

Creative Skills Supported by Multidisciplinary Learning: Case Innovation Course at the Seinäjoki University of Applied Sciences

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Abstract—This paper presents findings from a multidisciplinary course (bachelor level) implemented at Seinäjoki University of Applied Sciences, Finland. The course aims to develop innovative thinking of students, by having projects given by companies, using design thinking methods as a tool for creativity and by integrating students into multidisciplinary teams working on the given projects. The course is obligatory for all first year bachelor students across four faculties (business and culture, food and agriculture, health care and social work, and technology). The course involves around 800 students and 30 pedagogical coaches, and it is implemented as an intensive one-week course each year. The paper discusses the pedagogy, structure and coordination of the course. Also, reflections on methods for the development of creative skills are given. Experts in contemporary, global context often work in teams, which consist of people who have different areas of expertise and represent various professional backgrounds. That is why there is a strong need for new training methods where multidisciplinary approach is at the heart of learning. Creative learning takes place when different parties bring information to the discussion and learn from each other. When students in different fields are looking for professional growth for themselves and take responsibility for the professional growth of other learners, they form a mutual learning relationship with each other. Multidisciplinary team members make decisions both individually and collectively, which helps them to understand and appreciate other disciplines. Our results show that creative and multidisciplinary project learning can develop diversity of knowledge and competences, for instance, students' cultural knowledge, teamwork and innovation competences, time management and presentation skills as well as support a student's personal development as an expert. It is highly recommended that higher education curricula should include various studies for students from different study fields to work in multidisciplinary teams.

Keywords—Multidisciplinary learning, creative skills, innovative thinking, project-based learning.

I. INTRODUCTION

THIS article is intended to describe how innovation can be learned in multidisciplinary student teams as well as to present and evaluate our pedagogic concept called SeAMK Innovation Week at the Seinäjoki University of Applied Sciences. The article is based on both literature review of the subject area and the initial reflection of the experiences of SeAMK Innovation Week. Open feedback from companies, coaches and students are collected during the week, and this article highlights some of the feedback in the form of direct quotes.

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SeAMK Innovation Week is a compulsory course for the first year students of all units at Seinäjoki University of Applied Sciences. The course is implemented as an intensive week once a year, during the spring semester. During the week, design thinking as a method is used by multidisciplinary teams of students in order to find solutions to problems given by various companies and organizations. Following the process of design thinking, the student teams solve the problems with business mind and customer focus. The outcomes of the Innovation Week are proven concepts, which are given to the corporate representatives.

The preparation of the week starts right after the previous week has finished. The planning stage during the spring term includes activities, such as scheduling, communication with internal stakeholders and the recruitment of multidisciplinary coaches. During the autumn term, the planning stage is transformed towards communicational actions and the construction of the learning environment, and at the same time, to the search and involvement activities of corporate clients.

The intensive week is organized so that all 800 students are divided into 12 groups. Each group is divided into multidisciplinary teams of five or six, so there are at least 10 multidisciplinary teams in one group. Each group receives a specific company case to be solved. These cases are provided by local companies from various industries. The cases can involve various perspectives and tasks, for example, to map the company's customers and their needs, and to develop innovative solutions for these needs.

II. INNOVATION AS A COMPETENCE

Innovation competence is a relevant skill required at the present era, but what does it mean? As a concept, it is very diverse and does not have a specific, clear definition. Innovation, for example, involves interdisciplinarity, good communication skills, creativity and design ability [1]. You might argue that there is a need for new ways of learning where innovation is at the core. Research on innovation systems has also found that innovation and learning are closely linked [2].

In most cases, innovation competence is accompanied by cross-disciplinary perspective: contemporary experts often work in teams where different professional groups are represented. The interdisciplinary approach means that people work together as a team, but still bring their own expertise and experiences to solve the given problem. Such teams develop

individual and collective decision-making and help members understand and appreciate other disciplines. Mutual learning happens when different parties bring their own knowledge to a common discussion and learn from each other, which requires good communication and collaboration skills [3].

The increasingly complex business environment requires a holistic and multidisciplinary way of thinking and working. Here is one reason why engineering students, for example, should make use of marketing and innovation skills, as well as business students find it helpful to understand the technical approach to providing customized solutions to customers. Finnish companies have recognized this need, which also has been defined as a key factor in the global success of companies. This can be called as creative multidisciplinary: Finnish companies are using this creative interdisciplinarity to achieve a higher level of quality, faster access to the market, and in general, using their skills and resources related to creativity and continuous innovation. In all, multidisciplinary collaboration is of great benefit, especially when a problem occurs and solutions are based on different skills [4].

The various dimensions of the concept of interdisciplinarity have been highlighted by earlier studies, where it has been emphasized that the deepest interdisciplinary perspective means that team members build new, shared knowledge, not only bringing their own experiences and knowledge to a common discussion [5]. This can also be one pedagogical challenge in the context of SeAMK Innovation Week. The creation of new, common knowledge can be supported, for example, by utilizing a common process, concepts and tools.

“Working in a multidisciplinary teams can easily feel like walking on thin ice – having to be extremely careful so that the surface won’t crack, or break for that matter.” (Student A, International Business)

“Multidisciplinary teamwork is definitely a good thing, and I at least noticed that. When our group had students from many fields, we were able to combine our knowledge and skills to produce results and ideas. There were many different perspectives on the same issue and that is a good thing. In this way, we got thoughts and reflections from many different sources that we didn’t even come to think before. We are not yet experts when we study for the first year but maybe sometimes we are experts.” (Student B, Agriculture)

“In this multidisciplinary week, I found myself that everyone had some thoughts typical of a particular field, for example students of social science thought more humanly than maybe automation engineers.” (Student C, Hospitality Management)

III. EXPERIENCES OF LEARNING

Learning in a multidisciplinary team has been studied in a variety of contexts. As an example, 10 multidisciplinary teams in six organizations in the UK were studied. The learning outcomes were categorized into three main categories: self-learning, organizational learning and learning from other specialization areas. Participants in the study explained that they learned most about themselves and gained better

understanding of what kind of personal qualities and competencies are required for cross-disciplinary teamwork [6].

Self-learning also emerged in the reflections of our students:

“I learnt how to interact with people, making new friends from different culture with a different mindset and ideas and not depending on my own ideas and opinion alone.” (Student D, Nursing)

“During the Innovation Week I learned a lot about effective multidisciplinary teamwork, and I learned to think about the project and its design, especially from the service provider’s point of view. I developed my skills in customer-oriented thinking and learned to identify and target the service to different target groups.” (Student E, Social Work)

“During the Innovation Week I learned to trust my own and my team’s creative thinking and idea development. My teamwork skills have not been very good in the past, so during the week I had a good practice in working with the team. In the future, teamwork skills will surely be of use during and after studies, even in working life.” (Student F, Engineering)

Naturally, our students also presented constructive criticism, concerning for instance arrangements, such as facilities, scheduling and instructions. Likewise, comments were made on how to support team building and a creative atmosphere. An interesting critical aspect from the point of view of learning was how they experienced the interface to studies in their field:

“As a student of health services, I do not find the development of business particularly interesting and the most challenging was to try to create a kind of customer image of a company that was our subject.” (Student E, Health Services)

“This is probably a space to experience, but I don’t see what the future engineer will benefit from [the method]...In the field of technology, I think the workshop is more effective, especially in the sense that companies are in their own field and at the same time can build relationships with companies in their field.” (Student F, Technology)

However, this business-to-customer interface is an essential element in the design thinking approach used. The design thinking method has many definitions, but in its original sense, it means solving challenging problems using the methods of designers. Design thinking can be seen as guiding a user-driven innovation process that emphasizes understanding customer needs and analyzing business around the problem, multidisciplinary development team, quick experiments, visualization and presentation of ideas [7].

The Innovation Week process is based on the design thinking method, starting with limiting the problem, moving to customer research, ideas, conceptualization and quick experiments, and ending with the presentation of final results. The week starts with the sponsors’ performances, where they give the problem to be solved, and the week ends with student presentations to the sponsors. The method of design thinking

emerged in several student comments:

“During the Innovation Week we did a lot of design work using the Design Thinking method, so we learn how important the design phase is before implementing the idea.” (Student G, Business Economics)

“As an idea, this Design Thinking sounds great and contemporary, but I don’t see it any value in my area, but maybe that’s a good thing in such a job.” (Student H, Agriculture)

“It’s important to focus on design thinking, understand its purpose, and make it an effective tool. The issue to be addressed can be approached by starting a problem or solution. What inspires me most at Design Thinking is its social dimension.” (Student I, Cultural Management)

IV. COMMUNICATIONAL CHALLENGES

There is research evidence suggesting that the more similar the interacting people are, the more likely they are to have perceptual similarities. For instance, people having similar occupations are more likely to perceive things in a similar fashion. So, students of engineering can be assumed to be similar among themselves, as are business students or students of health services in their own group, and therefore are likely to communicate most effectively within their own occupational context.

However, communication is not as easy as it seems. One of the challenges that people with different backgrounds have is their own languages, for instance, technical specifications are more likely to be discussed in a group of engineers than by business people who may discuss more about focus groups, customer orientation and business concepts.

“We had two business students in our team, combined with students from three other fields. We noticed right away that there were differences in how we spoke about customers, concepts and solutions. I understood very well what the other business student was saying.” (Student J, Business)

Communication can make more issues to become shared among team members with different backgrounds. We can assume that the more communication there is between members, the more similar they can become. The more you communicate with someone else, it is more likely for you to start to understand and even adopt his or her point of view. If a multidisciplinary team aims to operate efficiently, issues must be communicated in a larger context than within a single occupational role. The degree of team integration depends on how widely shared knowledge is between the members. The more sharing occurs between them, the more integrated and efficient the team becomes.

“From the very first day, we discussed and discussed, and once again, discussed. Sometimes it felt there was too much communication, but in the end, you saw the value of communication. Our concept was clear and logical, and in our presentation we all were able to support each other.” (Student K, Health Services)

Differences in perceptions have been recorded in earlier studies. It has been found that perceptual differences are often

related to poor communication, while perceptual similarities lead to communicate more efficiently. Perceptual similarities have been conceptualized as shared meanings, especially among researchers studying organizations from a cultural or cognitive perspective [8].

We can claim that there are two main perspectives explaining how communication and shared meanings are integrated. The first perspective is that shared meanings are needed in order to get a team to communicate and work together, while the second approach assumes that communication is an antecedent of shared meanings [9]. These aspects can be combined by understanding that some beliefs are common to individuals’ cognitive structures but via communication, more beliefs become common to individuals in a team.

“I felt the other members did not understand my point of view, which was very frustrating. But I kept explaining, and finally, I think they started to think in a similar fashion. At least they said they understood my point of view...” (Student L, Cultural Management)

To conclude, communication can be understood as a device of co-ordination, making the functioning of a multidisciplinary team more efficient as the shared area of knowledge becomes wider. It is easy to believe that some issues must be shared in order to make communication possible. However, this does not exclude the possibility that communication can also make new issues to be shared.

V. REGIONAL IMPACTS

Traditionally, innovation activities have been evaluated in terms of financial profitability, but increasingly, innovation activity is assessed from the point of view of ecological, social and public impacts. As the course was based on cooperation with local companies, it is important to assess the course’s impact on regional development.

Current innovation research discussed widely the importance of open innovation and its impact on the competitiveness of enterprises, agreeing with the idea that relevant information related to innovation is widely distributed outside the company [10], [11].

In earlier days, it was common for companies to think that innovation should be as strictly controlled as an internal business activity. Nowadays, enterprises openly invite external actors to develop their new products and services. Innovation is always at the heart of business, because without new or renewed products, services or processes, enterprises would not be able to renew their businesses.

Opportunities for open innovation can be exploited at many different stages of the innovation process [12]. SeAMK Innovation Week’s method and process focuses specifically on the phase of ideation, as it aims to develop a large variety of ideas, test them quickly with potential customers, and build an initial concept, which enables companies to continue from it further.

“We still intend to internally analyze the results and the overall experience. On the basis of them, we consider what are the following stepping stones to solve the

problem. So, surely these are also of concrete benefit to us!" (Company A, Media Industry)

"That's where good ideas came in. Certainly, the students pointed us there are weaknesses in our App, which we need to seriously consider." (Company B, Professional Services)

"Our representative considered the Innovation Week exceeded expectations. It gave us much more than we thought." (Company C, Financial Services)

Innovation knowledge inevitably involves interactivity. As businesses are interested in the opportunities of open innovation, innovation activity must be seen as a growth-promoting factor in universities of applied sciences. Universities should not only be seen as trainers of experts, but rather as organizations shaping the behavior and skills that affect innovation and the development of society. Earlier studies in different countries have also clearly shown that cooperation between universities and businesses increases both the innovation capacity of companies and the development of information processes in universities [13]-[15]. It is quite understandable that the parties have different goals and motives to participate in co-development: enterprises focus on commercial goals, universities emphasize pedagogical goals and students are motivated by possible job opportunities. In return, all parties also gain added value for their own operations. For example, companies receive systematic support for problem solving, universities increase their awareness of the needs of local companies, and students deepen their practical skills and increase their self-knowledge [16].

Previous research has found that open innovation is not a generalized phenomenon, but its nature also depends on the characteristics of the region. It can be stated that companies find a significant amount of information on external, regional networks. In addition, studies suggest that the cultural characteristics of the region, such as trust, risk-taking and openness, affect the construction of business networks and thus the development of open innovation [17].

VI. CONCLUDING REMARKS

The SeAMK innovation Week can be seen as a platform for open innovation. These types of innovative learning environments develop the diversity of skills, such as student teamwork and innovation, time and presentation skills, and support the student's personal development as an expert. The company sponsors' comments support the notion:

"Students seemed to have a good drive for our project.

They had really invested in the project. The method in itself was ideal for this type of innovation and the students received the needed level of understanding for the method. The foremost point of development was that the background analysis cannot be overemphasized." (Company D, Expert Organization)

While business life has emphasized the multidisciplinary nature of innovation for a long time, we can only ponder why interdisciplinary study programs or learning environments are less widely exploited. Future experts must be better able to

manage transversal competences. It is also evident that innovation is increasingly created in a cross-sectoral terrain. Therefore, in particular, innovation studies can serve as a ground in which the multi-disciplinary approach is needed.

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