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Developing innovation pedagogy

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Abstract

The purpose of this paper is to discuss the concept of a pedagogical strategy called innovation pedagogy and study how it has been and will be developed. The paper provides a discussion of the changes in innovation pedagogy and, more generally, in higher education, including the changes in educational goals and involving a sustainable future as the priority in all education. The research methodology is based on action research and participatory observation as well as on the experiences of the authors of the development process, which has taken place in a Finnish university of applied sciences during the past 12 years. The study helps to understand how education development takes place gradually and how it can simultaneously respond to the demands of a sustainable future. This paper strengthens the understanding of innovation pedagogy by providing a set of concrete steps to advise how to put innovation pedagogy in practice.

Keywords: Education development, higher education, innovation pedagogy, sustainable future

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1. Introduction

In Finland, universities of applied sciences were established at the beginning of the 1990s to support regional development, while traditional research universities aimed to generate new universal knowledge in basic research. Universities are complementary in their respective areas of strength, and both sectors have their own profiles. Compared with universities, studying at a university of applied sciences is more practically oriented; universities of applied sciences educate experts for various positions in working life and its development. Universities of applied sciences are multi-field and mainly regional institutions of higher education. They are regional because the aim with the system of universities of applied sciences is to support regional development and promote cooperation between universities of applied sciences and companies as well as other working life organisations. They are usually multi-field, because multi-field units were considered able to create new degree programmes to serve the needs of the changing working life. In addition to their educational duties defined by the Finnish educational policy, universities of applied sciences conduct research and development work, which serves instruction and supports working life organisations.

Pedagogical solutions at universities of applied sciences have been much discussed during the whole lifespan of the Finnish universities of applied sciences. The pedagogical approaches adopted by traditional research universities were not regarded as suitable for universities of applied sciences. The pedagogical approaches of the traditional research universities often follow principles created in the 11th century when the first universities were born. The enormous changes in the world since have had very little impact on the practices followed in the academic world. As a result of the close collaboration with working life and the aim of producing graduates who are well prepared for the tasks there, it became a necessity for the universities of applied sciences to develop their own pedagogical approaches and strategies.

The concepts of learning and teaching at universities of applied sciences are based on shared assumptions on how learning takes place. In general, learning is viewed as a constructive process in which knowledge is not transferred to the learner, but learners must instead create their own thinking models and learning strategies. As learners, students constantly build on their previous knowledge and skills. Therefore, they have an opportunity to contribute to the contents of their own studies through an individual study plan in the framework of the degree regulations. Other pedagogical key elements at universities of applied sciences include learning processes and professional growth. Students' progress in their studies through a variety of different learning processes and gradually develops to skilful experts. They build their knowledge along with the changes taking place in working, participating in several networks, developing the working life and thus expanding their understanding of reality (Eteläpelto & Onnismaa, 2006; Raij, 2003; Raivola et al., 1998; Nonaka et al. 2000).

Turku University of Applied Sciences (TUAS) started the development of the innovation pedagogy approach in 2006 to provide competences needed in working life and to promote innovations and regional development (Kettunen, 2009; 2010; 2011). Two years later, the first Finnish innovation strategy was launched and a great deal of responsibility was given to universities of applied sciences to generate innovative graduates to meet the needs of working life. In addition, it was obvious that something – a skillset called 'soft skills' – had to be made a new priority in higher education. For those seeking employment, it was no longer enough to possess only traditional, study field-specific competences. Conventionally, the educational system had provided knowledge and skills that were adapted to innovation processes only later in future working life environments. Innovation pedagogy started from this challenge and offered an approach for supporting the development of students' so-called innovation competences from the very beginning of their studies. The challenge in the early days of innovation pedagogy was to examine which the requirements were for graduates for them to

be the innovative players needed in the job market. The research to understand what innovation competencies really are was started. The core of innovation pedagogy was to introduce an approach with which students' innovation competences can be enhanced already during their studies (Marin-Garcia et al., 2013, 2016; Keinänen, 2018.).

As a consequence of the introduction of innovation pedagogy, the traditional gap between 'theoretical teachings' and 'the practical requirements of working life' was filled, which enhanced the professional growth of students already during their studies. (Penttilä et al., 2009) Innovation pedagogy as a pedagogical approach had an impact on all university key activities, including learning methods, working life cooperation and curriculum development. However, which exactly these key activities are and how they should be redesigned has met big changes during the lifespan of innovation pedagogy.

The aims of innovation pedagogy have been refined during its lifespan. The aims mentioned earlier remain valid. However, they have been extended and nowadays receive different emphasis. The original aim of innovation pedagogy is to educate graduates who will succeed in their lives both as professionals and as individuals. Right from the beginning, innovation pedagogy aimed at personal growth of an individual by believing in the capacity of each individual to the best expert on their future. However, the world is under a constant change and so is work and working conditions. Education must apply foresight and acts proactively to respond to these changes. It is likely that the speed of the change will only accelerate in the future. These days, success and good life may bear a different meaning compared to the early days of innovation pedagogy. The change and its consequences affect the whole welfare society where economic growth is traditionally seen as the foundation for the welfare of people.

In this paper, we describe the development process of innovation pedagogy during the past 12 years. During this time, the authors have acted as researchers, planners, agents, developers and evaluators of innovation pedagogy and as consultants of innovation pedagogy in Finland as well as in other countries in several educational institutions that wished to adapt the innovation pedagogy approach to their own organisations. We start with a brief presentation of the early approach. The approach in the paper is based on action research and on the experiences of the authors during the process of implementing innovation pedagogy in universities. However, the emphasis of the paper is on the current and future vision of innovation pedagogy, that is, what has changed, why and how and what has to be redesigned in the future. No pedagogical strategy is ever final but must instead be continuously developed. The development of innovative pedagogy has required time and so does its implementation. A successful process needs participation by the whole educational community and requires shared values and goals. This study describes the results of the development work of innovation pedagogy and states that educational goals require consideration of processes, structures and aims based on values. We also aim to promote the understanding of innovation pedagogy by providing a set of concrete steps to advise how to put innovation pedagogy in practice to achieve the biggest aim of all education; a sustainable future and a good life both for people and nature.

2. Innovation Pedagogy – Early Days

The first versions of the framework for innovation pedagogy were presented 10 years ago (e.g., Kairisto-Mertanen et al., 2009; Lehto et al., 2011). They presented a model aiming to bridge the gap between education and working life (Figure 1). With the help of the model, the learning and teaching processes improving qualifications for students entering working life could be charted, which facilitated improving both personal and professional growth and social skills. Learning processes were seen to be deepened and strengthened as previously gained knowledge was continuously applied in practical contexts. Innovation pedagogy emphasised that education should not start with knowledge

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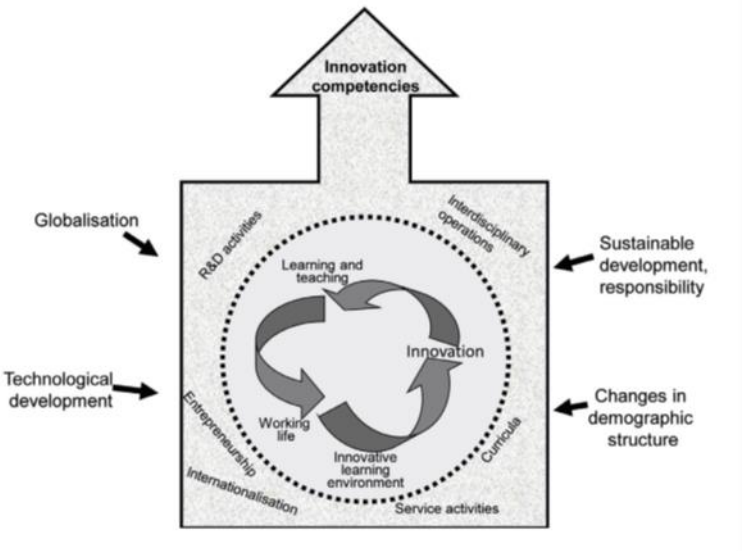

Figure 1. The drivers for pedagogical development in universities of applied sciences (Lehto et al., 2011, p. 17).

In the early texts, innovation pedagogy referred to an approach to learning and teaching that emphasised working life and research and development (R&D) skills. This meant applying existing learning and teaching methods in a creative, value-increasing way, developing new methods and ensuring that students take responsibility for their learning and that they actively pursue their learning objectives. The aim was that as a result, graduating students have professional skills and qualifications that are both innovative and development-oriented.

There was a clear demand for an approach such as innovation pedagogy. The approach was supported by Finland's innovation strategy in 2008. The world as well as working life had become more dynamic, requiring innovative people to develop innovations. Innovation pedagogy aimed to generate environments in which know-how-inspired competitive advantage could be created by combining different kinds of know-how. In a multidisciplinary environment, it was considered possible to evoke regional innovations and increases entrepreneurship through research and development. From the beginning, innovation pedagogy strived for contextually emerging and cumulative knowledge that is boundary-breaking, practical and societally durable by nature, and therefore it was a suitable theoretical framework for developing new innovative cooperation between working life and universities of applied sciences.

In the first publications, it was stated that innovation pedagogy offers an abundance of opportunities for further study. The research subjects that were particularly emphasised included the creation of an innovation barometer to evaluate the execution of innovation pedagogy and research on learning environments that enhance the development of innovation competences.

3. Innovation Pedagogy Now and in the Future

After the early days, innovation pedagogy has continuously been developed further. A significant step was the definition of the cornerstones of innovation pedagogy (Kairisto-Mertanen et al., 2012a; 2012b). As a concept, cornerstones refer to the tools and methods of innovation pedagogy. These

cornerstones have been reformulated and completed several times during the lifespan of innovation pedagogy, aiming at responding to the development needs of education in the current and future world (Penttilä et al., 2011; Penttilä & Kairisto-Mertanen, 2012; 2013). In the following, the cornerstones are presented in accordance with their current definitions.

Working life orientation and cooperation refer to differently implemented ways of action, based on the cooperation between education and working life, which improve graduates' employment opportunities, ensure that education meets the demands of working life, and additionally, evaluate, develop and renew the models of operation of working life. Entrepreneurship and entrepreneurial attitude are encouraged, as both are needed since the world has become more agile and requires instant actions and active attitude from everybody. The importance of globalisation is ever-increasing, as the global perspective is present in every profession. It is also essentially important to understand that a sustainable future can only be reached by developing a global mind-set. Moreover, innovation pedagogy relies on systemic thinking, as every action must be considered in relation to its consequences and other actions. Collaboration and inclusion are in the core of the ways of actions of innovation pedagogy. Innovations are seldom created alone but by a group of people who interact with each other and have different competencies and abilities.

The above-introduced cornerstones are basic requirements for innovation pedagogy. In addition, there are several other essential cornerstones which enable the successful implementation of innovative pedagogy to reach the set aims. These cornerstones are the integration of RDI with studies, flexible curricula, multidisciplinarity, activating learning and teaching methods, versatile and development-oriented assessment, and renewing teacher and student roles. Some of these cornerstones can be implemented starting from an individual teacher's ambition to do things in a different way. A single teacher can decide to start using activating learning and teaching methods as well as versatile and development-oriented assessment methods. To integrate RDI with studies, make the curricula flexible, introduce multidisciplinary studies or put an effort on renewing teacher and student roles, strategic commitment and decision-making are required from the educational institution to integrate innovation pedagogy into educational goals and structures and to make a real change in the learning culture.

Giving students opportunities to work with real-life assignments and in authentic research and development projects are essential when aiming to improve their innovation competences, and therefore RDI operations must be integrated with curricula and studies. Flexible curricula enable students to take different, alternative learning paths. Curricula can be shaped and developed and thus quickly react to the development needs of the surrounding society. Multidisciplinarity enables collaborative learning, which was described earlier, bringing different competences and expertise to work together. Something new is likely to be born when people with different expertise get the possibility to work together. Learning and teaching methods used in education must be activating and versatile, as such methods have been found to be strongly influential when considering the development of students' innovation competences (Keinänen & Kairisto-Mertanen, 2019). The assessment is development-oriented, which means that students can assess their own competences and know-how to develop them. Renewing teacher roles support, encourage and guide students to advance learning, and students need good study skills to take an active and responsible role in their own learning. (Konst & Kairisto-Mertanen, 2018.) All these cornerstones, as well as the process and aims of innovation pedagogy, are listed in Figure 2.

These cornerstones enable the innovation process in learning, during which learning takes place and is demonstrated through the development of innovation competencies and study field-specific competences. To reach the goals of innovation pedagogy, students must acquire the competences of their own study fields or disciplines and, in addition, a set of so-called innovation competences during their studies. Students are expected to become active contributors in the different innovation processes they will encounter when they enter working life, which is why the objective is that they will develop their knowledge, skills, and attitudes related to their study field-specific competencies and to the capability to act innovatively already during their studies. These learning outcomes, which are generic and common for all study fields, are called innovation competences, and they can be

categorised into individual, interpersonal and networking competences, all of which are needed to produce innovative knowledge. (Kairisto-Mertanen, Penttilä & Nuotio, 2011; Keinänen et al., 2018.) According to the latest research, innovation competences have five dimensions that focus on creativity, critical thinking, initiative, team working and networking (Fincoda, 2017; Marin-Garcia et al., 2016).

As innovation pedagogy aims at generating learning outcomes in the format of knowledge, skills and attitudes absorbed during the learning process, it can be said that the innovation process forms the core of the learning process. In other words, when a learning process closely resembles an innovation process, it facilitates the development of both study field-specific competencies and innovation competences. In practice this means, for example, that students work in authentic learning environments as well as in teams and groups which often are multidisciplinary, that they are given real problems to solve and that they have an opportunity to create, test, implement, evaluate and communicate different solutions to the problem. As the world is becoming increasingly complex and the amount of information is growing, it is evident that innovation competencies are required, because only a few can outdo the collective strength of a group or a team through individual actions (Penttilä et al., 2013.)

When innovation competencies are defined as learning objectives, listed as learning outcomes in curricula, and when learning methods and environments are designed to facilitate improving innovation competences, it is natural that an assessment tool for their development is required. Therefore, the development process of innovation pedagogy has included the development of an assessment tool, as well. The assessment process and related tools will be presented in the chapter 'Implementing innovation pedagogy.'

It is important that the learning process also includes elements that support students' growth as human beings. To strengthen the comprehension of the interconnectedness of human and nature, values and ethics should be included in the learning process. Without ethics, the understanding of some of the innovation competences may remain inadequate and result in dangerous notions. What is meant by this is, for instance, that using creativity and problem solving together should not result in ethically questionable results but in solutions which generate new solutions that in their turn help to save the environment. The purpose of innovation pedagogy is not to provide competences for working life only but competences for a good life and sustainable future, as well; competences that help to build a sustainable society, learn to think beyond ourselves, consider nature in all our actions and understand what is right under the new and changing circumstances. Therefore, the latest definition of innovation pedagogy acknowledges and emphasises growth as a human being, as well as ethics and values.

The same development can be seen in the aims of innovation pedagogy. In the early days of innovation pedagogy, the aim was defined as an individual's success at work, which will result in the success of their employer organisation, as well. Reformulating the aim became necessary along with the understanding that the world is interconnected and the success of one individual or organisation is ultimately connected to the success of wider surroundings. 'There is no good working life without good life' (Konst & Kairisto-Mertanen, 2018, p. 20), which is why innovation pedagogy aims at educating students to contribute to the sustainable development of the globe. The redesigned aim is to provide students with the competencies needed at work and to simultaneously support them to grow into mature and independent individuals and critical, constructive and ethical citizens who will actively participate in developing society and making it a better place for all living beings and the environment.

The illustration of the current description of innovation pedagogy (Figure 2) involves a time axis. This is important because learning approaches or pedagogical strategies cannot be successful without continuous redesigning and renewing. The world around us is changing all the time, and education must be a step forward it to be able to react and to change the world in the desired direction.

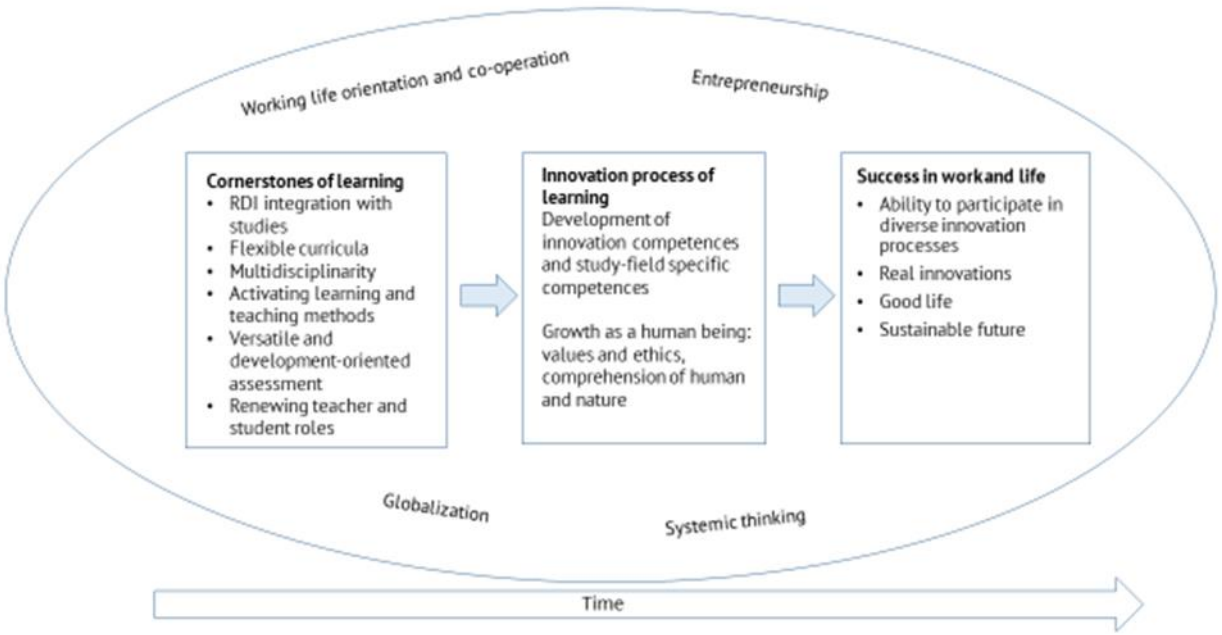

Figure 2. Innovation pedagogy in a nutshell; the cornerstones, process and aims

4. Implementing Innovation Pedagogy – Strategy and Organisational Culture

Implementing changes in the organisation can be viewed through the theory of the learning organisation. According to Senge (1992), a learning organisation is 'an organisation that is continually expanding its capacity to create its future.' In the increasingly changing environments, organisations and individuals working in them become ever more dependent on their ability to learn, which leads to the capacity to create. Acting in an adaptive way and being able to use information in an innovative manner when producing something new is characteristic of a learning organisation. They gain a competitive advantage when looking for information that cannot be bought anywhere. (Senge, 1990; Appelbaum & Reichart, 1997.) According to Senge (1992), the attributes describing a learning organisation can be presented in the form of a five-factor framework that consists of building a shared vision, personal mastery, working with mental models, team learning and systems thinking. The theory of the learning organisation has also influenced the implementation process of innovation pedagogy. In the following, we describe how the framework has been applied in innovation pedagogy.

When introducing a new way of doing things, for example, a pedagogical strategy for a university such as innovation pedagogy at TUAS, all the above-mentioned elements needed in building a learning organisation are helpful. In a learning organisation, decision-making is spread out to different people in the organisation. Top management is not considered as the only source of wisdom; instead, the whole organisation is supposed to be active in acquiring and interpreting information. The main issue is to create an atmosphere in which people are prepared to participate and use their potential as well as willing to learn from one another. (Heikkilä & Heikkilä, 2001.) According to Senge (1990), leadership in a learning organisation starts with the principle of creative tension. Creative tension comes from seeing clearly where the organisation wants to be the vision and understanding the truth about where it actually is current reality. In a learning organisation, the whole energy is used to work with creative

tension, moving the reality toward the vision. (Senge, 1990.) When introducing innovation pedagogy, the first aim was to work with creative tension by understanding what the surrounding working life required from graduates and comparing it with the actual way of carrying out education in different study programmes. The actual way of doing things had remained static for some time and the beliefs of the faculties did not correspond with the needs of working life. Something had to be done to reach the aim of educating graduates who were recognised also by the surrounding society. The process of recognizing the gap was not easy and entailed plenty of resistance and counterarguments from the faculties. The only way to make the change take place was finding trustworthy proof in the form of reports and interviews conducted with working life.

When building a shared vision, it is important to involve everyone in the working community, including students. Finding the right ways to implement real information exchange and dialogue is essential, as the vision must be accepted by all the people in the university; otherwise, it does not serve the function of a common goal for everybody. Trust and understanding between people can only be created if they get a chance to talk to and know one another. When working together, the members of the organisation start building a shared vision and develop the elastic glue that keeps the working environment together and also creates efficiency. When implementing innovation pedagogy, several joint workshops and other discussion forums were provided for the faculties First, the management tried to introduce their ideas too directly to the faculty, which was not a successful approach. The process required more mutual sense-making and collaborative development of the vision. Too often a strategy is described as a 'from top to down' activity, the management defining the goals and action plans which the employees will implement in their everyday work. According to our experiences, a successful strategy process in a higher education institution starts from collaboration with employees in strategy planning, and its implementation is measured daily in the encounters between employees and students. The vision as well as the strategy must be created together instead of being given from the management.

Organisations learn only through individuals who learn and, therefore, personal mastery is an essential cornerstone of a learning organisation. It is a situation where individual members of the organisation possess the skills they need to experience a feeling of mastering what is required from them, as well as the capacity for continuous learning when needed. People who are experts in their own fields make up the university setting; they most likely have accepted the concept of lifelong learning. They are very likely to have a good personal mastery of the core issues in their discipline. However, when implementing a new pedagogical strategy, such as innovation pedagogy, many new approaches are brought up, which may result in losing the feeling of personal mastery and increase anxiety. Creating an extensive training programme for the new approach has been proven to be a good way to maintain a sense of personal mastery. An organisation-wide training for all members of the university has led to good results first in introducing the principles of innovation pedagogy and later in sharing its best practices.

According to our experience, the mental models among people are extremely difficult to handle and form the main obstacle to creating a learning organisation. In a university setting, it is worldwide very typical to blame the students: They are lazy, lack knowledge, not interested, etc. The first thing is to identify and understand the existing mental models. Quite often the prevailing mental models are not based on facts but mostly rest on misunderstandings or involve false information acquired, for example, through gossiping. It is important to discuss the incorrect ones and provide people with facts. Changing old mental models takes time but can be done successfully with the persistent provision of information and discussions with people. When introducing innovation pedagogy, we managed to change the prevailing mental models, at least to certain extent. It required making the old beliefs visible and discussing these beliefs together in several joint meetings and other occasions. This generated a gradual and systematic movement in the right direction and the positive development created a positive cycle toward the desired direction.

Creating teams for taking care of different issues concerning the implementation of a new approach is a good way of engaging people. In such teams, people can share their ideas and get to know other people in the working environment. In team learning, the interaction between people from different

backgrounds is meaningful and natural because everybody in the team is committed to a mutual goal. Organizing work in teams saves resources and involves many different people in the working processes needed for implementing a new approach. Working in teams also encourages people to be involved in a constructive conflict, which again helps to build common mental models. Our experience has shown that being a part of a team can be experienced as rewarding and as something to look for and may by so doing increase the intrinsic motivation of those working in the organisation. Introducing innovation pedagogy relied on the power of teams by providing a forum where new ideas could be introduced. The most effective teams were multidisciplinary, consisting of people from different study programmes and including students.

A learning organisation will become functional only when its five factors are used together. Systems thinking is the factor that fuses all the elements needed to build a learning organisation into a coherent whole. The whole organisation is interconnected, and all the measures are taken to introduce a new approach influence each other. It is essential to understand how the actions are taken start from the understanding of the current mental models which create the current reality. Through a systemic view, plans can be made about how to build a shared vision and personal mastery. Systems thinking provides a way for teams to start learning about the issues that are the most important for the organisation. When implementing a new approach, such as innovation pedagogy, all the interconnected pieces must be considered, including the correct timing for every action. The process is the most likely to succeed when it is started in collaboration, 'from the top and the bottom,' simultaneously. It is important that the management understands the need for a change but, at the same time; the process becomes easier the more committed and enthusiastic people at the faculty level are.

5. Discussion

The process of creating a learning organisation is a never-ending one. The role of education is to provide society outside of the university with the kind of people it needs. As the world is changing at an accelerating speed, universities must be prepared to constantly monitor and acquire information about these changes and adapt their ways of carrying out education to meet the changing requirements.

Innovation pedagogy is a learning approach that is also evolving to meet the changed requirements. Its purpose is to present guidelines for carrying out education so that graduates will have the best possible chances to create a good life and success for themselves, for society and for the globe. This must be done with the understanding that 'a good life' also involves acknowledging the global challenges and acting to solve the sustainability crisis in our world.

At present, our western lifestyle is largely based on the use of fossil energy. Even though its destructive impacts are perceived clearly, the measures taken to prevent the ecological crisis are only in the beginning. The big challenge for all education is promoting an ecological civilisation (Heikkinen, 2019; Värri, 2018). This calls for redefining our understanding about competence-based education. The emphasis should be put on those competences that enhance innovations contributing to sustainable solutions and enabling a good life and sustainable future in general (Heikkinen, 2019.).

Focusing on the development of the concept of innovation pedagogy is useful in understanding how education development takes place gradually and how it can simultaneously respond to the demands of a sustainable future. This study extends approaches on research in education and innovation pedagogy and strengthens the understanding of innovation pedagogy by outlining concrete steps for putting innovation pedagogy in practice.

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