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Title: Entrepreneurship Education in Studio Based Learning Practices
Year: 2016
Version: As published

Please cite the original version:

Heikkinen, K.-P., Seppänen, U.-M., & Isokangas, J. (2016) Entrepreneurship Education in Studio Based Learning Practices. Proceedings of the 11th European Conference on Innovation and Entrepreneurship, 247-256.

Entrepreneurship Education in Studio Based Learning Practices

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Abstract: The need for entrepreneurial mindset, skills and creativity in the future work-life will require the renewal of pedagogical methods used. The studio based learning is one of the promising pedagogical methods enabling this change. The LAB studio model, pre-incubator style studio education in Oulu University of Applied Sciences in Finland, develops connections between work-life based problems and the recognition and development of the related business prototypes and start-up companies. Projects, based on the given problems are medium for educating self-aware future professionals, who will gain skills and attitude to work in interdisciplinary teams with entrepreneurial mindset. This article is a study by a literature review of the recent higher education practices utilising studio model as pedagogical method in variety of disciplines. The study will identify the common elements of entrepreneurship education and studio model practices described in the literature. The findings of the study indicate that entrepreneurship as a concept is not sufficiently addressed in the studio model literature; several similarities in the pedagogical principles between the LAB studio model and other studio models; and that LAB studio model has several unique practices compared to other studio model educations.

Keywords: studio based learning, studio model education, lab studio model, higher education, activity system model, entrepreneurship education

1. Introduction

The current economical decline in Europe causing the increased unemployment rate has challenged also the higher education institutions to renew their offering. One solution to overcome this societal problem is to increase and develop the entrepreneurship education offering in the universities. In Finland, Oulu University of Applied Sciences has responded and taken the initiative to develop the LAB Studio Model (LSM) for the need. LSM is grounded on the studio based learning as a pedagogical solution and is among other targets educating entrepreneurial skills in a small company like environment. Traditionally learning studios have been used to educate disciplinary skills for professional areas, such as architecture, design and software engineering. Since LSM has a significant focus on new business development, this article is a study of entrepreneurship education aspects within the educational settings utilising the studio based pedagogics. In addition the research of entrepreneurship education has shown the requirement of aligning the used methods and pedagogical solutions with the entrepreneurship phenomena, since the traditional methods of education are still widely used. The research questions stated in this article are as follows; how common 'entrepreneurship' and 'entrepreneurship education' are as a theme in the research articles within context of 'Studio Model Education' and 'Studio Based Learning'?, what elements does studio model education have in common with entrepreneurship education? and what are the unique entrepreneurship education elements of LAB Studio Model compared to other educations utilising studio based learning?

2. Entrepreneurship education and LAB studio model

Entrepreneurship is seen as a society-renewing phenomenon (Kuratko, 2005). Schumpeter connects the entrepreneurship to the creation of new innovations, as he describes entrepreneurs according to their ability to adapt to the changing demands of their customers and their own business environment, and the ability to offer a constant process of innovation to societies, no matter whether that innovation is a service or a physical product (Schumpeter, 1926). The main focus of entrepreneurship has shifted to the process of creating new businesses (Alvarez and Barney, 2006; Detienne and Chandler, 2004; Shane and Venkataraman, 2000), which is often an iterative process (Davidsson, 2005). The process is connected to changes in the operational environment (Bryat and Julien, 2000; Eckhard and Shane, 2003) and is used to develop knowledge and networks for the benefit of new businesses (Elfring and Hulsink, 2003). Theoretical categorisations to the creation of a new business have been made by e.g. Alvarez and Barney (2006); Detienne ja Chandler (2004), and Sarasvathy, Dew, Velamuri and Venkataraman (2002). Puhakka (2002) defines entrepreneurship as a process of creating new business, where the opportunity of new business is recognised and transformed into a form of creating economic value by using own and others resources and personal relationships. Coming from this entrepreneurship connects as a phenomenon to the environment of activity, innovation, human activity and future orientation (Shane, Locke ja

Collins 2003). The debate around the entrepreneurship education states, that it should be closely connected to the entrepreneurship phenomenon (Deakings and Free, 1998; Hytti, 2003).

Historically, formal education has differed from learning in the informal sector and in working life (Engeström, 1987; Miettinen, 1990). Teaching has typically been teacher-led, involving textbook- and individual-centered learning in classrooms with few connections with actors outside of the education context (Miettinen, Isokangas and Peisa, 1997). The objective of educational change is to move beyond the lesson and textbook structure and move to connect more strongly with activities focused on societal use. Entrepreneurship as new business creation is linked to changes in the environment and societal phenomena. Educational activities related to the recognition of business opportunities have become as part of entrepreneurship education (Detienne and Chandler, 2004). The challenge for the entrepreneurship education is that the traditional teaching methods are still widely used, e.g. Solomon, Duffy and Tarabishy (2002). Entrepreneurship education research has shown that entrepreneurship-learning methods should include functional project-based learning (Pittaway, 2004), which contains a sufficient level of challenge and uncertainty (Cope, 2003). This type of education requires students to be active and self-directed (Bird, 2002; Cope, 2003). In addition functional, new activity creative, pervasive and long-term learning are required. Strengthening of the social dimension and networking (Rae and Carswell, 2000) encourages the student to take part in educational planning (Fiet, 2000), self-organising and the use of versatile assessment (Honig, 2004). The learning methods should emphasise working under uncertainty, working under pressure and solving contradictions in the activity (Cope 2003; Pittaway 2004). Ultimately, linking the recognition of business opportunities to learning requires a detachment from traditional classroom pedagogy (Honig, 2004) and building bridges with learning networks outside the education environment (Deakings and Freel, 1998; Elfring and Hulsink, 2003; Isokangas, 2009). Originally by Schön (1983, 1987), the concept of studio model education has been developed to overcome this dilemma. The model emphasises learning skills of the experienced professionals by having a weak connection to the external representatives of the work-life and its conditions.

The LAB studio model (LSM) is a higher education, interdisciplinary education model created in Oulu University of Applied Sciences (Oamk), Finland and aimed at training competent new professionals, self-directed teams and new businesses with an industry focus. In general, the LSM can be defined as a business pre-incubator, created to produce promising teams with solid and proven potential for creating their own new business (Heikkinen, Seppänen and Isokangas 2015). In general, studio model education can be defined as an instructional strategy that provides students with opportunities to engage in relevant, authentic learning in a school setting (Boyer and Mitgang 1996; Burroughs, Brocato, and Franz, 2009) A studio model of educational delivery suggests a more practical approach to professional education. Schön (1983, 1987) summarizes this process as reflective practice or "knowing- and reflecting-in-action". Pakman (2000) adds that this model of learning can allow practitioners to reconstruct their theories of action making and form action strategies explicitly open to criticism. Recent study of Heikkinen and Stevenson (2015) has shown LSM to utilise the studio model for its pedagogical model and include several new factors compared to the existing definition of studio model education by Bull, Whittle, and Cruickshank, (2013). These factors include: the offering a form of instruction that is more competitive in structure in contrast to other studio models (competitiveness); integrating experienced professionals and coaches from the industry (work-life connection); including problems or ideas directly from targeted industries; and building interdisciplinary project teams that cross professional and higher education faculty boundaries. Also the study of Heikkinen et al. (2015) has shown the expansion of the learning networks and the study of Heikkinen and Räisänen (2016) the utilisation of knowledge creation in the LSM.

DevLAB is one of the three LSM based educational settings, called as Oamk LABs, using LSM as it's pedagogical basis. DevLAB is one or two semesters full time education in English aiming to educate self-aware future professionals who are capable for developing client centered solutions in a cooperative interdisciplinary team. During the academic year of 2015-2016 the industries in focus were health and social care, tourism, energy and environment. Industries are chosen based on the local development and employment needs as well as the strategic development areas of Oamk. Student teams develop their solutions and business models by an iterative design thinking process and Lean startup business model. During the academic year of 2015-2016 40 students, consisted from 12 different countries, 11 different degree programs and five different disciplines participated DevLAB. By its organisation and administration DevLAB is part of the Oamk, but it operates outside the university campuses. This is in order to provide possibilities to connect with the startups, entrepreneurship services and learning network beyond the university learning network. (Heikkinen, Seppänen and Isokangas, 2015.) The

learning, as well as each student's individual goals of learning and professional and personal aims of development, are based on the goals and methods described in the Oamk LABs curriculum (Oamk, 2016).

3. Method for the study

The study was done in two major parts; firstly by an overview of the articles in the studio context published during the past thirty years and secondly by a literature review to identify a more detailed and recent understandings of the core studio model practices described in the literature and compare the entrepreneurship education practices to the studio model practices. For achieving the best coverage for the study, two different search terms for the published articles were used; "studio model education" and "studio based learning". For the analysis tool of the second part Activity System Model (Engeström 1987), based on Activity Theory, was chosen because of its viability in analysing the activity of a system in general and the social aspect of the activity. Activity Theory defines that the behavior of an individual cannot be separated from the changing environment. Vygotsky (1978) defined mediated action from the individual's perspective. Activity Theory emphasises the concept of object-oriented, collective and culturally mediated human activity and the role of artefacts on it (e.g. Engeström 1987, Leontjev et al. 1977).

The production of any activity involves a subject, the object of the activity, the tools that are used in the activity, and the actions and operations that affect an outcome (Nardi, 1996). The subject of any activity is the individual or group of actors engaged in the activity. (Jonassen and Rohrer-Murphy, 1999; Engeström, 2001) A tool can be anything that is used in the transformation process, including both material tools and tools for thinking. (Jonassen and Rohrer-Murphy, 1999) The activity in the system should have an object, which is clearly defined. According to Leontjev et al. (1977) the object of the activity is the real motive for the activity. Objects and motives are collective (Engeström, 1987, 1995), and the individual activity is always part of a system activity and activity among other actors in the system (Engeström, 1983, 1987; Leontjev et al., 1977). Figure 1 illustrates the concept of Activity System Model, where individuals participating to activity are in relation to the environment via artefacts, signs and other individuals.

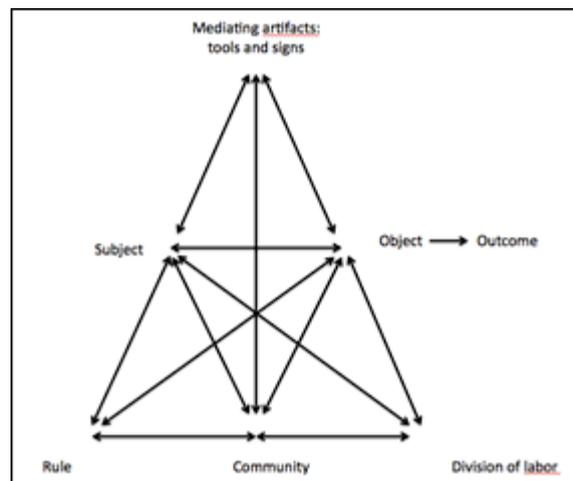


Figure 1: The structure of a human activity system (Engeström, 1987, p. 78)

The activity is social, only the actions are individual (Engeström, 1987). Engeström expanded the Activity Theory to include collective motivated activity toward an object, making room for understanding how collective action by social groups mediates activity by inclusion of community, rules and division of labour. The community consists of the interdependent aggregate, which share object (Jonassen and Rohrer-Murphy, 1999). Rules inherently guide actions or activities acceptable by the community, so the signs, symbols, tools, models, and methods that the community uses will mediate the process. The division of labour prescribes the task specialization by individual members of groups within the community or organization as related to the transformation process of the object into the outcome. The outcome is the form of instruction that is developed and implemented from the object. (Jonassen and Rohrer-Murphy, 1999.)

The overview study was performed by a text content analysis (Krippendorff, 2012) for the keywords and abstracts in articles published between the years 1984-2015. The searches with two search terms were directed to Scopus, one of the biggest bibliographic databases having more than 60 million records (Scopus 2016). After the searches the non-relevant and duplicate articles were removed and by using Nvivo-tool the analysis was

performed for the relevant articles in two patches; the first batch with a “studio model education”-search term included 92 articles and the second batch with a “studio based learning”- search term included 164 articles. The analysis was performed in two parts, first the total amount of articles published per year was counted from two batches and second the articles of most used words in the abstracts and keywords were found out. The first analysis was performed to achieve overall understanding of the amounts of the articles in studio context and the second analysis was performed to achieve overall understanding of the subjects written in the articles. The literature review was performed for the articles written between the years 2010 and 2015, called ‘Studio articles’ in this study, by an analysis using the Activity System Model. The search for the articles was directed to Scopus and included the articles with the search term “studio model education” and “studio based learning”. Total amount of 23 articles were read by three researchers during the spring 2016 and analysed by a deductive content analysis using the Activity System model as a theoretical background. The findings were written down using Google Sheets in the research seminars between the researchers, after which, two experienced coaches, both working in DevLAB, reviewed the findings and the conclusions.

4. Results

4.1 Results of the overview study

The results of the overview are illustrated in the Figures 2, 3 and 4. The Figure 2 shows the amount of the published articles about the studio model education and studio based learning between the years 1984-2015.

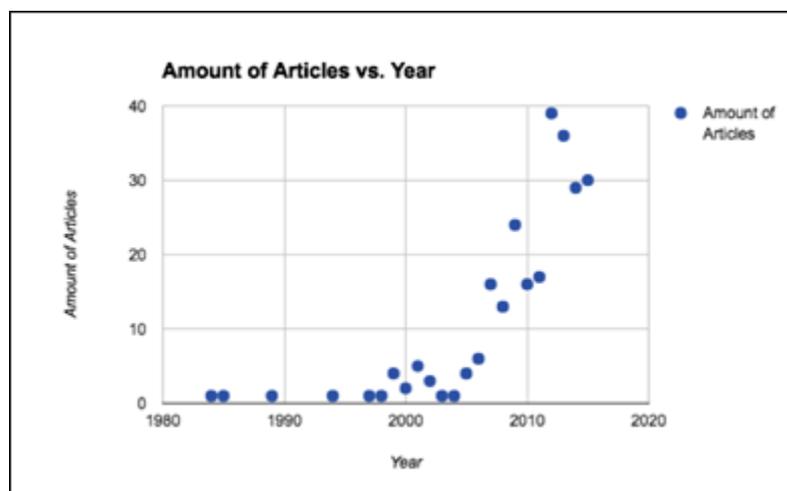


Figure 2: Amount of the published ‘Studio Model Education’ and ‘Studio Based Learning’ articles between the years 1984-2015.

As it can be seen from the Figure 2, the amount of publications has been significantly rising during the past ten years. This trend can be a sign of a rising interest of new studio environments establishment and interest towards the studio based pedagogic overall. Adding the search terms ‘entrepreneurship’ or ‘pre-incubator’ to the used terms didn’t give any results from the Scopus for published articles. This indicates the possibility of missing entrepreneurship education and startup company pre-incubator settings utilising studio model practices.

Provided by the Nvivo-tool, Figure 3 and Figure 4 illustrates wordclouds of the ten most used words in the published articles keywords and abstracts between the years 1984-2015.

From the both wordcloud, where larger font means bigger count in the amount of words used, can be seen that subjects like ‘architecture’, ‘environment’, ‘project’ and ‘process’ are the most common used, while as in the first search the words missing are ‘entrepreneurship’ and ‘pre-incubator’. In fact, business related words are a minority in the articles keywords and abstracts. The findings indicate that there are no articles published about business and entrepreneurship educations utilising studio pedagogics within the last thirty years. Based on the nature of words on the wordclouds, there is a possibility that the search term ‘Studio Model Education’ would find the articles describing more the practical implementation of the studios, while ‘Studio Based Learning’ would find the articles describing the practices of the studios.

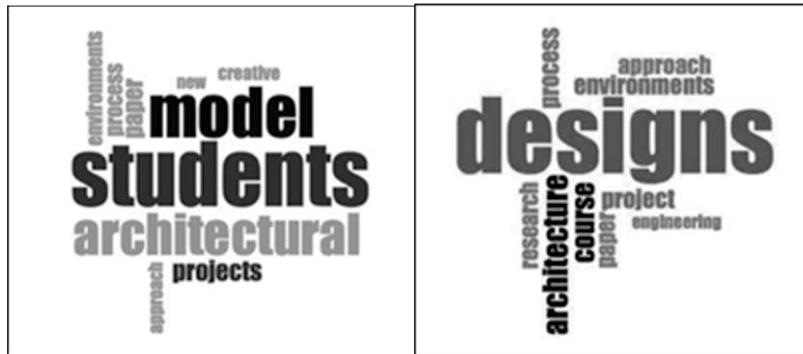


Figure 3 and 4: Wordclouds of the published 'Studio Model Education' (Figure 3) and 'Studio Based Learning' (Figure 4) articles between 1984-2015.

4.2 Results of the literature review

The results of the literature review are presented first by presenting the common findings of the comparison of Studio articles and LSM, second by comparing the findings to entrepreneurship education and third by presenting the unique features of LSM.

4.2.1 Subject

In this study the subject is a group of higher education students. Students might be either bachelor or master level with different phases of studies. Most commonly students are from one or two professions, in fewer cases the groups are interdisciplinary. (Bull and Whittle, 2014; Bosman, Dedekorkut and Dredge, 2012; Khan and Mahmood, 2013; Shraiky and Lamb, 2013; Schnabel and Ham, 2012; Collison, Cody and Stanford, 2012; Hundhausen, Fairbrother and Petre 2012.) When comparing the findings between Studio articles and entrepreneurial educations, none of the articles mentioned students from the field of business or entrepreneurial studies. DevLAB includes students from the field of business and other fields of higher education studies. Before entering the LSM students are ensured to realise the curriculum including entrepreneurial subjects, as well as the possibility for establishing their own enterprise.

4.2.2 Object

In this study the object is a prototype of the desired solution to a given problem. The solution is based on a recognised need of a client. Articles describe the prototype to be a kind of fulfilling the needs of the curricula practices within the particular discipline. (Bosman, Dedekorkut and Dredge, 2012; Brandt et al, 2013; Bull and Whittle, 2014b; Gattie et al, 2011; Wang, 2010.) Studio articles are having an object of prototyping a viable solution, while entrepreneurial educations object is making new business. DevLAB object is to combine both of these; prototyping a viable solution with a viable business model. Solutions developed in LSM are based on client's real need, so there is already a customer willing to pay for the new solution. This setup creates a need for the business opportunity recognition, as well as requirement of scalable solution, enabling growth of their possible business.

4.2.3 Outcome

The outcome is a concrete result of the development activities, such as a product or a service; student personal and professional development; understanding the connection between theory and practice and between work-life and academic context. (Bosman, Dedekorkut and Dredge, 2012; Bull, Whittle and Cruickshank, 2013; Bull and Whittle, 2014; Carter and Hundhausen 2011; Clinton and Rieber, 2010; Collison, Cody and Stanford, 2012; Forest et al, 2014; Habash, Suurtamm and Neculescu 2011; Peterson et al, 2015; Lee et al, 2015; Mathews 2010; Schnabel and Ham, 2012.) Outcomes shared are in categories of personal and professional development and understanding the connection between theory and practice.

Findings about student personal and professional development are connected to a personality, skills to work as a team member and networking skills. Common for both entrepreneurship education and studio model learning is that student will develop his/her agility, self-regulation, -awareness and -esteem. Also competences to confidently network and become a team worker are to develop. Common is also different ways of cooperating

with the external experts, targeting to develop meaningful networks. Being able to execute and evaluate the process from a need to a solution is one outcome. This requires student to connect theory and practice as well as acting and adapting their product and their own ways of working according to the changes in throughout the process. In DevLAB learning by an interactive process with business model development will enable understanding of the client centered product development. By having concrete results as an outcome of the activities, students will learn how to develop a viable solution fitting to the needs of a client.

4.2.4 Tool

In this study the tool is defined to include practices within four different categories; pedagogical models; culture of critique; iterative problem solving process; and practical equipment and spaces. Common for all tools is the aim of using them to support the reflective nature of learning, reflective practice. The common issues for the studio articles and entrepreneurship education can be found from every category.

Teaching in studio model is based on different pedagogical models. The most commonly used models are project-based learning, learning by doing and problem based learning. (Bull, Whittle and Cruickshank,, 2013; Bull and Whittle, 2014; Collison, Cody and Stanford, 2012; Habash, Suurtamm and Neculescu, 2011; Hundhausen, Fairbrother and Petre, 2012; Schnabel and Ham, 2012.) Pedagogical models discussed both in Studio articles and entrepreneurship education are project-based learning and learning by doing. Solving challenging ill-defined problems with uncertain parameters teaches coping with uncertainty. (Bosman, Dedekorkut and Dredge, 2012; Brandt et al, 2013; Bull and Whittle, 2014; Habash, Suurtamm and Neculescu, 2011; Hundhausen, Fairbrother and Petre, 2012; Mor and Mogilevsky, 2013; Peterson, 2015; Wang, 2010.) In DevLAB projects are based on ill-defined problems from partners from different industries.

Critique is in a format of self- and peer-critique as well as receiving critique from the coaches and external experts. Students are also taught how to ask and receive critique from industry client and end-users (Brandt et al, 2013; Bull, Whittle and Cruickshank, 2013; Bull and Whittle, 2014; Carter and Hundhausen 2011; Cennamo et al, 2011; Hundhausen, Fairbrother and Petre 2012; Mor and Mogilevsky, 2013; Schnabel and Ham, 2012; Shraiky and Lamb, 2013; Wang, 2010.) Unique for DevLAB culture of critique is the principle of competitiveness that enhances also the skills of coping with uncertainty. The competition between projects enables the culture of excellence; only the most viable solutions will be made as demonstrations. The decision-making by the external industry experts of the continuing projects will increase the credibility of the solution.

Learning process is an interactive process for developing solution. Main issues are the problem, iterative nature of the progress, length of the project, learning theoretical knowledge and ownership of intellectual property (IP). (Bosman, Dedekorkut and Dredge, 2012; Brandt et al., 2013; Carter and Hundhausen 2012; Cennamo et al, 2011; Mor and Mogilevsky, 2013; Peterson et al, 2015.) Learning is based on real life problems, where industry representatives are involved. It is focusing on developing a solution based on analyzed data in order to understand the problem, what is verified by making series of prototypes. (Bosman, Dedekorkut and Dredge, 2012; Bull, Whittle and Cruickshank, 2013; Bull and Whittle, 2014; Bull and Whittle 2014b; Forest et al, 2014; Habash, Suurtamm and Neculescu 2011; Mor and Mogilevsky, 2013; Peterson 2015; Shraiky and Lamb, 2013; Wang 2010.) In DevLAB the problems are from industry and length of the project is one or two semesters. Development of solution with the business model is done as iterative process, where process is repeated several times. There were no articles in the literature review describing the ownership of the IP rights.

Main categories for the equipment and space are defined to include: learning tools, visualisation and description of the space. For supporting students to be more active and self-directed different learning tools are used. One of the most important tools is the studying space; use a public space that could be used also by other people and learning environment that belongs to the students. This conveys the principle of mutual trust and reciprocity. Digital tools, such as learning platforms, virtual environments, social media and video conferences provide student a possibility to become less dependent of teachers and become more team centered. Using tools like log books and journals will support students to store their documents and to reflect their personal learning process. (Bosman, Dedekorkut and Dredge, 2012; Brandt et al, 2013; Bull, Whittle and Cruickshank, 2013; Bull and Whittle, 2014b; Forest et al, 2014; Hundhausen, Fairbrother and Petre 2012; Lee, 2015; Mor, 2013; Schnabel and Ham, 2012; Wang, 2010.) DevLAB uses one platform for team communication and mutual feedback. In studio learning versatile assessment tools are used to support students reflection of professional and personal development. Students are making different kinds of self-reflection reports, learning journals,

design narratives as well as personal and team role journals. (Lee et al, 2015; Mor and Mogilevsky 2013.) Becoming a self-aware future professional is one of the main goals of DevLAB. For this reason also other tools for reflection and self-assessment are used, such as future curriculum vitae and Kawa-model river (Iwama 2006). One main difference compared to Studio articles is the location of a studio; DevLAB is located outside of the university campuses and belongs to a startup business community, called Business Kitchen (Business Kitchen 2016).

4.2.5 Rules

Rules are divided into four different categories; academic rules; co-operation rules; community rules defined between the studio actors and personal rules for person's internal behaviour. When comparing the findings between studio articles and entrepreneurial education, academic rules, community rules and personal rules are recognized as shared categories. One common rule is that peers, clients and professionals do evaluation in academic manner enabling a public critique. These rules are described in curriculum. For the evaluation versatile assessment methods are used. One rule is that teams own result of their work. One rule for the learning community is the socialization for learning purposes. (Bosman, Dedekorkut and Dredge, 2012; Brandt et al, 2013; Bull, Whittle and Cruickshank, 2013; Bull and Whittle, 2014; Clinton and Rieber, 2010; Forest et al, 2014; Lee et al, 2015; Mor and Mogilevsky, 2013; Wang 2010.) In the DevLAB rules are defined by the university e.g. in curriculum, by the community e.g. how to take care of the premises and by students e.g. one's own goals of learning. A common rule characteristic to DevLAB is that student teams will have IP of their own product. Also strong focus on solving problems from economical and sustainability topics in its projects is one of the learning rules. Rules are enabling the process of creating knowledge development as well as new businesses and networks without economical constraints.

4.2.6 Community

The community is an important factor for the process of innovating and creating new business. In this article the community includes students; university staff; and external participants. The process is fostered by social interaction; connections between studio participants and external participants. The external participants are used for e.g. as be clients for the projects and as giving feedback from the professional context. (Bosman, Dedekorkut and Dredge, 2012; Bull, Whittle and Cruickshank, 2013; Bull and Whittle, 2014; Carter and Hundhausen, 2011; Forest et al, 2014; Habash, Suurtamm and Neculescu 2011; Harinarain and Haupt, 2015; Khan and Mahmood, 2013; Lee 2015; Pektas 2015; Peterson 2015; Shraiky and Lamb, 2013.) In the process of creating innovations the activity of producing personal relationships is enhanced by the mix of students with different levels of knowledge (Khan and Mahmood, 2013). In DevLAB students are at least on 3th year since the model requires a basic knowledge of their own profession. In addition teams of DevLAB includes unemployed, experienced professionals. Staff members have background from different industry fields and have at least master's education as well as pedagogical studies. External participants are experts of different fields of industry.

4.2.7 Division of labour

Division of labour is divided between two groups of actors; students and staff members. (Brandt et al., 2013; Bull and Whittle, 2014; Habash, Suurtamm and Neculescu 2011; Hundhausen, Fairbrother and Petre 2012; Carter and Hundhausen, 2011; Mor and Mogilevsky, 2013.) In DevLAB students are always working in teams. Every team has to decide their tasks and roles. Different tools and team coaching are used to support each team to recognize the roles and members suitable for each role. Students are also encouraged to try roles and tasks they find challenging. In DevLAB students require supervision and coaching several times in a week. There are specific staff members responsible, called LAB Masters, for taking care of operational activities, such as planning of the learning activities in studio and evaluation of the students. Student teams have also possibilities to have coaching from experienced coaches, who have different areas of expertise. In the beginning of the semester these coaching moments are organized by LAB Masters and coaches, by the end of the semester students are expected to be fully independent to recognize the need of coaching and contact coaches themselves.

5. Conclusion

Studio based learning are one of the promising pedagogical methods to combine theory and practice in higher education. LAB Studio Model (LSM) is one of the higher education concepts utilising the studio model practices in Finland. This article presents a study about the common elements of studio model and entrepreneurship educations. Results of the overview study give a strong indication that there are no articles written about

entrepreneurship and entrepreneurship educations utilising studio based learning. Even with the limitation that the study was performed by using only one database, the results indicate there seems not to be a significant number of entrepreneurship education settings utilising studio practices at the moment. This might also indicate the weakness of the real work-life connection among the educations utilising studio pedagogics. Results of the literature review shows that the current studio practices are mainly established based on the academic and disciplinary needs, while LSM practices instead are established from the needs of renewing and bridging the higher education and work-life practices. The common elements that studio model education have in common with entrepreneurship education are; active learning methods, such as project based learning and learning by doing; iterative process; dealing with uncertainty; close work-life connection; active and self directed learning; and sense of community. The uniqueness in LAB studio model practices compared to the other studio practices include; true interdisciplinarity; conscious support of self-awareness; and conscious support of team working abilities. Also as a process wise, LSM produces new, innovative solutions with related business models; the competitive nature of the development process generate the culture of excellence, where student teams have common goal to work together in order to develop the most viable solutions as demonstrations.

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