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Promoting students' reflections in organisational improvisation arrangement between higher education and workplaces

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Abstract

This article focuses on how experimentation-based pedagogy has been pursued by one Finnish university of applied sciences (UAS) in working life environments in the context of the Triple Helix. This article focuses on efforts to combine together situated learning, organisational improvisation and cultural-historical activity theory. In this higher education organisation, the students' multidisciplinary innovation projects are used to improve the students' skills in performing experiments with variations. The article demonstrates how pilot trainings were organised for teachers and their networks to equip them to project facilitators in a new mode of activity. It also reports on the undergraduates' group demonstrations and evaluations based on a recent sample of their subsequent innovation projects. The small-scale content analysis was conducted to identify areas for further development. According to the activity theory, the crucial learning outcome of the UAS educational projects should be a collective reflection on practices. In addition, the two essentials of reflection and learning are the tools available for mirroring and continuous concept formation. According to the findings, there were prominent achievements in ethnographic fieldwork but more supportive arrangements and training is needed to promote especially the concept formation.

Keywords: vocational pedagogy, triple helix, reflection, organisational improvisation, experimentation, activity theory

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Introduction

At the largest UAS in Finland, project-based learning is arranged by organising multidisciplinary innovation projects for third-year bachelor students. In this article, the research question focuses on how the students' reflections would take place in a new UAS arrangement, where the educational project would be temporarily organised and undertaken with the collaboration of citizens and customers from the business and public sectors, as well as UAS faculty, staff and students.

The theoretical framework of the article utilises an organisational improvisation approach (Cunha, Cunha & Kamoche, 1999; Cunha, Kamoche & Cunha, 2002) in the context of the cultural-historical activity theory (Engeström, 2001, 2008). The approach and the theory are connected to UAS practice-based pedagogy (Taatila & Raij 2011), involving its challenges in building concurrent learning, research and innovation environments, and are closely integrated into the current meaning-mediated working life and innovative culture in western postindustrial societies.

According to the theoretical framework of the cultural-historical activity theory, the central concern is how to strengthen the students and other participants' agency in promoting change. Reflections and changes in the working life can only take place when participants encounter one another and are actors in dialogue (Shaw, 2002). In this framework, organisational improvisation can be related to a learning action called experimentation (Engeström, 1987). According to Cunha et al. (1999, 318–322), constant readiness for quick reactions belongs to the culture of experimentation, and the new experimental way of acting is based on utilising diversity in encounter situations. Both approaches offer the possibility of questioning and enriching existing meanings (Stacey, 2006). The organisational improvisation approach has been a well-established framework in organisation research but seldom used in inter-organisational collaboration between higher education and working life sectors.

The next section describes the challenges in UAS pedagogy, which should be met by using new methods and learning environments.

Educating for innovative working life

The current Finnish system of higher education consists of 15 universities and 26 UASs; apparently there will be less education institutes in the near future. The UASs adopt a more practical approach and provide education up to the master level. In Finland, research and development (R&D) efforts have been integrated into the training and education mission of UASs since their creation in the nineties. Many UASs now have a broader understanding of their function in relation to research, development and innovation (RDI) work. According to

the Finnish national innovation system (Hautamäki, 2010; Inkinen & Kaivo-oja, 2009), relations among universities, the public and business sectors are organised into a network-like Triple Helix structure (Etzkowitz, 2003) in which the UAS sector's task is viewed as supporting and developing its surrounding area. In integrating learning, research and innovation processes in a public-private-people partnership (Rautkorpi, 2014b), the Finnish UAS pedagogy has utilised user-centred, open-innovation ecosystems such as living laboratories (European Network of Living Labs [ENoLL], 2015; Leminen, Westerlund & Nyström, 2012). Nevertheless, the basic requirement for UASs is to train new generations of workers to attain the necessary skills to develop work in their workplaces (Alasoini, 2011; Buch, Andersen & Klemsdahl, 2015).

The starting point for the chosen developmental approach in the Finnish UAS case and in this contribution is that the meaning of interaction has become crucial throughout the working life. The central conclusion of the majority of work-related research is that throughout its history, the shift from handicrafts and mass production to more knowledge-intensive forms of work, including the team structures responsible for carrying this out, has transformed work. It has increasingly become more cooperative, thus requiring greater levels of co-ordination (Engeström, 2008; Victor & Boynton, 1998). The latest generation of work under the co-creation theme is defined as the production of services and products through constant interactions among the user, the producer and the product. Both worker and customer are considered active parties in the development of work and collaborative action (Moggridge, 2007; Ramaswamy & Gouillart, 2010; Victor & Boynton, 1998).

The overriding mission of UASs in the Triple Helix arrangement was created at the stage in which the inclusion of the user or customer in planning products and services heightened the need for interaction. The Finnish national innovation strategy is based on the idea that both the customers' needs and their inclusion in the service or product creation are essential (Hautamäki, 2010). This was also the phase in which work and production became increasingly multidisciplinary, involving networked experts (Hakkarainen, Palonen, Paavola & Lehtinen, 2004). Since mass products and services are insufficient, new products and services are constantly created with different versions, whose value is based on non-material cultural meanings and the possibility of differentiation (Hamel & Prahalad, 1994). When the signification and personalisation of products and services have become a rule, the skills in developing their variations have become crucial (Marton & Trigwell, 2000).

There are also specific reasons for promoting interactions among different business sectors and actors as the Finnish economy is comparatively small, heavily dependent on exports and situated in the distant north. With only five million inhabitants, Finland has always lacked human capital – people capable of participating in different sectors of production. Moreover, economic globali-

sation is a key factor in the pressure placed on companies, regions and nations to innovate more rapidly and frequently or simply survive in the global competition (Schienstock & Hämäläinen, 2001, pp. 22–23). The other challenges are to find the appropriate gaps to fill and to allow the development of new solutions and variations for the global market.

The next section introduces organisational improvisation, putting it in a new learning context.

Improvisation as an experimentation method

The core of organisational improvisation is putting new meanings into practice and experimenting with variations. Responding to practical working life situations, organisational improvisation produces 'action as it unfolds, [performed] by an organisation and/or its members, drawing on available material, cognitive, affective and social resources' (Cunha et al., 1999, p. 302). This action produces 'intuition, guiding action upon something in a spontaneous but historically contextualised way' (Hatch, 1997, p. 181). Another concept from art – bricolage – refers to selecting elements from different decades and traditions and rearranging them into new combinations (Baker, Miner & Eesley, 2003).

Improvisation thinking originally draws on artistic collaboration, such as observing how the artistic ensemble and its leadership act. The roots are in temporal performance arts, such as music, theatre and dance. Improvisation is often defined in terms of two polarities – creativity and learning (Cunha et al., 1999, pp. 311–312; Moorman & Miner, 1998). Organisations or companies that include improvisation in their strategy consider a 90% failure rate a just price for the 10% success rate and ensuing learning (Crossan & Sorrenti, 1997). There must be a high acceptance of failure.

In the Triple Helix arrangement, UASs have been handed an even further-reaching task to develop their students – as well as the cooperating parties that these students encounter – into full-fledged citizens capable of taking charge of their own lives (Arnkil & Spangar, 2011). Citizens are immersed in a creative social space for designing and simulating their future experiences (Arnkil, 2008; Heiskala, 2007). In these environments, organisational improvisation can be viewed as promoting the basic principles of democratised or open innovation (Chesbrough, 2006; von Hippel, 2005), which is also sustainable from the perspective of human and natural resources (European Commision [EC], 2010). It utilises material, social and affective resources to the maximum because the process does not employ any material that is external to the situation. A high failure rate in experiments is not problematic if there are ways of making errors serve the higher purpose of the participants' learning (Billett, 2012).

The cultural-historical activity theory does not present obstacles to realising organisational improvisation; instead, it deepens comprehension. According to

Engeström (1987), the development of human activity and work is connected to a learning theory called expansive learning and its specific learning actions (Engeström, 2001, pp. 150–153). From the activity theory perspective, the relationship between a subject and his or her environment is perceived as mediated by signs and tools (Engeström, 1987; Vygotsky, 1978). In situations where the old, routine ways of working are insufficient to attain the common work object and outcome, there is a need to develop new tools – practices, various product-service combinations and ways of organising work (Edwards & Kinti, 2010). Workers themselves are considered acting subjects who, through reflecting and interpreting their own work, constantly change and develop it. In this development process based on broad participation, a diversity of available skills is crucial.

The double-stimulation method (Vygotsky, 1978) is applied in activity theory interventions (Virkkunen & Newnham, 2013). The first stage in reflection is conducting proper ethnographic fieldwork. Visual observations and recordings and fact-based data of current work practices, environments and interactions are collected as mirror data for reflection and learning. They function as the first stimulus by describing current work conditions, specifically their problematic aspects or those related to new challenges. When organisational improvisation refers to cognitive resources, such as mental models, the cultural-historical activity theory presents the conceptual models as the second stimulus required for interpreting the mirror data. The actor reflects on the current work from the perspectives of future possibilities and tools that he or she can attain with the support of more skilled parties. However, much more is needed for expansive learning, which means changing the practices, according to the activity theory. An essential step is experimenting with new tools when novel ways of working, organising and producing are put into practice (Engeström, 2001, p. 152). At this stage, the experiments (i.e., new kinds of products and services) can be produced through the principles of improvisation.

In this article, both improvisation and reflection are regarded as teachable skills (Vera & Crossan, 2005; Weick, 1998). In UAS pedagogy, training in these skills is closely connected to that of co-creation skills. All interaction-based skills lean on cultural signification and cultural literacy. In the activity theory framework, developing a new kind of UAS pedagogy, reflection and learning should be viewed as a process whereby the new method of planning and execution, the tools for pursuing this, the concepts describing it, as well as the systems of interaction, are developed hand in hand (Hyrkkänen, 2007). This process requires facilitators who promote participatory development and open new theoretical perspectives.

The next section shows how the experimentation-based pedagogy has been developed so far in the Finnish UAS case.

The Finnish case

Two former UASs (the Helsinki University of Applied Sciences Stadia and the EVTEK University of Applied Sciences) merged into the Metropolia umbrella organisation on 1 August 2008. At the time of this study, Metropolia UAS had more than 16,000 students and 1000 staff members, of whom approximately 650 were teachers. It offers education in the fields of technology, healthcare, social services, business and culture. Similar to other Finnish UASs, it requires students to undertake projects, with the thesis originally the largest and most challenging.

Today, at Metropolia, every student completing a bachelor's degree participates in a mandatory third-year project called the Minno® Innovation project, worth ten credits (equivalent to 270 hours of study time). The Minno® pedagogical concept was created to standardise and coordinate project supply among students and workplaces. Nowadays, this innovative pedagogical concept has evolved to facilitate multidisciplinary projects. Students from different faculties brainstorm with representatives from businesses and workplaces. Their course curricula have provided students with the practical possibility to build collaborative projects across educational programme boundaries. Internet presentations and a handbook have also been written with project evaluation instructions for students (Vehkaperä, Pirilä & Roivas, 2013, pp. 184–185; Metropolia, 2015). The implementation of the Minno® system will be evaluated for the first time in the international audit of UAS's quality system in autumn 2016.

The project's explicit aim is for the students to build novel solutions, products, services or processes to resolve the challenges presented by companies and other work organisations. Typically, the end products include new types of spaces, plans or manuals for new customer services; products such as games, videos or promotional items; and services such as guidance for organising events or technical solutions, such as robots, vintage electric cars or new ways of treating physiotherapy patients. Following the principles of both improvisation and the activity theory described thus far, the basic challenge for the educational institution is to increase the students' situated creativity (Potts, Hartley, Banks, Burgess, Cobcroft, Cunningham & Montgomery, 2008) and to meet the modern labour market's needs over the long term. In the activity theory design phase, the students should learn to use ethnographic methods (Virkkunen & Newnham, 2013) for better reflection and learning. In the Triple Helix arrangement, another aim is to find new practical and usable solutions (i.e., product or service innovations) that can be utilised in organisations and workplaces. Some of these innovations will also be commercialised.

Before the case study results are presented, the next section introduces the pilot teacher training, carried out one year before the innovation project concept was developed and put to use.

Teacher training: developing facilitators

Both precursors of Metropolia UAS cooperatively carried out the new in-house training experiment for 11 R&D facilitators between 2007 and 2008. From 2006 to 2008, a pilot Change Laboratory training for 20 teachers was also undertaken, drawing on the cultural-historical activity theory (Virkkunen & Ahonen, 2013). The new pilot training, named 'R&D into Speech', applied the same participatory intervention method. The intervention process was built into an open learning environment so that different mirror data of activities were produced and offered to the participants for continuous interpretation (Rautkorpi, 2010). To enable UAS teachers to execute students' experimental innovation projects, the objective was to empower these teachers to become facilitators who would begin constant interactions with companies, the public sector and user communities. The UAS professional graduates had three principal challenges. The first involved developing their competencies. The second is figuring out how to organise the constant interactions among the daily situations of their current working life and the appropriate research information and practices. Finally, they should determine how to acquire different areas of expertise for collaborative discussions to promote the creation of new variations and innovations.

The basis of the training experiment was designed to be ethically sustainable, so the training was a part of the continuum of rooting new practices in the then upcoming Metropolia UAS. At that time, the new activity environment meant that the job description of UAS teachers was undergoing a fundamental change (Taatila & Raij, 2011). According to a survey, Finnish UAS teachers experienced their work as fragmenting and felt that their workload was increasing (Mäki, 2012). In coordinating different components, the major challenges required superior methodological capability (Tynjälä, 2009; Virolainen, 2014).

The application to conduct pilot training in a five-credit course was on a voluntary basis. In practice, the training was undertaken in such a way that the monthly meetings always had a different theme. External parties, comprising other staff members participating in the national development circles that convened at the same time, were occasionally invited to the monthly meetings. The starting point involved the participants' previous R&D projects or other efforts, such as pedagogical ventures, which were brought into interaction with present R&D networks, funding, customers and different types of audiences, including publishers and the media. Some gatherings included external guests, for example, a living laboratory consultant and researcher, a working life researcher and the chief editor of a working life magazine who gives professional feedback

about writers' texts. Some gatherings were practical workshops in which participants' texts, such as R&D project applications or articles for professional magazines, were examined in detail. Other gatherings included more theoretical tools. The theoretical principle was never simply explained; instead, the participants' interpretation was constantly tested with small learning assignments between meetings.

The process began with the idea that the participants' present and future modes of activity should be as closely connected as possible. The participants had to examine the history of their mode of activity from different angles in relation to the new challenges of their environment. According to the activity theory, it became possible for them to invent their RDI teacher identity and their zone of proximal development (Vygotsky, 1978). Their cooperative learning proceeded through meaning enrichment by comparing and contrasting different practices with new solutions through participation. Critical examinations of prior modes of activity, as well as responsive interactions, were encouraged during the process to promote the construction of new concepts. In the context of merging the organisations, the training and other networks in RDI communications offered an important practice forum and allowed the spread of the modes of activity.

The first author of this article was the instructor of the training experiment. This experiment was a subproject of the Developing Teaching training programme in the UAS sector, financed by the Finnish Ministry of Education. After the pilot training sessions, the activity theory methods have not yet been systematically used in entire in-house training programmes, and the interaction and improvisation methods have only been occasionally applied. However, multidisciplinary teacher peer-training sessions have been regularly organised and the materials and impacts of these pilot training programmes have been broadly disseminated; for example, articles about the development methods have been published in the UAS' own publication series (Rautkorpi, 2014a; Virkkunen & Ahonen, 2008).

The next chapters focus on monitoring undergraduates' innovation projects.

Students' evaluations during the three years

The study sample consisted of a total of 44 innovation projects undertaken by a different batch of second- and third-year students per year, from 2013 to 2015. The case study data included written reports of these teams. All available written project demonstrations, drawings and video materials produced during the students' fieldwork were also explored. In addition to that, the end products, or at least written, drawn or recorded descriptions of them, were also investigated. The project group members collectively made and presented their evaluations summarised on PowerPoint presentations in the closing seminars. The

second writer personally visited some of the projects and the closing seminars, but there were no researcher-made observations on fieldwork or researcher-made interviews during the project, or following them, besides the fieldwork the students made and reported themselves.

The sample comprised 267 second- or third-year undergraduates, mainly from cultural management, media, film and television, and from different fields in healthcare and social services, supplemented by some undergraduates from business and technology, mostly from information and communications technology. Each innovation group had 3 to 18 members, typically 5–7 members from several academic disciplines. The types of expected and achieved end products included a plan, a pilot experiment or a demonstration of a novel solution to the given problem. The main clients presenting the problem to be solved were public-sector service providers or third-sector organisations, as well as commercial health and wellbeing companies. Some projects were related to social habitats, as well as services and products for people with disabilities. In the latter context, recording 'normality' was needed to discover central characteristics and how they differed from services and products for people without disabilities.

The research question was how the students' reflections would take place in the UAS arrangement where the educational project would be organised and executed on a temporary basis. The evaluations were analysed by using content analysis. For this purpose, the following three dimensions were distinguished in the project evaluations:

1. How did the group members technically and operationally evaluate the communication tools available for contacting one another, their clients and teachers during the project? In the analysis, the answers to these questions were placed under the *communication tools* topic.
2. How did the group members evaluate the organisation and course of the project and their own commitment to it? How did they assess the project outcomes and their success in project management? In the analysis, the answers to these questions were classified under the *project management* topic.
3. How did the group members evaluate their ethnographic fieldwork in the workplace or in the surroundings for new products and services? How did the group members describe and reflect on the mirroring of existing practices and user needs, as well as their aspirations in planning and experimenting on their new products or services for their clients? Compared to the actual end products of the projects, how deep and multifaceted were the reflections produced by the groups in their project evaluations? In the analysis, the answers to these questions were categorised under the *fieldwork and reflection* topic.

The reflection can be recognized from the evaluations and also from the collected project materials on many levels. Most often the group writings state that their information gathering or fieldwork works well and produces results which are suitable for their intended purposes. Often there is also somebody considering their project learning in the written project evaluations. As explained in detail on page six, the thorough reflection is future oriented and connected to expanding the shared object co-operatively (Engeström, 1987). It is quite easy to note if the group is satisfied with their learning experience, but the level of the reflection is based on the interpretations of the writers of the article and it is briefly described in the findings.

The data were divided into three parts, following the projects' respective implementation years. This section presents a rough outline of the projects to describe how the project organisation and evaluations developed year by year. This is represented in Table 1.

Table 1. Evaluations on three dimensions in students' innovation projects during the three years.

N=44 projects (N=267 students)	2013 N=5 projects (N=28 students)	2014 N=22 projects (N=146 students)	2015 N=17 projects (N=93 students)
Problems with tools	2	2	2
Problems with project management	4	10	7
Problems with reflection	3	14	6
Problems with all dimensions	2	2	0
No reported problems	1	7	6

Note. N (projects) means the number of innovation projects per year in the sample. Each project was carried out by one students' innovation project team, and N (students) means the number of students involved per year. The problems the students' innovation project teams mentioned in their own evaluations are listed under the Problems topic. For example, 'Problems with project management' shows the number of project teams per year, which mentioned problems in their project management. 'Problems with all dimensions' means that the students' innovation project team felt problems with tools, project management and reflection and 'No reported problems' means the students' team felt problems with none of the dimensions.

The first part of the data consisted of only five projects involving 28 undergraduates, carried out in the autumn of 2013. There were problems with the project management prerequisites. The size of the project groups varied. One group could not use Facebook, and another thought that it was a wrong com-

munication tool for their purposes. The challenge was to form a group whose members had all the necessary skills for achieving a satisfactory project outcome. The end products were a pilot experiment in three cases and a plan in two cases. Only one project (a pilot experiment) was reported by its members as successful in all dimensions. In two groups, the students encountered problems in all dimensions; the first was a pilot experiment, and the second was a plan. Most of the project groups reported problems with their fieldwork, which often meant that they felt they had not received enough meaningful or useful information for their renovation project in gathering background materials from the workers, users or customers.

The second part of the data was comprised of 22 projects undertaken by 146 undergraduates. Sometimes, some implementation experts were included in the project groups. The most typical group consisted of 5 to 6 participants. However, there were variations, such as double groups. Several groups shared the same client or assignment, and the assignments were more complicated and ambitious. The end product achieved was mostly a plan. There were 10 product plans and four service or event plans. Only eight pilot experiments were reported.

Although the development in project management was auspicious, more than half of the project groups still experienced problems with their fieldwork or in their ways of gathering information. There were seven sufficient projects with no problems in either dimension, consisting of five pilot experiments and two product plans. Eight product plans experienced problems with both project management and fieldwork, two of which also encountered issues with communication tools. Only one pilot experiment experienced problems with both management and fieldwork.

The third part of the data included six projects in the spring of 2015 and 11 projects in the autumn of 2015. Therefore, the project evaluations totalled 17, involving 93 students. In 2015, the average project group had five members. However, there were even more variations, for example, two groups with three members and one triple group with 18 members. The aim in some cases was to have more finalised end products (e.g., for student competitions). The end products achieved were divided into two almost equal parts: nine pilot experiments, mainly products and product demonstrations, as well as services, and eight product or service plans. In 2015, there were six reported successful projects in all three dimensions: two each of pilot experiments (new products), product plans and service plans. Only one plan and one pilot experiment had difficulties in both project management and fieldwork.

To conclude, in 2014 and 2015, the collaborative process became stabilised, and only two projects each in both years reported issues with their basic communication tools. Nearly half of the projects in 2014 and 2015 still indicated problems with project management and also in obtaining the expected results.

Compared to 2014, the problems they experienced with fieldwork decreased significantly in 2015, but as will be demonstrated in the following sections, also new problems connected to reflection emerged.

The next section presents a more detailed description of the analysis, with a few excerpts from the evaluation reports.

Groups performed their tasks with or without reporting their learning experiences

Each year, there were satisfied groups in all three dimensions. In 2013, one group succeeded in making a far-reaching pilot experiment: they held an opening day for an organisation and prepared the wardrobe, programme and communication materials. The members of this project group took photos of their partner's work during the project. The mirror materials of the work practices were made in detail and considered most areas of the project. The group also produced an elaborate project report with demonstration photos. They utilised the project as a learning process to be evaluated step by step. They also believed that their identity as producers developed because they wanted to reflect on and learn totally new things. The following excerpts are from different parts of the group's evaluation report:

> Collective Report A: 'I think this was a learning experience for all the participants. Every time we were creating something new, we had to start somewhere and learn a lot for the second time […]. I realised it was possible to carry out projects out of our comfort zone. For us, the project meant a practice-based way of networking'.
>
> Participant 1: 'I learned to observe my surroundings and to see development targets there. I also learned courage to meet special groups'.
>
> Participant 2: 'I learned how to take the position of a person with a speech handicap and how to share his or her views on what was tempting and interesting'.

In 2014, most of the satisfied groups made pilot experiments, mainly with plans as the end products. The students really benefited from making experiments in practice. Many groups used visual materials in a quite similar way as the group described in the preceding paragraph did in 2013. They produced videos of places and their inhabitants, as well as of users (customers), and uploaded them on YouTube to make surveys about customers' opinions or feedback.

One project group's mission was to produce materials for a new kind of community for elderly people. The presentations did not include videos, but the group made exact models of how the work of different resident subgroups should be organised. They used mostly drawn figures. Their fieldwork was exact and encompassing, which they described using the word 'learning'. The following excerpt is taken from their evaluation:

> Collective Report B: We researched on group dynamics, resolving differences, community development and living together. We ended up producing materials together with the customers and arranging a community evening for the incoming residents. We developed a procedure for community living, providing a theory and also some exercises on how to put it in practice.

This group also wanted to step out of their comfort zone and to concentrate in an unprejudiced manner on the shared object, as follows:

> Collective Report B: We learned that a project plan is for making our thoughts clear and more structured and for giving the framework for carrying out the project. We learned about the need to communicate and to cooperate a lot, both with the customers and with each other. We learned a lot about living in a community and about the tools for describing our thoughts more clearly. We learned how to combine different skills for taking into account more points of view.

In 2015, the variations of the end products increased in amount. As described earlier, there were equal numbers of pilot experiments and product and service plans, which produced good results in all dimensions of the evaluations. In many cases, there were deeper group considerations and also self-criticism about weaknesses in fieldwork. However, there were still other problems in reflection which sometimes became even more visible. Three groups conducted very good fieldwork and mirroring with visual tools. However, in their written evaluations, they mentioned and conceptualised their performance as either poor or in an impersonal way, without describing personal experiences.

First, an example of a project in 2015 indicates incomplete written considerations. In this complicated project, the students made a demonstration for a children's hospital. Based on the end product, the fieldwork had been elaborate and conducted in close cooperation with the child patients. The project group also cooperated very much with the game industry and won a prize in a competition. Nevertheless, the following excerpt reveals that considerations about the members' learning process were not at all verbalised in the evaluation, which focused mainly on obtaining expert support for the project implementation:

> Collective Report D: The use of technical experts would need to be much easier in this kind of project. We missed technical support and business advice, but the other question was how the outsiders could connect the project to their curriculum.

Second, an example of another project shows the students as satisfied in all the evaluation dimensions. The students planned a virtual guide to promote virtual care for the housekeeping unit. The end product was a video demonstration of the guide. The project aimed to demonstrate in detail with visual tools how the virtual care worked. The following excerpt shows how the project group maintained its focus on the shared object. Although there were a lot of considerations about the project learning, the considerations were also sometimes extremely abstract and elegantly phrased like sentences borrowed from a project evaluation handbook:

> Collective Report C: We learned a lot about the work of the housekeeping unit. We also learned a lot about virtual care. A good learning environment is important.

Groups succeeding or not in their fieldwork

In 2014, when the number of groups achieving satisfactory results in project management was at its best, but the end products in most of the projects were just plans, there where various and complicated problems with the fieldwork. The problems occurred in the mirroring tools and in the breadth and depth of the fieldwork. Among the project groups whose end product was a plan, four groups were satisfied with their project management, but they still reported poor or incomplete performance in their shared object and mirroring tools. To conclude, the difficulties in finding the shared object and conducting elaborate fieldwork were connected to the project aim, which was quite abstract. One group conducted a pilot experiment as their end product but they did not pay much attention to their fieldwork.

In 2015, five cases conducted very limited fieldwork. In one case, the project group contacted the customers but failed to reach them. In the second case, the workers were not allowed to give orders to the students. In the third case, the division of the work collapsed. In the other two cases, the fieldwork was undertaken within one group or in one place only.

The data also showed groups that failed to achieve the planned project results but were still pleased. Already in 2013, the smallest project group with two member departures still managed to mirror the practices of the city block and its daily commuters by making a video. In one interesting case in 2014, the group stated in their evaluation that their aim of designing a utility article (a kind of promotional and conceptual product) was too restrictive for them. However, they still produced deep and enthusiastic considerations concerning values such as tolerance, love and loneliness among young people in today's society. The reason was that they utilised comprehensive communication tools in their fieldwork, specifically, social media to collect both photos and written materials as personalised information from their customers.

According to the data, the external and internal difficulties, such as the limited timetable, did not disturb the group work when the groups found their strategy and the proper tools for fieldwork. For example, the satisfied group in 2013 faced workforce layoffs in the client organisation, lacked time for implementation and even had basic problems with their internal communication tools (e.g., their Facebook and e-mail connections), but they found supplementary tools and were pleased with all three dimensions. In 2014, two groups had multilingual participants, which did not in itself pose a barrier for co-operation. One group found their fieldwork good, but the other did not. In 2015, there was also one case of a breakdown and disorientation when there were problems in

using the conceptual tools, where the project group could not produce the script for their mobile application because they could not receive help with the vocabulary required.

Main findings

To conclude, some preliminary findings of the small-scale inquiry can be shown as a starting point for a more intensive research:

The case study demonstrates that technically, the in-group interaction using multiple social media tools was quite self-evident for the students. The real challenge was how to organise and use content-related interactions among the student groups and the workers and the clients whose services and products they designed and developed.

At least in relation to the students' motivation, the Minno® Innovation project design proved to be a step in the right direction. Among the 44 student projects, there were 14 projects where the students were satisfied with all dimensions of the project, see the dimensions on page 11. However, the dimensional results were occasionally even in a contradictory relation to each other. The chosen project design guided the undergraduates to conduct proper fieldwork also in situations where the other dimensions of the project somehow collapsed. There were 21 projects where the students were satisfied with their fieldwork and felt that they had learned new ideas.

The learning achievements were connected to the tools, scope and end products of the projects in interesting ways. In 2014 and 2015, many students provided more detailed reports about their limitations in fieldwork in reaching their customers or working life partners. The written considerations were often elaborate in projects where the research field was limited, and some kind of visual tool (e.g., video, photo, drawings) was used to support the fieldwork and demonstrations concretely. In the most thoroughly written evaluations, the undergraduates concentrated on the learning process and its objects that were common to all the participants. There were usually more considerations when the end product was a concrete pilot project. Conversely, some methods of collecting information from workers or clients, and also some end products, (mainly plans), were perhaps too abstract to support the students' considerations. Sometimes the students' considerations were also on a very abstract and impersonal level.

Especially in 2015, when the end products were surpassing higher technical and business rates, there were some written evaluations, where the students had hardly any detailed considerations about their working process or their object, although the project results can reveal their demanding fieldwork. In these cases, the students forgot or were unable to evaluate their working process in their writings because of a lack of time, conceptual tools or guidance.

The next section concludes how the essentials for reflection among different participants of Triple Helix are perceived in the activity theory framework.

Conclusions

To be more systematic and to obtain better results in the organisational improvisation-based UAS arrangement, the principles of double stimulation should be taken into account. Mirroring operational environments and customer actions and needs and the new concept formation are all required to achieve the entire basis for the expansive learning intervention and for the learning community (Hayes, 2011; Lave & Wenger, 1991; Wenger, 1998; Senge, 1990). From the activity theory perspective, the following encounters with the Triple Helix cooperation partners are needed for questioning, enriching and changing existing practices:

First, the students' task during fieldwork and experimentation is to make concrete demonstrations of work practices, or, even better, to have the workers or customers demonstrate their own work or needs. The evidence showed that in many Minno® Innovation projects, the students had already utilised versatile tools to mirror the workers' or customers' behaviour.

Second, in the activity theory framework, new innovations and new concepts can be produced in cooperation with the parties that concentrate on developing the shared object. This case requires space for students, teachers and other Triple Helix partners to design, direct, work on and evaluate their cooperation, which is the specific learning space where collected data can be more thoroughly collated and analysed. Some findings from the Minno® Innovation projects demonstrated the remarkable lack of verbalising reflections, especially in technically advanced projects. Furthermore, they also demonstrated the lack of describing personal experiences in reflection.

According to the evidence from Hyrkkänen's (2007) case study, the constant interaction and concept formation within UASs were key activities by which the new and old concepts describing the UAS functions were woven into a continuum while shifting to newer, more effective practices. To conclude, much more systematic training and collaboration is needed to arrange the circumstances for a continuous and conscious concept formation. The essential facilitator's role is to be also given to the different specialists or peer-learning partners from the Triple Helix setup, who are asked to deliver their theoretical tools and methods available for students.

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References

Alasoini, T. (2011). Workplace development as part of broad-based innovation policy: Exploiting and exploring three types of knowledge. *Nordic Journal of Working Life Studies*, *1*(1), 23–43.

Arnkil, R. (2008). Remembering the future: Future dialogue and the future of dialogising. In J. Lehtonen, & S. Kalliola (Eds.), *Dialogue in working life research and development in Finland* (pp. 131–143). Frankfurt am Main: Peter Lang. Retrieved December 7, 2016, from https://asiakas.kotisivukone.com/files/testataan.kotisivukone.com/julkaisut/good_future_dialogue.pdf

Arnkil, R., & Spangar, T. (2011). Open and integrated peer-learning spaces in municipal development. In T. Alasoini, M. Lahtonen, N. Rouhiainen, C. Sweins, K. Hulkko-Nyman, & T. Spangar (Eds.), *Linking theory and practice: Learning networks at the service of workplace innovation* (pp. 183–199). Reports 75. Helsinki: Tekes. Retrieved December 7, 2016, from https://www.tekes.fi/globalassets/julkaisut/75_linking_theory_and_practice.pdf

Baker, T., Miner, A.S., & Eesley, D.T. (2003). Improvising firms: Bricolage, account giving and improvisational competencies in the founding process. *Research Policy, 32*(2), 255–276.

Billett, S. (2012). Errors and learning from errors at work. In J. Bauer, & C. Harteis (Eds.), *Human fallibility: The ambiguity of errors for work and learning* (pp. 17–32). Dordrecht: Springer.

Buch, A., Andersen, V., & Klemsdal, L. (2015). Turn to practice within working life studies. *Nordic Journal of Working Life Studies, 5*(3a), 1–11.

Chesbrough, H. (2006). *Open business models: How to thrive in the new innovation landscape*. Boston: Harvard Business School Press.

Crossan, M., & Sorrenti. M. (1997). Making sense of improvisation. In J. Walsch, & A. Huff (Eds.), *Advances in strategic management* (pp. 155–180). Greenwich, CT: JAI Press.

Cunha, M.P., Cunha, J.V., & Kamoche, K.N. (1999). Organizational improvisation: What, when, how and why. *International Journal of Management Reviews, 1*(3), 299–341.

Cunha, J.V., Kamoche, K.N., & Cunha, M.P. (2002). Once again: What, when, how and why. In K.N. Kamoche, M.P. Cunha, & J.V. Cunha (Eds.), *Organizational improvisation* (pp. 296–308). London: Routledge.

Edwards, A., & Kinti, I. (2010). Working relationally at organizational boundaries: Negotiating expertise and identity. In H. Daniels, A. Edwards, Y. Engeström, T. Gallagher, & S. Ludvigsen (Eds.), *Activity theory in practice: Promoting learning across boundaries and agencies* (pp. 126–139). London: Routledge.

Engeström, Y. (1987). *Learning by expanding: An activity-theoretical approach to developmental research.* Helsinki: Orienta-Konsultit.

Engeström, Y. (2001). Expansive learning at work: Toward an activity theoretical reconceptualization. *Journal of Education and Work, 14*(1), 134–156.

Engeström, Y. (2008). *From teams to knots: Activity-theoretical studies of collaboration and learning at work.* UK: Cambridge University Press.

Etzkowitz, H. (2003). Innovation in innovation: The triple helix of university-industry-government relations. *Social Science Information, 42*(3), 293–337.

European Commision [EC]. (2010). *Europe's growth strategy Europe 2020: Proposed by the European Commission on 3 March 2010*. Retrieved December 7, 2016, from http://ec.europa.eu/europe2020/index_en.htm

European Network of Living Labs. (2015). *All our living labs in Finland*. Retrieved December 7, 2016, from http://www.openlivinglabs.eu/ourlabs/Finland

Hakkarainen, K., Palonen, T., Paavola, S., & Lehtinen, E. (2004). *Communities of networked expertise: Professional and educational perspectives.* Amsterdam: Elsevier.

Hamel, G., & Prahalad, G.K. (1994). *Competing for the future*. Boston, MA: Harvard Business School Press.

Hatch, M.J. (1997). Jazzing up the theory of organizational improvisation. *Advances in Strategic Management, 14*(2), 181–191.

Hautamäki, A. (2010). *Sustainable innovation: A new age of innovation and Finland's innovation policy.* Sitra Report 87. Retrieved December 7, 2016, from http://www.sitra.fi/julkaisut/raportti87.pdf

Hayes, K.J. (2011). Triple helix organisations, communities of practice and time. In O.R. Hernáez, & E.B. Cambos (Eds.), *Handbook of research on communities of practice for organizational management and networking: Methodologies for competitive advantage* (pp. 245–264). Hershey, PA: IGI Global.

Heiskala, R. (2007). Social innovations: Structural and power perspectives. In T.J. Hämäläinen, & R. Heiskala (Eds.), *Social innovations, institutional change and economic performance: Making sense of structural adjustment processes in industrial sectors, regions and societies* (pp. 52–79). Cheltenham: Edward Elgar.

Hyrkkänen, U. (2007). *Käsityksistä ajatuksen poluille: Ammattikorkeakoulun tutkimus- ja kehitystoiminnan konseptin kehittäminen* [From conceptions to cognitive trails: Developing the concept of research and development activity for the university of applied sciences]. Faculty of Behavioural Sciences, Department of Education Research 210. Helsinki: University of Helsinki.

Inkinen, S., & J. Kaivo-oja. (2009). *Understanding innovation dynamics: Aspects of creative processes, foresight strategies, innovation media, and innovation ecosystems.* FFRC eBook 9. Retrieved December 7, 2016, from http://www.utu.fi/fi/yksikot/ffrc/julkaisut/e-tutu/Documents/eTutu_2009-9.pdf

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge, MA: Cambridge University Press.

Leminen S., Westerlund, M., & Nyström, A-G. (2012). Living labs as open-innovation networks. *Technology Innovation Management Review*, September, 6–11. Retrieved December 7, 2016, from http://timreview.ca/article/602

Mäki, K. (2012). *Opetustyön ammattilaiset ja mosaiikin mestarit: Työkulttuurit ammattikorkeakouluopettajan toiminnan kontekstina* [Teaching professionals and masters of mosaic: Work cultures as the context of action of the teachers in universities of applied sciences]. Jyväskylä Studies in Business and Economics 109. Jyväskylä: University of Jyväskylä.

Marton, F., & K. Trigwell. (2000). Variatio est mater studiorum. *Higher Education Research & Development, 19*(3), 381–395.

Metropolia. (2015). *Oivallusta tulevaisuuden tekemiseen: Näe maailma uusin silmin!* [Presentation: Metropolia open innovation projects]. Retrieved December 7, 2016, from http://www.metropolia.fi/palvelut/innovaatioprojektit/

Moggridge, B. (2007). *Designing interactions.* Cambridge, MA: MIT Press.

Moorman, C., & Miner, A. (1998). The convergence of planning and execution: Improvisation in new product development. *Journal of Marketing, 62*(3), 1–20.

Potts, J.D., Hartley, J., Banks, J.A., Burgess, J.E., Cobcroft, R.S., Cunningham, S.D., & Montgomery, L. (2008). Consumer co-creation and situated creativity. *Industry and Innovation, 15*(5), 459–474.

Ramaswamy, V., & Gouillart, F. (2010). *The power of co-creation: Build it with them to boost growth, productivity, and profits.* New York: Free Press.

Rautkorpi, T. (2014a). Oppimisen tiloista innovatiiviseen työelämään [From learning spaces to innovative work life]. In T. Rautkorpi, A. Mutanen, & L. Vanhanen-Nuutinen (Eds.), *Kestävä innovointi: Oppimista korkeakoulun ja työelämän dialogissa* [Sustainable innovation: Learning in higher education and work life dialogue] (pp. 134–155). Taito [Skill] 7. Helsinki: Metropolia University of Applied Sciences. Retrieved December 7, 2016, from http://www.metropolia.fi/palvelut/julkaisutoiminta/julkaisusarjat/taito-tyoelamakirjat/kestava-innovointi/

Rautkorpi, T. (2014b). *Tuetut innovoinnin tilat ammattikorkeakoulun ja työelämän rajavyöhykkeellä* [Supported innovative spaces between universities of applied sciences and working life]. Work Research Conference Publication 5/2014. (pp. 227–240). Tampere: Work Research Centre. Retrieved December 7, 2016, from http://tampub.uta.fi/handle/10024/95420

Rautkorpi, T. (2010). *Viestintätaidot osana verkostomaista työtapaa* [Communication skills as part of a networking work method]. *Kever-Osaaja,* 2. Retrieved December 7, 2016, from https://arkisto.uasjournal.fi/kever-osaaja_2010-2/1237-2320-1-CE.pdf

Schienstock, G., & Hämäläinen, T. (2001). *Transformation of the Finnish innovation system: A network approach.* Report Series 7. Helsinki: Sitra. Retrieved December 7, 2016, from http://www.sitra.fi/julkaisut/raportti7.pdf

Senge, P. (1990). *The fifth discipline: The art of practice of the learning organization.* London: Doubleday.

Shaw, P. (2002). *Changing conversations in organizations: A complexity approach to change.* London: Routledge. Retrieved December 7, 2016, from http://wtf.tw/ref/shaw.pdf

Stacey, R. (2006). Complex responsive processes as a theory of organizational improvisation. In P. Shaw, & P. Stacey (Eds.), *Experiencing risk, spontaneity and improvisation in organizational change: Working life* (pp. 124–141). London: Routledge.

Taatila, V.P., & Raij, K. (2011). Philosophical review of pragmatism as a basis for learning by developing pedagogy. *Educational Philosophy and Theory, 44*(8), 831–844.

Tynjälä, P. (2009). Connectivity and transformation in work-related learning: Theoretical foundations. In M-L. Stenström, & P. Tynjälä (Eds.), *Towards integration of work and learning: Strategies for connectivity and transformation* (pp. 11–37). Amsterdam: Springer.

Vehkaperä, U., Pirilä, K., & Roivas, M. (2013). *Innostu ja innovoi: Käsikirja innovaatioprojektiopintoihin* [Inspire and innovate: A handbook for planning and conducting students' innovation projects]. Oiva 1. Helsinki: Metropolia University of Applied Sciences.

Vera, D., & Crossan, M. (2005). Improvisation and innovative performance in teams. *Organization Science, 16*(3), 203–224.

Victor, B., & Boynton, A. (1998). *Invented here. Maximizing your organization's growth and profitability: A practical guide to transforming work.* Boston, MA: Harvard Business School Press.

Virkkunen, J., & Ahonen, H. (2008). Toimintakonseptin kehittämisen lähtökohdat ammattikorkeakoulussa [Developing a new concept of activity at UAS institutions]. In J. Virkkunen, H. Ahonen, & L. Lintula (Eds.), *Uuden toimintakonseptin kehittäminen ammattikorkeakouluun: Muutoslaboratorio yhteisen kehittämisen välineenä* [Collaborative development of a new concept of activity: Case Metropolia UAS change laboratory] (pp. 10–24). Helsinki: Helsinki Polytechnic. Retrieved December 7, 2016, from http://www.metropolia.fi/fileadmin/user_upload/Julkaisutoiminta/Julkaisusarjat/A_SARJA/PDF/STADIA_SARJA_A_T_R13_korjattu.pdf

Virkkunen, J., & Newnham, D.S. (2013). *The change laboratory: A tool for collaborative development of work and education.* Rotterdam: Sense Publishers.

Virolainen, M. (2014). *Toward connectivity: Internships of Finnish universities of applied sciences.* Finnish Institute for Educational Research. Studies 29.

Jyväskylä: Jyväskylä University Press. Retrieved December 7, 2016, from https://ktl.jyu.fi/julkaisut/julkaisuluettelo/julkaisut/2014/t029.pdf

Von Hippel, E. (2005). *Democratizing innovation*. Cambridge, MA: MIT Press.

Vygotsky, L.S. (1978). *Mind in society: The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Weick, K.E. (1998). Introductory essay: Improvisation as a mindset for organizational analysis. *Organization Science, 9*(5), 543–555.

Wenger, E. (1998). *Communities of practice: Learning, meaning and identity.* Cambridge: Cambridge University Press.