becoming learning experts and facilitators, not simply the vessels and agents of knowledge concerning their teaching subjects. According to Kallioinen (2014), professional teachers encourage students' motivation and participation.

Team teaching is one form of teachership. In phenomenon-based teaching, the teachers in the team have common objectives, resources and practices. Each one is individually responsible for achieving the objectives. At KAMK, multidisciplinary team teaching is used in the project management course and also in each school's smart solutions development courses. The discussions concerning the role of the teacher transforming into a coach have been important. Shared concepts, materials, course aims and tasks, timetable and also evaluating methods have been clarified together. In these studies, teachers/coaches are named to facilitate study groups where students are from different schools. Due to the special working life questions, experts in the content can also facilitate students. The expert can be from the company or from KAMK. Of course, the project manager role is very important in the study teams. The project manager has to be responsible for how the project continues.

It seems to be that KAMK's good practices from the creation of shared concepts of teachers' changing roles should be modified for Laurea UAS where, at the moment, teachers tend to have different perspectives of Laurea's pedagogical action model. A twenty-year long history with Laurea's pedagogical action model has created many ways to apply the pedagogical action model between teachers. As earlier teachers were trained to apply the LbD action model, today's teachers seem to be expected to practise the basics of LbD individually. Common discussions of teaching by utilising the LbD action model would be needed. At the moment, Laurea UAS is reviewing LbD, which is part of the strategic development project. The aim of the development project is to take care of the skills and competencies of the experts at Laurea and a Future LbD Specialist is recognised as one of the development areas.

At KAMK, the project work in multidisciplinary teams has been a great success. Through these study projects students have built many useful products for companies, had the possibility to get jobs and also start their own businesses. The team work in multidisciplinary teams has orientated to solve complex working life questions. Most cases have been local or regional and the task of increasing international

skills has not been fulfilled. However, the co-operation has been important for the students and companies and working together will continue (Itkonen 2016).

Similar results have been achieved at Laurea UAS where students have seemed to benefit from working life contacts while participating in LbD project studies. Students are getting jobs quickly after graduating and the contacts they have created while studying seem to be helpful at the beginning of their careers.

KAMK is now also starting co-operation with Demola, which is a global network, to create new companies, universities and students. At Demola, students also have real life cases to solve, but the answer or solution is not so concrete as in KAMK's earlier working life projects. At Demola, working will focus more on exploring future innovations. Multidisciplinary teams validate problems, create and refine business concepts and develop new products and services (Demola 2018). The first project started in 2018.

Laurea UAS has started to integrate research, development and innovation (RDI) projects with LbD courses more systematically. In recent years, the number of externally funded international projects has grown and the way of managing projects has become more complicated. Projects with working life partners call for many kinds of expertise and competencies, such as networking management, accountability and international communication skills, which are typically not present in teachers' everyday work (Juvonen, Nurkka, Väkeväinen 2017). It might be that challenging project management has affected learning integration in a way that study credits from RDI projects have not grown in relation to projects. Therefore, Laurea UAS has started to review multiple possibilities in the integration of LbD courses with RDI projects, especially with Master's degree students. At best, RDI projects can offer flexible and inspirational learning environments in which learning takes place between students, teachers and working life representatives as project consortiums and stakeholders in the project. From LbD perspective, this kind of learning environment enables discovering new ways of thinking and doing in order to manage changing situations in future working life. According to Raji (2014, 17), learning is viewed as a tool that facilitates the achievement of competencies.

Conclusion

This article has brought out the similarities in the pedagogical approaches of KAMK and Laurea UAS. This conclusion contains a few recommendations for students and teachers as well as for companies and stakeholders on how to develop knowledge for future work. According to KAMK's and Laurea's experiences, the integration of learning with regional development and RDI work has achieved a lot of advantages for students. Learning in authentic learning environments seems to be beneficial for students. Project-based learning and RDI work are simple methods to strengthen students' professional growth. For companies, these are easy ways to co-operate with universities and university students. Employers also need to

renew themselves—how to be more attractive and interesting for the workers so of the future. New skills are needed from leaders and managers to support teachers/coaches in multidisciplinary project-based learning and RDI work. When teachers/coaches really coach their students in professional growth, simple models for tutoring and learning are needed.

These methods demand much more independent learning and uncertainty for students, teachers/coaches and stakeholders. Responsibility for finding answers and also collaboration skills are needed from students (Itkonen 2016). It also demands a lot of notifications for team formation together with all participants. It is very important for the coach to recognise on this level what team formation is.

Recommendation: Time management is necessary because of the classes and responsibilities of students, teachers/coaches and stakeholders' staff.

These pedagogical approaches also demand that the curriculum is open enough to work with companies and stakeholders. The curriculum should include modules where the student can increase their knowledge together with other students in multidisciplinary teams and solve current and actual working life problems. Of course, methods and tools are needed for how the companies and universities can easily contact each other and work together. For example, simple websites for contacts is something that universities of applied sciences must keep on. Also, a person who answers companies' suggestions and questions immediately is significant.

Recommendation: Education provider should seek continuous collaboration between colleagues and working life partners to ease collaboration in a study module.

The evaluation process in study modules affects unfair experiences if evaluation differs among courses implemented in projects and traditionally organised courses. To avoid inequality, courses implemented with a working life project should be described precisely in line with the evaluation.

Recommendation: An evaluation process with teachers, students and even working life representatives could benefit the learning process if the evaluation is based on pre-defined learning targets.

As previously mentioned, the workplaces of the future will require more flexible working time, working in teams and projects (Bersin Insights Team, 2018), and collaboration is recognised as being much more valuable than working alone (Heikkinen 2016). It seems to be obvious that new types of learning methods are essential to teach the competencies needed in the future, and projects offer innovative and versatile learning environments to both students and teachers. When teachers use projects as learning environments, they need to redesign and plan study modules from the beginning for each project's context, and teachers are therefore involved continuously in the life-long learning process. In addition to this, projects make life-long learning in workplaces possible.

Table 1. Needs in working life, pedagogical methods to solve the needs, and the recommendations.

NEEDS IN WORKING LIFE	PEDAGOGICAL METHODS	RECOMMENDATIONS
<p>FUTURE WORKING SKILLS, F. EX</p> <ul style="list-style-type: none"> LACK OF ENTREPRENEURIAL MINDSET AND SKILLS, TALENTS LACK OF LEADERSHIP SKILLS IN CREATING ORGANICALLY LEARNING AND RENEWING ORGANIZATIONS <p>DEMAND FOR LIFELONG LEARNING AND METHODS USING IN WORKING LIFE</p>	<p>JOINT PROBLEM SOLVING METHODS TO TEACHERS, STUDENTS AND ENTREPRENEURS (STAFF)</p> <ul style="list-style-type: none"> COACHING SKILLS TO ENTREPRENEURS AND UNIVERSITIES (STAFF) PROJECT BASED LEARNING METHOD TO SOLVE REAL LIFE PROBLEMS LEARNING BY DEVELOPING (LBD) 	<p>TIME MANAGEMENT FOR THE COLLABORATION OF UNIVERSITIES OF APPLIED SCIENCES AND STAKEHOLDERS</p> <p>CONTINUOUS COLLABORATION BETWEEN COLLEAGUES AND WORKING LIFE PARTNERS EVALUATED LEARNING PROCESS AND TOOLS</p> <p>COLLABORATION BETWEEN DIFFERENT ACTORS IN LEARNING INTEGRATION WITH PROJECTS</p>

Recommendation: Collaboration between different actors in learning integration with projects.

At the end of a project, students usually feel they have learned a lot, their co-operation with companies has opened up new possibilities for working or continuing their own business ideas (Itkonen 2016). The phenomenon-based learning approach and the LbD action model require more effort from both the teacher and student. A connection with working life seems to be essential from the student's perspective as well as from the perspective of universities of applied sciences, whose mission is to serve their regions. This also means that universities of applied sciences need to respond to the needs of future working life. Projects can be seen as excellent learning environments, but integrating learning with working life oriented projects does not naturally respond to the needs of working life. Learning results depend on learning tasks created by the teacher and therefore teachers' role in educating for future working life is remarkable. Collaboration between teachers as team teaching at KAMK is one solution to supporting the education process in projects in addition to teachers' understanding in coaching students' development process towards the skills needed in future work. The following figure describes the main principles of this article.

It is hoped that project-based learning implemented by phenomenon-based learning and the LbD action model offer the competencies needed for future work. It could be said that project-based learning with RDI work is a step towards more entrepreneurial, future universities of applied sciences. By connecting, creating and coaching future professionals, students in higher education institutions get more possibilities to learn and develop. Above all, it is hoped the education students receive affects their personality in such a way that life-long learning would become a natural part of renewing the competencies needed in future working life.

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PEDAGOGICAL LEADERSHIP IN THE DIGITAL AGE - LEARNING BY DEVELOPING CREATING OPPORTUNITIES FOR FUTURE GENERATIONS

Abstract

The digitalisation of learning environments, the expectations of generations of learners and the increasing openness of education are all paving way for changes in pedagogy. The Learning by Developing action model has proven to be a strong strategic choice, a kind of recipe for success, in the field of higher education. This article focuses on discussing how pedagogical leadership should be developed in the Digital Age when the basic elements of the LbD action model - creativity, partnership, authenticity, experiential nature and research-orientation - are intertwined with open, digital learning environments.

The LbD action model gives centre stage to the student's learning and agency. It has also provided students with a natural connection to working life already during their studies. Combining work and high-quality learning has been a challenge for higher education pedagogy, which makes it an important topic of research. The article deals with how the LbD action model will be able to function as a basis for meeting the competence demands of future (digitalising) working life.

With reference to recent studies and pedagogical research, I discuss how the strengths of the LbD action model could be harnessed into the world of open education and digitality. I also discuss the types of pedagogical leadership that will be required in the changing world of learning, where learning environments supportive of safety, creativity and the joy of learning are exposed to global competition.

Introduction

Shaping education to better suit individual and societal needs as well as the anticipation of future competence requirements have become increasingly central, as the competencies required for traditional occupations become outdated and change at an increasing pace. In dialogues where the needs of working life and those of education are discussed, one often hears claims of the disappearance of professions and the loss of work due to developments in robotics. This causes concern as to whether the education system will be able to reshape itself quickly enough to meet the requirements of working life in the future.

Consequently, the future of working life seems threatened, and the demand for new competencies might seem unreachable. The demands of digitalising working life, on the one hand, and the digital competencies of new learners, on the other, create challenges for learning environments in higher education - even the operational logic of higher education may come into question. We must be able to guarantee a steady quality of education with dwindling resources, and invest in technology and developing the competencies of our teachers while giving students enough time and space for professional growth and the development of their professional identity. Technology in itself does not speed up the learning process, but it can be used to enrich the learning environment, to provide pedagogical choice and to encourage the learner. Digitality as such is not a solution to the challenges of learning (Pfeffer & Reif 2015; Loveless & Williamson 2013)

The premise of this article is to represent the view that education does not adapt to changes in working life, but it is used to create a new kind of working life. In other words, education is not reactive but generative, it creates new competence and new ways of working. The basic principle behind Learning by Developing (LbD) is this interaction, where the theory and knowledge accumulated through education meets the pragmatic experience and contextualisation of working life; creativity, knowledge, and partnership enable transformation and communal development.

In this article, I focus on the requirements that Learning by Developing and digitalising open education place on leadership. What is needed from pedagogical leadership in an age where safe, static and institutional learning environments are giving way to the umbrella of open education, societally inclusive, digital forums of interaction, where learning takes place in a multi-professional digital community.

I also aim to highlight the significance of pedagogical leadership in the context of working life; learning together and reaching competence objectives requires bringing elements of pedagogical leadership into the context of working life. In this respect, LbD can have a lot to offer the development of working life. I also discuss the ways in which digitality can support pedagogical leadership in higher education as well as in working life.

The purpose of this article is to incorporate the basic elements of pedagogical leadership to Learning by Developing and to reflect on how this may affect open, digital learning environments as well as provide better understanding, monitoring and direction of learning brought about by technology.

Pedagogical leadership in the Digital Age

Broadly speaking, pedagogical leadership can be seen as encompassing everything related to the organisation, coordination and allocation of tasks and resources in teaching and studying in a way that enables high-quality, deep learning and creates the expertise required in different areas of society. The pedagogical development of teaching requires structure and resources but also clear, strategic leadership both at the organisational as well as the individual level. Pedagogical leadership is about signposting, goal setting, decision making and paying attention to the organisation's competence development. Pedagogical leadership also has a strong ethical component, which relates to an awareness of equal treatment of different learners as well as their social and physical well-being. (Male & Palaiologou 2011; Nevgi 2014; Day & Gurr 2014; Moller 2017.)

In the current political environment, increased openness and better results are expected from education. In the European context, the funding of higher education is increasingly based on degree progression and the number of graduates. (Mathies & Ferland 2014.) Consequently, successful pedagogical leadership has a strong financial dimension, in addition to questions of quality in education and learning results. The LbD action model and personalised study paths have proven useful in streamlining studies and expediting turnaround. This approach has also helped the university of applied sciences make operations financially viable due to external funding for research and development projects. (Laurea, Toimintakertomus 2016.)

The Digital Age brings its own dimension to pedagogical leadership; technology cannot only create new platforms for learning and communication but must also provide the possibility for a more data-driven approach to governing education and learning. Data related to learning and education has become a point of interest from the perspective of political decision making and the national governance of higher education as well as that of the development of the individual learner. (Williamson 2016.) Learning analytics can provide us with more data to support learning design and leadership.

The basic elements of pedagogical leadership have a timeless quality, but some aspects related to power relations are highlighted due to the increasing pace of development in digital learning. From the point of view of the LbD action model, digitalised learning makes the process of learning more visible, the platforms of learning more extensive and global, and - most importantly from the point of view of leadership - the monitoring of the results of learning and the impact of education easier.

The strong diversification of education and increasing pedagogical possibilities have created a need for pedagogical leadership and learning design even in working life. By utilising the LbD action model, the principle of pedagogical leadership can also be integrated into working life situations, where competence development required for meeting the needs of transforming professions and societal competitiveness are more critical than ever before.

A safe learning environment

It is interesting to see the ways in which open learning environments can be used to construct the kind of culture of confidential interaction that enables us to create safe and responsible learning environments. One of the goals of education should be to train students to have the courage to express their opinions and demonstrate their own competence through conversation, listening and co-operation (Virtanen & Tynjälä 2013; Niinistö-Sivuranta 2013.) In an open learning environment, the culture of conversation is based on trust, as the setting is impossible, for example, for a teacher to continuously govern or control. Studies should therefore include ample discussion about the rules of learning and the commonly agreed upon rules of the community working together. Trust should be built on all levels of higher education. Open leadership and practices are of great importance in building a culture of interaction. (Niinistö-Sivuranta 2013.)

The LbD action model deals with communal action and enables the development of preparedness for working life in authentic learning situations (Raij 2007; Kallioinen 2008; Raij 2014.). The basis of the action model is pragmatic in nature, but there are also some elements of constructivism (Raij 2014). According to the concept of learning used especially in constructivism, working and taking responsibility for one's own education are part of the role of the student (see e.g. Tynjälä, 1999). The constructivist viewpoint is that learning occurs within the learner as a result of their own activity (see e.g. Tynjälä 1999). Studying in higher education always requires responsibility and self-guidance from the student in order for them to be able to progress in their studies and have the best possible learning results (Palonen & Murtonen, 2017). A responsible student will make progress in their studies and is able to work in an interactive manner, adhering to the social norms of the group. Pedagogical leadership should support the practices of a responsible learning environment.

Open Learning Environments – opportunities and threats

An open learning culture where an emphasis is placed on the possibility of choice can, at best, guide the student towards harmonious professional growth and reinforce their strengths. At worst, however, it causes insecurity, drifting and even social exclusion. Digital learning environments can, for their part, help create learning opportunities that are not bound to a specific time or place. They enable more personalised study paths and make it possible for different types of learners to find the methods best suited to their style of learning, and enable them to progress at their own pace. However, digital learning is not altogether unproblematic from the point of view of pedagogical leadership, as digitality creates more lax boundaries than before. Institutions of higher education are expected to provide freedom and the possibility of choice, on the one hand, and boundaries and structure, on the other (Niinistö-Sivuranta 2013).

Mental health issues and a lack of direction are growing issues among young generations of learners, partly due to increasing pressure to produce quick results as well as the endless number of choices available. There is an increasing need for student counselling and study support in institutions of higher education. (Korkeakouluopiskelijoiden terveystutkimus 2016; Nuorisobarometri 2017.) The need for social encounters as well as boundaries and guidance do not disappear when learning is transferred online due to advancements in technology.

Therefore, the challenge of pedagogical leadership is to create models, tools and practices for higher education that can be used in open learning environments, such as to ensure learners' safety and ability to understand the consequences of their choices in ethically demanding situations. I believe that open learning environments are creating a new kind of pressure to ensure students' ethical capabilities and to reinforce their ethical thinking when facing growing possibilities for choice.

The value base of the institution of higher education creates an ethically sound foundation for pedagogical activity. Values stemming from this culture are a good basis for the development of expertise and high-quality learning. It is important to highlight the significance of this value base for professional growth as well as all processes of learning. (Kallioinen 2008; Day & Leithwood 2007.)

Open education and the new generation

The concept of open education includes various elements related to the openness of education. Therefore, the concept is not restricted to online courses or MOOCs. It also comprises such issues as the open distribution of learning materials and licencing that enables their free use (Creative Commons) as well as the overall openness of learning situations. The requirements of open education include determining the level of openness, setting goals and taking measures at a strategic level. Open education thinking is significant from the point of view of lifelong learning because, by

committing to open education, we enable more extensive, more flexible and freer access to higher education than before. (Inamorato dos Santos 2016.)

We have come a long way since the early days of the Learning by Developing model. A whole generation of people having studied under the LbD action model have entered working life. Differences between generations and their demands mean that the context today is completely different from what it was in the early days of LbD. Our understanding of learning, operational environments and global competition have developed at a rapid pace. Creativity and good communication skills are seen as central for working life. Consequently, the learning environment and learning situations should challenge the way students think and enable active interaction. (Niinistö-Sivuranta 2013; Blašková 2014.) Students can improve these skills in co-operative projects and development projects.

Digital development has meant, in part, that the significance of institutions of higher education as communities has been called into question. This has been visible in social discourse and societal actions, which has led to the disjointing of learning, increasing the emphasis placed on individuality and demands made for the integration of studying and working life. From the point of view of growth, however, young students in particular should be given the chance to develop their professional identity in a society one can be socialised into and where interaction and communication take place in an environment of trust. (see e.g. Niinistö-Sivuranta 2013.) We must preserve the time and safety needed for growth.

Student's experience of higher education

More and more attention must be paid to the student's experience of higher education as a whole. In other words, we should ask how co-operation between teachers, professionals and colleagues functions in higher education throughout the student's education. The focus should not be on the design of individual courses but on the whole of the student's experience. The goal of pedagogical leadership is also to get teachers to work as a team, to know and to acknowledge how the whole of the degree programme is structured as well as what it feels like from the point of view of the student. From the student's perspective, it is essential that teachers are aware of what happens in other courses, what the student is currently working on, how situations of overload are prevented, and what the feedback and assessment culture of the institution is like.

Young people have respect for openness and they actively participate in various types of networks—for example, in social media. They appreciate authentic learning experiences and technology has had an impact on their style and methods of learning (Valo 2003; Tapscott 2009). They seem to place a lot of value on functionality, communality and equal interaction in learning situations. They expect to receive continuous feedback from and interact with others in their learning environment. (EU-report 2017.) In discussions concerning new generations, qualities that get highlighted include technological orientation, sociality and an ability

for active learning and working in groups: “New student generations are commonly associated with hyper-connected digital natives, who expect interactive and student-centred learning with high expectations of teachers and a rejection of ‘sage on the stage’ teaching. They respond well to team work and show a high level of motivation in developing the skills they see as useful. In addition to acquiring specialist knowledge, there is a growing focus on transversal skills, including active citizenship.” (EU-report 2017.)

Learning by Developing enables the creation of a culture of interaction as well as continuous, interactive feedback. In this sense, digitality functions as a reinforcer of interactivity. With the help of mobile applications and social media, discussions can and must be *au courant*. (Laine & Nygren 2016.)

Multi-professional collaboration and knowledge management

One of the key areas of pedagogical leadership is to ensure structures and a culture that are supportive of multi-professional work. As competence requirements grow, a teacher cannot manage all of the challenges related to students’ learning alone. Problems related to wellbeing, workload, the need for interaction, and students’ integration into the community all require input from experts from different fields. Changing operational environments pose challenges to the LbD action model also from the point of view of multi-professional collaboration. Teachers can still be considered instructors of learning and growth, but there is also a requirement for technical experts, data acquisition experts, communications experts and educational psychologists for support in and prevention of problems related to insecurity and overload.

In the LbD action model, multi-professionalism is realised as partnership. The action model offers the possibility for colleagues, students as well as teachers to bring their own expertise into the development work. Collaborative development projects require various different perspectives, good interaction and respectful co-operation, where different areas of expertise are valued. (Raij 2014.) This multi-professional side of the model could still be developed further.

One of the central elements of pedagogical leadership is knowledge management (see e.g. Nevgi 2014). In higher education, it is essential for teachers to be able to maintain their competence. Digitality brings its own challenges to the maintenance of competence. Knowledge management among teachers requires systematic planning and clearly defined goals. The requirements for the level of competence must also be defined.

The expectation in the development of teaching and the role of the teacher has, for a long time, been primarily focused on constructing the process of learning to suit the learning needs of the student. The role of the teacher is to guide and support the student. (see e.g. Auvinen 2004; Postareff & Lindblom-Ylänne 2008; Virtanen & Tynjälä

2012.) The LbD action model has challenged the role of teachers and teaching as well as enabled changes in teaching and the continuous development of pedagogy. In the LbD action model, the teacher is seen first and foremost as an instructor of learning (see e.g. Raij 2007; Kallioinen 2008; Raij 2014).

The Digital Age also poses new demands on teachers’ competence. Concerning the LbD action model, the question is how teachers will be able to, in addition to their core competence, handle interaction and collaboration between learners and interest groups as well as utilise digital learning platforms and other types of technology as part of the learning process. Technology can be used to create different kinds of interactive forums and to support collaborative development in many ways, as any given situation or problem can be opened up to be solved by large groups. (Niinistö-Sivuranta 2013.) Learning situations can, for example, be filmed and then reflected upon in various peer forums, or they can be returned to and used as part of the assessment process. Learning tasks always leave a digital footprint, which makes it easier for teachers to monitor their students’ participation and progress as well as to utilise digital tools in the assessment of learning. The results of development work can be published openly, which means that collaboration between institutions, students and working life can be extensively utilised. (November 2012; Niinistö-Sivuranta 2013; Loveless & Williamson 2013; Pfeffer & Reif 2015.)

However, not all teachers have good technological skills. Knowledge management thus comes into play; how much is invested in developing teachers’ competence? Also related to this is multi-professional collaboration, which I believe is of increasing significance in the context of higher education. However, it is strategically inevitable that a minimum competence level is defined for digital skills and digital pedagogy. When this competence level has been defined, the institution must make investments and prioritisations towards it.

Ensuring the digital pedagogical competence of teachers requires time and resources. Even though the Digital Age means that any classroom or learning situation can be made open and global, this will not be possible without the required skills.

Conclusion

The LbD action model includes the core components of future competence. Digitality in learning creates new dimensions for pedagogical leadership within the LbD action model. It is important to develop a strong LbD culture in order to be able to take full advantage of the possibilities of technology. It is equally important to pay attention to the results and quality of higher education: How can higher education meet the requirements of working life in the future, and how can extensive social discourse take place with regard to competence demands without resorting to unnecessary threat scenarios? (Figure 1)

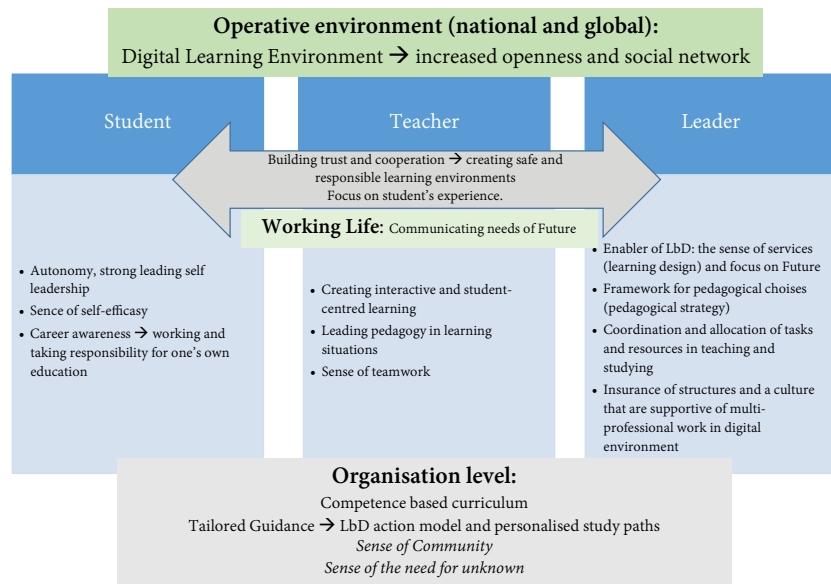


Figure 1. LbD and higher education meeting the requirements of working life in the future

It is also important to develop learning analytics and automated impact and result monitoring to support pedagogical leadership and educational planning. Digital platforms can be used in the learning environment as forums for collaboration, and technology allows us to monitor the key factors of learning. Pedagogical choices are, first and foremost, a way of building bridges with the surrounding society, and the goal should not be to separate students from society within the walls and curriculums of the institution. In this sense, the strategic level of the Learning by Developing action model has had a significant impact on promoting open education.

The world of open education also raises a lot of questions: How can we ensure the safety of learning environments and meet the ever-increasing ethical challenges brought about by a multitude of choices and openness? New generations of learners can place their own goals on learning and make more choices on the basis of their own preferences when the whole world is open to them. There is a need for research-based knowledge on the effects of different pedagogical solutions on learning, career paths and professional growth. Technology in itself does not guarantee good learning results, we still need high-quality encounters and time for interaction. Collaboration between education and working life will not automatically lead to effective learning if sufficient room is not given for professional growth and if communality is superseded by individual solutions. The effectiveness of pedagogical leadership lies in individual experiences and the learning community's ability to create good and relevant competencies for the future.

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Róisín Smith holds a PhD in Political Science from Queen's University Belfast and has worked as a Lecturer and Research Fellow with the Edward M. Kennedy Institute for Conflict Intervention, Maynooth University, Ireland. She has taught courses in international political conflict, peacebuilding, conflict resolution, U.S. foreign policy and interventions in the Middle East, at Maynooth University, Dublin City University and Trinity College Dublin. Her area of interest includes peacebuilding and conflict prevention strategies, third party mediation and humanitarian intervention and she has also provided monitoring and evaluation projects for NGOs in Ireland and Africa. Dr Smith carried out extensive research and analysis on EU, UN and global approaches to peacekeeping training, soft skills and serious games for the EU H2020 Project Gaming for Peace.

Kirsi Hyttinen, MA, PhD Cand., holds a position as Senior Manager for Research in Laurea University of Applied Sciences. She has worked as Consortium Coordinator of IECEU (Improving the Effectiveness of Capabilities in EU conflict prevention, H2020 funded project) and as a Researcher in EU H2020 Project GAP (Gaming for Peace). She has taught courses in security management and global health studies. Beyond these, she has worked several years in CMC (Crisis Management Centre) Finland. She holds a Master of Arts (education) and is finalising her PhD studies in Information Technology Department, University of Jyväskylä. Her research interests focus on human technology interaction in peacebuilding and crisis management as well as impact assessments and evaluation in security studies.



Tuija Marstio has been working in the field of education and training for more than 30 years and has gained a strong insight in digital pedagogy, online education. Tuija Marstio, Senior Lecturer, MSc (FIN) has been working in the field of education and training for more than 30 years and has gained a strong insight in digital pedagogy, online education, digital marketing, entrepreneurial training, digital marketing and international business operations, especially from the SME perspective. As member of the DigiTeam at Laurea University of Applied Sciences she contributes to the development of online learning through staff training and managing various digital learning initiatives. Before joining Laurea in 2007 Tuija developed a long career in international project management and consultancy, and has managed several projects in the fields of education and business-related ICT, funded by the EC, ESF and the Ministry of Foreign Affairs of Finland.



Jyri Rajamäki is Principal Lecturer in Information Technology at Laurea since 2006 and Adjunct Professor of Critical Infrastructure Protection and Cyber Security at University of Jyväskylä since 2015. He worked 1986-1996 for Telecom Finland main tasks being protection of telecommunications. From 1996 to 2006 he acted as Senior/Chief Engineer for Safety Technology Authority where his main assignment was to make the Finnish market ready for the European EMC Directive.

He holds D.Sc. degree in electrical and communications engineering from Helsinki University of Technology, and PhD degree in mathematical information technology from University of Jyväskylä.



Liisa Ranta earned her Master of Nursing Sciences degree from the University of Turku. Currently a senior lecturer at Laurea University of Applied Sciences, Lohja campus, she previously worked on various wellbeing and educational projects such as Pumppu, Boosting Innovative Entrepreneurial Ecosystem in Regions for Young Entrepreneurs, Healthier Uusimaa, VTours and Be Well - Building Self-employed and Micro-entrepreneur's

Wellbeing. Before joining Laurea, she worked as an entrepreneur in the well-being sector and as a nurse. Liisa has long experience in integrating education, RDI projects and regional development.



Dr **Susanna Niinistö-Sivuranta** has 20 years working experience in the field of Higher Education as a teacher, developer and leader. She has Ph.D. in education. Currently she is working as a Director of Development in the University of Helsinki. Susanna was a part of Laurea team years 2009 – 2016.

Susanna thinks that as a leader it is important to support and inspire individual people as well as the teams to strive for challenging results. This is well supported by the field of expertise she is having in communication in creative learning environments and higher education.

Susanna is an active member of global higher educational networks and works as a board member in several companies. She is passionate about learning, leading, interaction and a life itself: "Working in Higher Education is inspiring because we work every day for the better future."



Anna Nykänen works as a planning officer responsible for developing education processes at Laurea UAS. Currently she works as a part-time project manager in Sometaduuniin project (<http://www.sometaduuniin.fi>), which aims to develop portfolio practices. Her own portfolio is mostly in Finnish and accessible here: <http://bit.ly/kukaAnna>.

Currently **Minna-Kaisa Lehtilinna** works as a Senior Lecturer of Communication in Laurea University of Applied Sciences, Tikkurila campus. She is also a qualified Special Education teacher. Minna-Kaisa is also working as a specialist in two projects: in a project funded by ESF called "Social Media and its Equipment as a Way to Working-life" as well as an eAMK project focusing on developing digital guidance. Minna-Kaisa is interested in digital learning, portfolio practices and service design.



Eija Heikkinen, PhD, Director (Education), Kajaani University of Applied Sciences
Expertise includes: coordinator of education including pedagogical issues, curriculum work, elearning and study guidance. Eija coordinates the development of personnel competence in digital environments and the use of tools in KAMK. She has worked as a director or head of schools for 14 years. She has previously worked in national elearning projects and taught health care to student at Bachelor's and Master's degree level.

Soile Juujärvi is a doctor of Social Sciences and holds positions as a principal lecturer at the Laurea University of Applied Sciences and an adjunct professor in social psychology at the University of Helsinki. Her research interests include competence development, ethical decision-making, health and social services, and innovation processes in regional Living Labs. She has been active in developing new pedagogical models for higher education. Currently she is a principal investigator in the subproject Competence, Decision-Making and Lifelong Learning in the consortium project Competent Workforce for the Future – COPE, funded by the Strategic Research Council, the Academy of Finland (www.stncope.fi).





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UNIVERSITY OF APPLIED SCIENCES
Together we are stronger



Sanna Juvonen, Päivi Marjanen &
Tarja Meristö (eds.)

LEARNING BY DEVELOPING 2.0 - CASE STUDIES IN THEORY AND PRACTICE

Learning by Developing Action Model (LbD) was developed at Laurea University of Applied Sciences at the beginning of the year 2000 to answer to the three main tasks given to the universities of applied sciences by the ministry of education and culture in Finland: education, regional development, and research, development and innovation (RDI). This publication addresses the current state and ongoing developments of the LbD action model. Higher education is expected to prepare students for the future and to provide competences for dealing with transforming society and working life. The publication shows that the LbD action model creates competences needed in the uncertain future. In addition to that, this publication proves that the LbD action model effectively promotes Laurea and its students and staff to flexibly adapt to the transition of working life and actively influence the development of the region. We hope that you are inspired by articles in this publication which cover a number of contemporary aspects of LbD action model.