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Meiju Räsänen & Annariikka Kyllönen (eds.)

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Handbook for implementation

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INCODE

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Education and Culture DG
Lifelong Learning Programme

UNIVERSITAT POLITÈCNICA DE VALÈNCIA

Hochschule für Angewandte Wissenschaften Hamburg
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FOREWORD

This guide presents a new pedagogical method – the research hatchery – on a practical level. The research hatchery is one of the educational research, development and innovation methods (ERDIM) originally developed at Turku University of Applied Sciences (TUAS) and later by other universities as well. The guide offers experiences and implications relating to this learning method, which is part of the innovation pedagogy approach adopted at TUAS. The guide advises how to implement the method in practice step by step. The guide also brings up good practices and possible minefields of working with research hatcheries, and encourages teachers and the Research, Development and Innovation (RDI) staff to explore and apply the method in their work. Our aim is to show that the research hatchery can function as a useful pedagogical method for many different kinds of educational organisations.

The research hatchery method has also been applied in the project Innovation Competencies Development (INCODE), forming an essential part of the functions of the project. The project is part of a European strategy to face new challenges for Europe in the future – smart, sustainable and inclusive growth as priorities of the Europe 2020 Strategy lead to the creation of the Innovation Union, which aims to improve the framework conditions for research and innovation, and to ensure in this way that the transfer from innovative ideas into innovative products and services succeeds. There is an urgent need for future professionals who can contribute to the creation of the Innovation Union. These professionals are presently found in different universities and other higher education institutes all around Europe. It is an urgent task to raise a new generation of professionals whose conceptions of producing, adopting and utilising knowledge make innovative thinking and creating innovations possible.

The INCODE project strives to connect professional working life with professional education by enhancing innovation potential in higher education institutions. This way the successful integration of pedagogical knowledge into the innovation activities of working life can take place. The project aims at getting valid information about different competencies needed for the creation of innovations, and about how these innovation competencies can be reached and evaluated while research hatcheries function as the operational environment.

The guide sums up experiences from research hatchery pilots from INCODE partner countries. The descriptions of pilots with interviews of key players – students, teachers and RDI experts – show on a practical level, how teaching and learning can become more versatile and interesting to both teachers and students by applying this new method.

Turku, November 2013

The Editors

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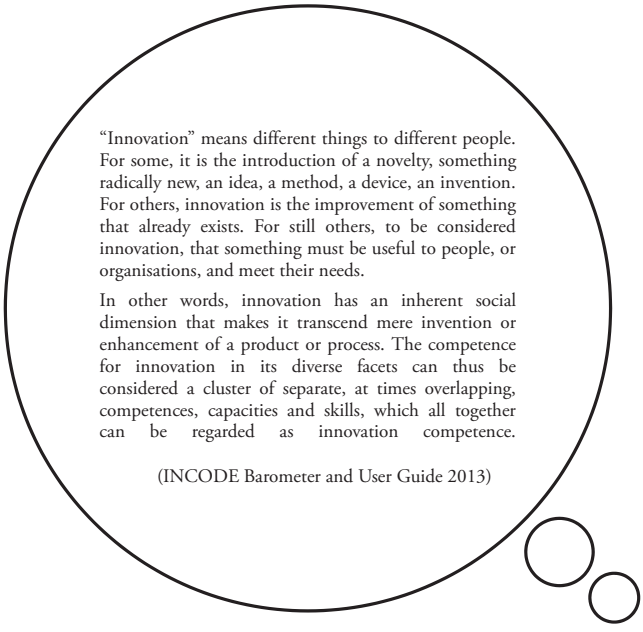
1 INTRODUCTION

Competence requirements for working life have changed in the past, and they will change even more in the future. Knowing what kind of competencies the future working life expects from professionals and graduates is essential for educational organisations. Education must be able to train future professionals so that the graduates have competencies to participate in tasks requiring cooperation and that are unpredictable and complex by nature.

In the current challenging economic and competitive situations, promoting innovations is even more important. This challenge does not mean only the development of innovations, but especially developing environments which can support innovation creation. Innovations can be defined and understood in many different ways. According to the general view, innovations are seen as creating new information and commercialising it. However, the majority of innovations are based on the utilisation of the existing information and creation of new combinations of this information. (e.g. Kallio et al. 2013). For instance, ideas for a product that may be considered irrelevant in one context can easily become successful in another. However, innovation development requires new methods and ways to act and think, enthusiastic people, and supportive environments. Thus, higher education institutions have a central role in grooming future employees.

Universities and other higher education institutes all around Europe have an urgent task to educate a new generation of professionals who can produce, adopt and utilise knowledge so that innovative thinking and innovation creation become possible. In addition to theory-based competencies, students need a different attitude and a desire to do things differently, open-mindedly but critically, in order to be able to succeed in working life. Education should enhance students' competencies and abilities to work in innovation-based environments. The development and application of new thinking and operational models in complicated and constantly changing circumstances require new kind of learning, its perspective transforming from memorising and

repeating towards learning that creates new ideas and applies them. Therefore, learning is not just adopting information, but also creating it. The studies must promote students' abilities to solve problems, apply and test theories and experiences, and create information collaboratively in multidisciplinary teams and networks. This requires changes in the traditional teacher-based learning culture and in the practices of how to evaluate learning.



Universities have different pedagogical strategies and practices to match the future needs and develop their students' working life skills. At Turku University of Applied Sciences, a new culture of learning, called innovation pedagogy, has been developed during the recent years. The role of education has traditionally been to provide knowledge-based readiness, which later should be applied in various innovation processes in working life. Innovation pedagogy introduces the development of students' innovation skills from the very beginning of their studies. In addition, innovation pedagogy aims to create real innovations during the learning process, and also to contribute to the development of such learning outcomes. Kairisto-Mertanen et al. (2011) have defined *innovation pedagogy as a learning approach that defines in a new way how knowledge is assimilated, produced and used in a manner that can create innovations*.

The core idea in innovation pedagogy is to bridge the gap between the educational context and working life. Learning and teaching processes are developed so that they provide improved competences for the students and enable personal and professional growth. Innovation pedagogy aims to produce learning outcomes that are both subject-specific and generic. The subject-specific competencies are specific to the field of study. The generic learning outcomes, i.e. innovation competencies, are the same for all higher education students and aim to create competencies needed when engaging with innovations. (Kairisto-Mertanen et al. 2011.) Innovation competencies are divided into individual, interpersonal and networking innovation competencies. Innovation competency as a learning outcome consists of knowledge, skills and attitudes that enable students to participate in innovation activities and contribute to creating innovations. (Kairisto-Mertanen et al. 2011; Perez-Penalver et al. 2012; Watts et al. 2013.)

The aim of innovation pedagogy is to generate environments in which competitive advantage can be created by combining different kinds of know-how – innovation competences being the key to introducing new competitive advantages based on know-how. The competences for innovation creation required in work places are developed during the studies in a multidisciplinary environment. The methods applied, and the way how teachers and students interact, constitute a base for learning and enable the forming of innovation competences. The methods used also facilitate intuitive learning during the learning process and make transmitting of tacit knowledge possible when dealing with working life. (Kairisto-Mertanen et al. 2011.)

A new culture of learning means changing universities' pedagogical practices and learning environments. This theme is also the core of the Innovation Competencies Development (INCODE) project, which is part of a European strategy to face new challenges for Europe in the future (Europe 2020). Innovation pedagogy forms the framework of the project. The project strives to connect working life with higher education by enhancing innovation potential in higher education institutions. Embedding pedagogical knowledge in innovation activities strives to offer a long-desired theoretical basis for developing knowledge-based competitiveness in the co-operation between working life and education. Up to now, there has only been a very limited amount of research-based information on the target competencies when wanting to educate somebody to be innovative. Furthermore, without any measurement tool it is hard to evaluate the present state of the education and

the learning outcomes it aims to provide. In connection to this, the INCODE project was aimed at getting valid information about different competencies and how these innovation competencies can be reached and evaluated.

The INCODE project developed and implemented a special measurement tool for higher education called *Innovation Competencies Development Barometer* (INCODE Barometer) and a special kind of learning and teaching method, the research hatchery. The key tasks in the INCODE project were to define innovation competencies and to create a measuring tool, the INCODE Barometer, to assess competence acquisition. Before the project, the existing assessment methods focused mainly on measuring an individual's knowledge-based learning. The interpersonal and networking competences, which are needed in working life, were hardly taken into account. However, the new barometer enables defining innovation competencies and their target-oriented development. In the INCODE project, the methods to promote the development of these competencies was also examined and developed, focusing on the research hatchery method further described in this handbook. The method provides added value when aiming to achieve the educational goals of the European Union. (Further information: http://www.incode-eu.eu/en/; INCODE Barometer and User Guide 2013.)

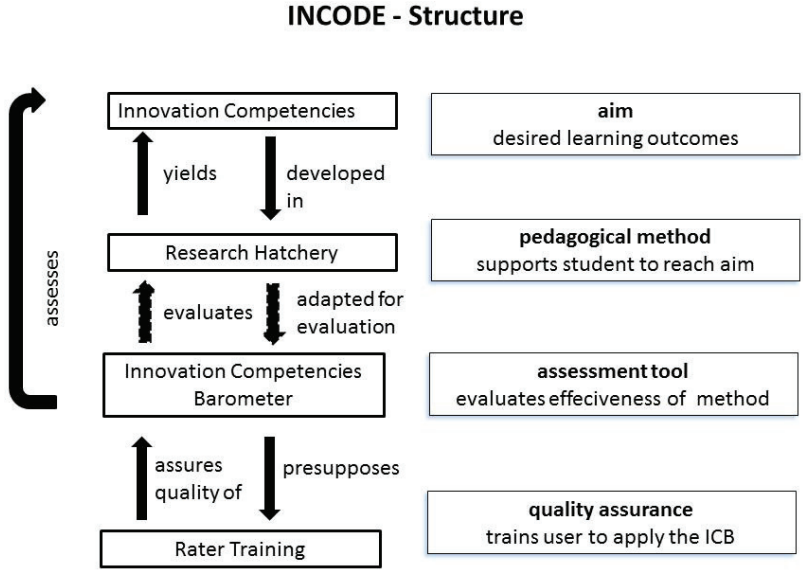


FIGURE 1. *INCODE project general overview (HAW 2013).*

This handbook focuses on the concept of research hatchery as a versatile learning environment. It provides two different perspectives. Primarily it functions as a guidebook for applying the method in teaching and also in RDI activities, but on the other hand it provides additional theoretical framework and description of context.

Chapter II – *Toward new types of learning environments* – describes how the understanding of learning and learning environments is changing. Additionally, the research hatchery method and its pilots in the INCODE project, where the method was implemented, are described in detail. At the end of the chapter, the data of the research hatchery interviews is also presented.

The handbook's main chapter is chapter III – *Research hatchery as a teaching method* – which offers a practical guide for implementing the method. The whole process is explained and practical instructions are given. The chapter also sums up the authentic experiences from both the teachers' and the students' point of views in the form of transcribed quotations.[1] The aim of the section is to show on a more practical level how the method can be introduced and used. Chapter III functions as an independent part which can be utilised as an independent guidebook.

1. Some of the spoken quotations have been slightly altered for grammatical correctness.

2 TOWARDS NEW TYPES OF LEARNING ENVIRONMENTS

A learning environment is most frequently understood as the physical or virtual surroundings meant and built for learning purposes. The concept of social and networked learning environment is often neglected in this discussion. However, in working life the way of working emphasises problem-solving, and innovations are created in groups and networks. In work places there usually are people from many different disciplines who are expected to work together efficiently. Equally, also the tasks in working life often require knowledge and skills which do not belong to the scope of only one discipline. The employees have to be able to learn from other and to be able to utilise the expertise and ideas of others. (Räsänen et al. 2013.) The understanding should be more often holistic in nature, combining areas from different disciplines. However, at the same time the subject-specific knowledge and skills should also have a central role in the final learning outcomes.

Thomas & Brown (2011) remind that memorisation, one of the basic staples of education, is not a bad way to learn about things that seldom change. However, as the world changes in an escalating pace, making knowledge stable is an unwinnable game. Additionally, in the new information economy, expertise is less about having a stockpile of information or facts at one's disposal and increasingly about knowing how to find and evaluate information on a given topic. In the new era of learning, people of all ages are learning by doing, asking fresh questions and working together to solve problems and seize opportunities. These principles should be reflected in the design and construction of new learning environments.

The emergence of new fields of know-how and new technologies has resulted in a growing awareness and recognition of alternative theories of learning. These theories see problems in traditional teaching and are often based on the principles of constructivist learning approaches. Based on these theories,

"learning is achieved by the active construction of knowledge supported by various perspectives within meaningful contexts". Also social interactions are considered important to the processes of learning and cognition. The learning environments that are based on constructivist principles require learners to work with others, to share the results of their work, and to reflect. In these learning environments, the emphasis is on learning how, instead of learning about. Some examples of these kinds of learning environments are problem-based learning (PBL), case-based learning, project-based learning, inquiry-based learning and role playing. (Oliver 2001.)

In the era of social and networked learning, the "network" component is vital in the formation of learning environments. It promotes and facilitates collaborative and cooperative connections. Networked learning environments provide "socially situated learner support through the active processes of dialogue, collaboration, and shared knowledge construction driving learning in social settings". Networked learning environments have many benefits, including "opportunities for participants to share their knowledge and expertise and to discuss, plan, reflect on, and explore learning issues, increased inspiration, innovation, and motivation amongst participants and social contact between individuals from different backgrounds, a reduction in feelings of isolation, and increased access to shared resources". (Petropoulou et al. 2010)

Student engagement is highlighted in current approaches to teaching and learning. Traditional learning environments, such as classrooms, do not necessarily encourage engaged learning. Finding answers and memorising facts do little to inspire students' passion to learn. Current views on learning confirm that learning occurs often in informal environments not even necessarily originally considered as learning environments. (Thomas 2010; Thomas & Brown 2011.)

The main points of the above theories relating to learning environments are taken into account in innovation pedagogy, in which they are functionally integrated in learning systems designs. In order to create something new and innovative, it is essential to share knowledge and expertise. In addition, innovation creation concerns freedom to explore new ideas and make mistakes and time for reflection. In innovation pedagogy, questions are more important than answers – and the learning environments are generated so that they enable applying theory into practice and simulating reality of the working life

in unexpected and surprising situations. Thus learning environments are not only based on classrooms. In the learning environments there are opportunities to collaborate in a flexible way across boundaries and in an atmosphere where it feels psychologically safe and acceptable to take risks and share experiences and mistakes, and learn from them. (see more Lehto et al. 2011.)

2.1 RESEARCH HATCHERY – A NEW LEARNING METHOD

A good example of educational research, development and innovation methods (ERDIM) and how to apply new types of learning environments is the research hatchery method. The learning and teaching concept research hatchery has been developed since 2004 at Turku University of Applied Sciences (TUAS). It is a concept for combining learning, innovation and research. It aims at narrowing the gap between the demand of professional skills and the acquired classroom skills of the students. The goal is to combine teaching and learning with research and development activities as well as serving the purposes of working life. The operational idea of the concept is to offer a functional learning environment where students, under counselling, can create new information with reliable methods by carrying out research and development assignments from their own university, companies and other organisations. (Kanerva-Lehto et al. 2011)

Research hatchery promotes collective learning, and it is based on the social constructive learning approach. There are also many similarities to the theory of shared expertise and organisational learning. It is vitally important that an organisation, when aspiring to continuously maintain its competitive advantage, also makes sure that the conditions for organisational learning exist. Sharing information and building trust are crucial parts of enhancing the innovation capability of organisations. (Manley 2008; Sáenz et al. 2009.) A research hatchery is a diversified team where there are different kinds of skilled persons. Every person has an important role in that system, and the participants all stand on equal ground. Bringing together experts from different fields, interacting with co-workers from diverse backgrounds and multidisciplinary teams generate possibilities for groundbreaking work when boundaries are set aside and solutions are looked for in previously underexplored areas. (Räsänen et al. 2013)

The actors of a research hatchery consist of students, student assistants, RDI experts and a teacher. Students' role is active and differs a lot from traditional classroom studying. They take on different responsibilities of the project and get credits for their work. Students study in small groups and more experienced students act as tutors for their group. Meetings organised at regular intervals aid in keeping different subprojects together. Learning occurs in different ways: through self-study, counselling and guidance as well as with the help of fellow students and more experienced project workers. (Kanerva-Lehto 2011 et al.; Kairisto-Mertanen, Räsänen, Lehtonen & Lappalainen 2012) Students learn by watching, doing, experimenting and simply absorbing knowledge from things, events and activities around the hatchery. Teacher's role is to be a coach and facilitator who creates learning environments which wake the students' capability to question and understand.

In the research hatchery, the social aspects of working and learning are emphasised. Group processes, where learning happens, form an essential part of the whole process of learning. The hatchery groups are formed by people with different talents and competencies and by the interaction enabling collaborative learning. Learning takes place in different social relationships and in collaborative situations where each and every individual brings his previous knowledge, history, experience, intuition, expertise, know-how, creativity etc. to the table. The work done in hatcheries is usually divided among participants, but at the same time the aim is to construct a shared outcome. In other words, this kind of studying involves both cooperative and collaborative learning. Furthermore, hatchery tasks are usually planned so that they could not be performed without the common efforts of the participants. (Räsänen et al. 2013.)

The working methods of research hatcheries approach practices of working life, as they resemble points of problem-based, progressive inquiry and project learning. Every hatchery is like a project that has clear goals, schedule and resources, and they are usually long-lasting by nature. The method increases students' understanding of diversified projects and capability to see their own and others' roles as part of the whole work. Indeed, during research hatchery studies, it is possible for students and teachers to try out different working routines and make mistakes and learn from them.

In the research hatcheries learning outcomes consist of knowledge, skills and attitudes which enable students to participate in innovation activities and contribute to creating new social, technological, ecological or commercial innovations. Studying in research hatcheries results in active learning in a project, which requires commitment, motivation and responsibility but on the other hand offering freedom to work and fulfillment in itself. It teaches creativity, problem-solving skills and how to cope with chaos. The students learn to recognise their strengths and weaknesses, to develop and deepen their know-how and to put their earlier learning in practice. These are skills that cannot be learnt by heart or directly from books; these are skills that need practicing, and need to be learned by doing.

2.2 RESEARCH HATCHERIES IN THE INCODE PROJECT

As stated earlier, the research hatchery method is a diversified learning environment, offering great learning situations for all actors of the hatchery. Therefore, the concept was selected for piloting in the Innovation Competencies Development (INCODE) project. The pilots' purpose was to act as a test environment for the measurement of the students' innovation competencies, and to develop and distribute the new learning and teaching method further.

During the project, one or two pilot rounds were organised in every partner university of the project[2]. In these pilots, the research hatchery concept was used in two or more small groups. One of the main ideas of the research hatchery is that the themes of the hatchery spring up from the needs of the real world. Therefore, research hatcheries were organised as part of the universities' existing activities, such as RDI projects or curricula. All in all, a total of 23 research hatcheries took place during the project with altogether nearly 60 students (see Table 1).

2. From Finland Turku University of Applied Sciences (TUAS), from Spain Universitat Politècnica de València (UPV), from Belgium Karel de Grote Hogeschool (KDG) and from Germany Hochschule für Angewandte Wissenschaften Hamburg (HAW).

TABLE 1. *The research hatchery pilots in the INCODE project 2012–2013.*

Pilot round	University	Topic of hatchery	Number of hatcheries	Number of students	Credits per student
I	TUAS	**Developing underpinning** part of RDI project FIN-C2M	1	6	2–3
I	TUAS	**Developing network of environmental knowhow** part of RDI project eGreenNet	1	5	3
I	UPV	**Developing efficiency of an organisation** case – Animal protectors association part of curriculum	2	5–6	3
I	HAW	**Workplace Health Promotion** part of curriculum	5	3	5
I	HAW	**Food product development** part of curriculum	4	3–4	5
I-II	KDG	**Small business project (The Company)** case – window gardening case – redesigning cycle bags part of curriculum	2	10	8
II	TUAS	**Reed biomass as local bio-energy and building material** part of RDI project Cofreen	2	7	3
II	TUAS	**Management of onshore cleanup operations of oil spills in archipelagos** part of RDI project ARCHOIL	1	5	2
II	HAW	**Marketing Strategy for organic food retailers** part of curriculum	2-3	5	5
II	HAW	**Development of a training-manual for cooks in residential care homes for the elderly** part of curriculum	3	5	5
In total			23–24	54–56	41–43

Every hatchery was unique in terms of theme, participants, extension, realisation and success. For instance, some of the counselling teachers had never before used the teaching method in question, while for others the method was an essential part of the curriculum. Also the themes between the hatcheries varied a lot from construction engineering to health care, marketing, entrepreneurship and business. Many hatcheries were diversified, and in some hatcheries there were also exchange students. This enabled integration of different knowledge and know-how.

There were also differences in working methods. In some hatcheries, research was more emphasised, while others concentrated more on courageous idea development – in some hatcheries even innovative new products were created (see Pictures 1–2). As a baseline when selecting the pilot subjects, the diversity and the application opportunities of the teaching and learning method were emphasised. Also, the term *research* was used in a flexible way – within the scope of this method, the term does not refer to the scientific activity but to deeply familiarising oneself with a certain topic. Although as diverse environments as possible were selected for the pilot subjects, all of the hatcheries had shared goals and baseline concerning the realisation of the concept.

PICTURES 1–2. *New products created in KDG research hatcheries (see Table 1).*

2.2.1 Research hatchery interviews

To draw information about the experiences relating to the research hatchery method, interviews were conducted among partner universities of the INCODE project. From every university participating in the project, one

or two research hatcheries were selected for an interview. Both teachers and students from the research hatcheries were interviewed. Altogether 13 interviews were made, of which nine interviews were recorded and four students commented on their hatcheries in writing. Altogether five teachers and 13 students were interviewed (see Attachment 2). Teacher interviews were individual interviews and the students' interviews were group interviews.

The goal of the interviews was to examine the functionality of the teaching and learning method more profoundly, to bring up the voices of the different persons in key positions and to summon up valuable knowledge of experiences. The interviews were semi-structured/theme interviews (see Attachment 1). The interview questions were sent to the interviewees beforehand, and after the interviews the interviewees also had the opportunity to add to their answers later. The interviews were recorded for gathering data and all the interviews were transcribed. The data was analysed using thematic analysis.

The aim of the interviews was to gather more experiences and highlight the main points of the method. In this guide, these experiences are presented to give life to the description of the method. Also good tips and practical advice from real experiences are presented at the same time. The guide encourages new teachers and RDI personnel to explore the research hatchery concept by applying it in their work. In other words, it is hoped that the research hatchery concept will act as a pedagogical innovation for different educational organisations.

3 RESEARCH HATCHERY AS A TEACHING METHOD

In this chapter, the research hatchery method is presented on a practical level – how the method could be used in teaching and applied as part of an RDI project. Working in a research hatchery could be described as a teaching and learning process. In this chapter, the method is presented through different parts of the process (see Figure 2) which are described in detail. The process can be divided into four main cycles: planning phase, initiating phase, working phase and closing phase. The following description offers an example of the phases and what they could include when the research hatchery method is implemented in teaching. In the end of every phase description, there is a checklist for the person guiding a research hatchery. The advisory course of a research hatchery presented here is only a directional presentation, and the way a research hatchery is implemented can vary and is dependent on the case in question.

3.1 THE PLANNING PHASE

The planning phase starts with defining the subject and topic for the research hatchery and building a team. Defining the problem is an important part of the process, but there is no rule on how it should be done. Research hatchery subjects arise from real-world needs for new information. The topics could be linked to university's RDI activities, or similarly the client could be any company or organisation whose problem the project aims to solve. The topics of a research hatchery can vary; they can be for example about creating new social, technological, ecological or commercial innovations. In the pilot research hatcheries, new innovations were created in the form of project outcomes, teaching practices and group work methods. The main point is that the students work with a real case. The real experience makes the students think how they would solve problems and challenges in real-life situations, enabling students to understand the real problems in different organisations and to bring theory into practice.

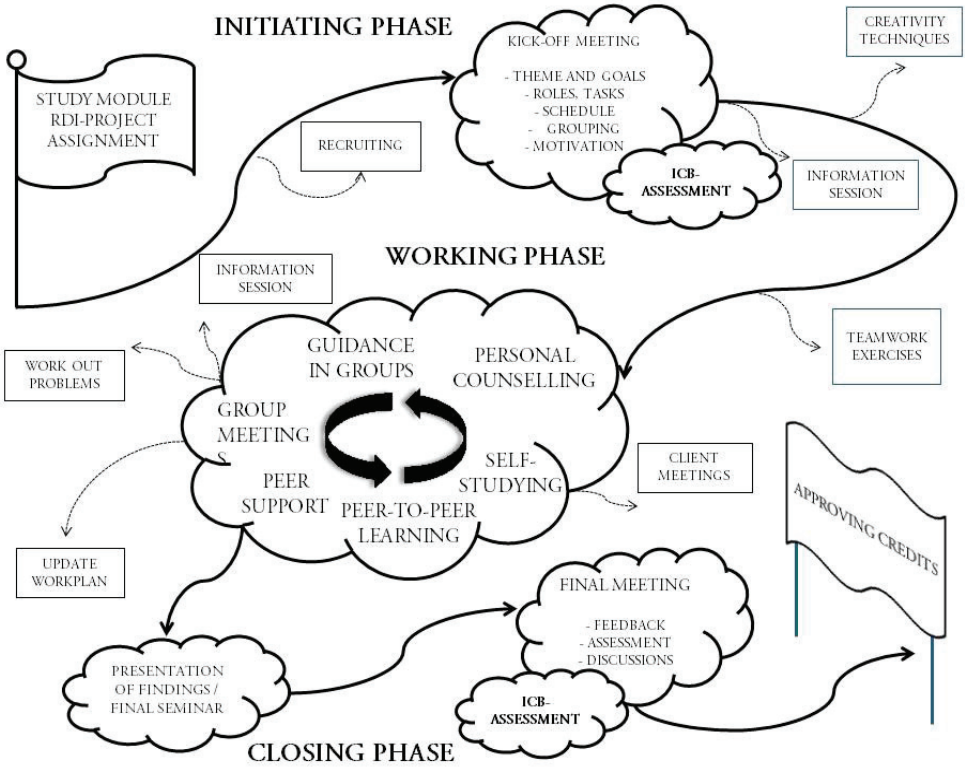


FIGURE 2. *The Research Hatchery as a learning process.*

It is important for a teacher to take different factors into account when selecting an appropriate project and outlining the research hatchery subject. When defining the topic, the teacher should bear in mind that if the topic is too open it can result in frustration, and then again if it is too narrow, it can hinder the creativity and ideas. The subject of the hatchery is one element in creating student involvement. When students feel passion for the topic, they will seek out the tough problems rather than the easy ones, and work harder to solve them.

"I would definitely recommend the hatchery method, because in school environment you also have support of teacher and some other students who have experienced it, and I think you are much better prepared for real life in the industry." S7

"Compared to non-research hatchery studying this is such a nice way to learn skills for real working life." T1

Some practical preparations also need to be done in the planning phase. In addition to defining the topic, also the key persons (teacher, RDI expert, tutor student) should be selected. The key persons' tentative roles and responsibilities (see Figure 3) and resources, i.e. working hours should be defined in the planning phase, adjusting them according to the timeframe and work load of the chosen topic. Lack of time may create frustration. However, time management is also an important skill to learn in preparation for working life. Before starting to market the project and recruit the students, it should be defined how much student work the project approximately requires, how many credits students will get and the number of groups and students needed. Practical arrangements, such as reserving the studying space, need to be taken care of as well.

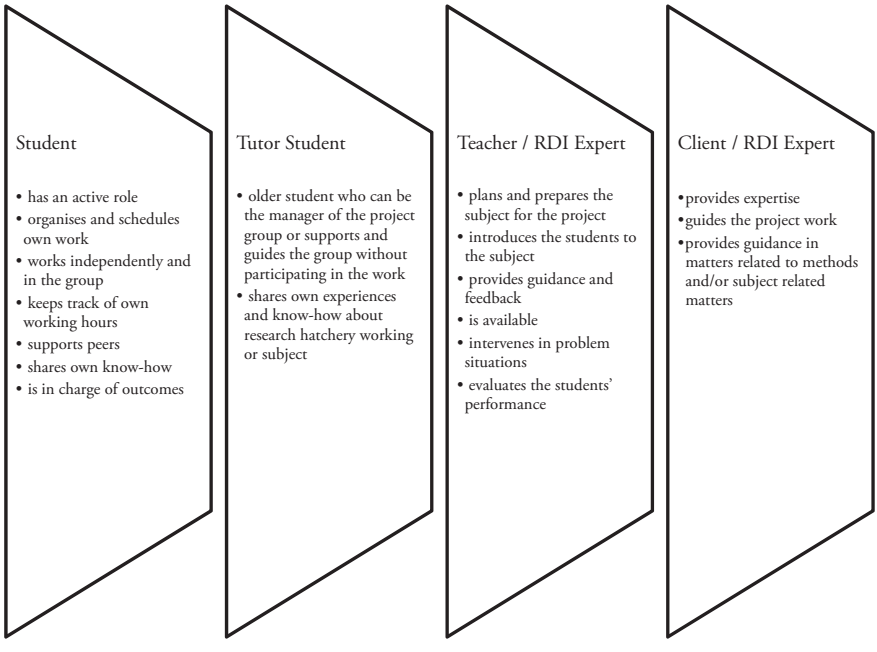
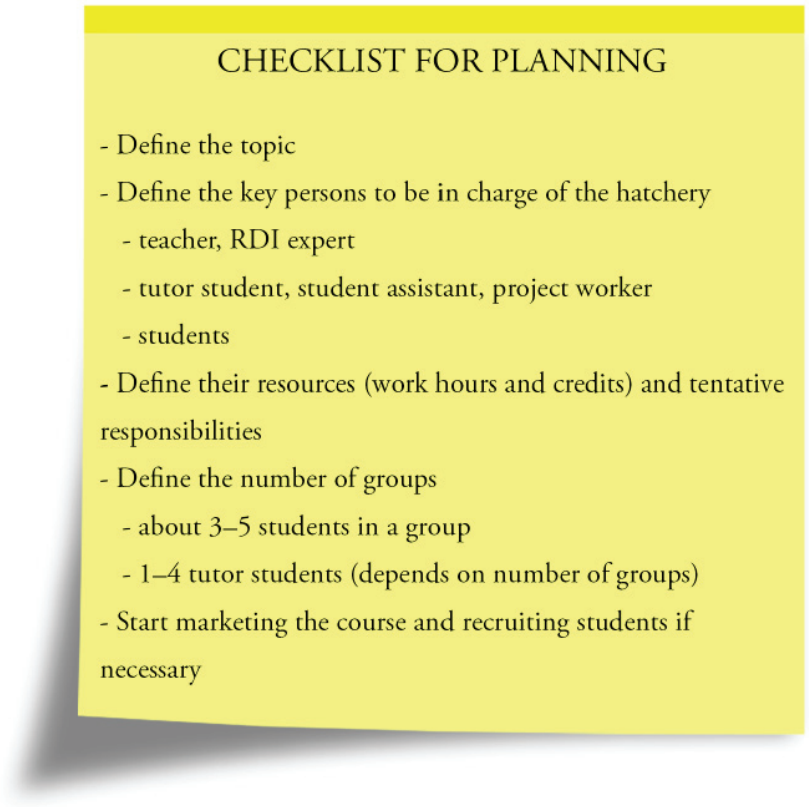


FIGURE 3. *Participants' roles in the research hatchery.*



3.2 THE INITIATING PHASE

After initial arrangements the work is started with kick-off meeting(s). This phase has a very important role in the hatchery work as a whole, because in it the framework of the project is created and the students are motivated and committed to the project. The aim of a kick-off meeting is to introduce students to the research hatchery method and the topic of the hatchery – how the project is implemented as well as what the objectives and what the appropriate working methods are. It is important to agree together upon the common ground rules for the work. One thing is to set a schedule for the whole project, for the individual work and for the group work, and to agree on dates of regular meetings in order to keep different subprojects together. On a more specific level, students organise and schedule their own work, learning time management at the same time.

In this phase, it is appropriate to define a work plan according to which students' roles, responsibilities and tasks are distributed. Students should realise that everyone has an important role and a sphere of responsibility in the whole project; someone else's work may be dependent on their contribution and their ability of fulfilling commitments in time. An essential part of the start of research hatchery work is to define common rules for the work, such as meeting procedures, attendance and working hours reporting. The rules should be clear, binding and fair to all of the participants in the hatchery. This way, it is easier to avoid possible disagreements.

Evaluation of the students should also be discussed in this phase. Evaluation is not that straightforward in a research hatchery where learning occurs on many levels. It should be defined if evaluation is focusing on formative (process) or summative (outcome) evaluation and whether it will take into account the individual and group levels. Thus, defining the learning objectives in the beginning and discussing the evaluation methods is recommended. The INCODE Barometer can be used for evaluating innovation competencies in the research hatchery. The barometer also functions as a tool to increase the understanding of innovative approach and thinking. (The INCODE Barometer can be found at http://www.incode-eu.eu/en/).

> *"It was positive that the INCODE Barometer gave us an enhanced awareness for innovation. Students accepted the role of innovators. And the items [of the INCODE Barometer] made clear which skills and behaviours are useful and necessary" T3*

Familiarising with the topic

After the kick-off meeting, the group continues familiarising themselves with the topic. The teacher's role is to find out what the students already know about the subject by doing some exercises or discussing it. After that, students have the chance to look for more information about the subject and deepen their knowledge. Information retrieval could be divided into

different approaches. Depending on the research hatchery subject, it is possible to use some creativity techniques or brainstorming sessions to promote working. Brainstorming and creativity techniques are good ways to achieve an atmosphere of innovation in the project. To allow innovative ideas, all kinds of suggestions should be allowed and not hinder the ideas in the beginning. In some cases, extra information sessions could be needed. The sessions could be inspiring lectures, some detailed information about the subject or project work (eg. information session about IPR issues, patents, agreements or an overview on project management, project work, group work) or a meeting with the client. It is often good for students to have some theoretical basis related to the subject in question before a research hatchery project starts. This can support knowledge accumulation and thus make knowledge more applicable.

"With the brainstorming, don't stop after one session, do it maybe in a couple of days in another environment, something new can just spring in." S7

"Don't be afraid to create crazy ideas." S3

It is important to keep in mind not to look too early for solutions, but to allow enough time for the topic to be processed and developed. The teacher should be flexible to adjust the topic if needed and also give the students the opportunity to outline it further. It is important to get to know the group well in the beginning. If the strengths and weaknesses of the group are known when further defining the topic, facing the subject can be easier and thus make the whole work process smoother. However, it is part of the process that students feel somewhat confused in the beginning. They should be told that it is a natural part of this kind of a working process.

"Certainly this form of work is exhausting. Sometimes it is a bit frustrating because there are moments of depression, but it is very encouraging when at some point it looks like things evolve for the better quickly. The key is to be confident that sooner or later emerges an idea that removes the obstacles preventing a flood of ideas." S11

Attitude towards challenges is also an important aspect to be considered. Challenges should be tackled as they come, trusting that the answer comes when the problem arises. The participants learn to get up when they fall, and to trust the process and adjust to the situation. The solution how to face an upcoming challenge can be giving a lecture about the particular topic, providing tools that are needed or consulting the client for required information, for example. It is also important to be able to continue even if all required information is not available, to be able to operate even with inadequate information. Challenges and problems may be the driving forces of a project if they are encountered in an open, constructive way. In a way, innovations are about solving problems.

> *"Small inventions, small new products that everybody says "I could have done this". It is always interesting when many people say "yes, I could have done this" and then it's a success for us, because then the first year students will have the confidence to say "if it's that kind of thing that is expected from me, I can do this, and even I can do this better."" T2*

PICTURE 3. *Familiarising with the subject in UPV research hatchery.*

Forming a supportive atmosphere

In order to achieve fluent work in the group, it pays off to spend enough time in the first meetings to form a trustworthy and supportive atmosphere. The teacher could use, for example, some teamwork exercises improving the group dynamics. It is very common for teachers to start their lessons the ”subject first” teaching style. In the research hatchery, the work is started with building a supportive atmosphere, because learning together is more important than the actual content of the work. An open atmosphere increases also the participants' motivation and commitment. The research hatchery teams rely on everyone to understand that their success as individuals creates something that amounts to more than the sum of its parts.

> *“You should try to learn during the whole process and not focus just in the result you want to achieve but also in how you get that result. Communication, creativity and interaction with all the members I think is the key.” S10*

Freedom is an essential part of the learning process in a research hatchery. There should be the right balance between freedom and guidance which should be adjusted according to the circumstances. This requires getting to know the students and the dynamics of the group and being sensitive to notice the changes and needs of the group in the different phases of the process. In some cases more guidance ends up with best results, whereas in others almost total freedom given to students to develop the project can result in something unexpected and very

> *“Learning more and more to trust that you don´t have to guide everything. You just show the way and then student are going that way. Because it's not so easy to let go. Teachers like me are also used to the old kind of methods so maybe I learned again more about just that the students are very wise and good and you can trust that they are doing a good job.” T1*

innovative results. It is important that students are given the freedom to make suggestions and to develop the project themselves and that not too strict expectations of the outcome are presented. There should be the possibility to let the project develop to unforeseen directions and be implemented in different ways best suitable to the task and results. Students learn by doing themselves, also by making mistakes or struggling and by trying to solve the situations themselves – they should be given frameworks but not be guided every step. It should be acknowledged that freedom may also bring dysfunction, like unwise ideas or less contribution from some members of the group, and the teacher should be prepared to give support to solve the issues if needed. All in all, it is very important that the project is seen as a learning process. One of the strengths of the method is that it is about learning by working.

CHECKLIST FOR INITIATING

- Introduce the subject and the research hatchery method
- Define goals and learning objectives together with students
- Agree on subprojects, responsibilities and roles
- Form small groups if needed
- Agree on rules, timeline and meeting dates
- Arrange at least one meeting per week (regular meetings or steering events)
- Schedule the meetings so that everyone can attend, only for valid reasons one can be absent
- Use teamwork exercises to form an open atmosphere
- Use brainstorming or inspiring lectures to familiarise the students with the subject

3.3 THE WORKING PHASE

> *"If you compare this kind of working with our traditional classroom teaching, you have to be much more flexible as a teacher and as a student, because when you're doing this kind of project, all things come up that are not foreseeable." T2*

When the project has been initiated properly, the cyclical working phase will follow. In the research hatchery, working and learning occur in different ways: through self-study, counselling and guidance as well as with the help of fellow students and also more experienced students. After initial meetings, students will start working independently or with a group depending on the nature of the subproject. Students keep track of their working hours and what they have done (e.g. information retrieval, meetings, negotiations, planning, reporting). Although the frames for the work are created and principles of action are agreed upon in the beginning, the working should be flexible and independent.

Flexibility is needed of both teacher and students. Research hatchery means facilitating learning in a new way, by not offering ready-made answers but empowering and motivating the students to work for the goals and to take responsibility. It is about learning to let go of control and trusting the abilities of the students to solve the problems and create their best ways of working. It is important how the teacher relates to the method; teacher should be open and interested in developing and trying out new methods and facing new situations. The process also requires quite a lot of involvement. Even though the research hatchery, especially in the beginning, might bring more work, it adds to the participants' expertise and improves the learning of the students.

PICTURE 4. *Group work in a research hatchery.*

Group work

The work in a research hatchery can be arranged in different ways. The subject of the project may define the way of working or the group dynamics may require some elements. First off, some of the work in research hatcheries is done independently. An individual student then works as part of a group and the group works together with an outside party. Both the individual and the group are part of a larger network. The balance between the different ways of working should be considered to best serve the purposes of the project. It is important for the people working in a research hatchery to

> *"I would advise that you always need to be in good communication with your team and just be honest with each other, listen to different opinions [---] It's normal that there is a lot of differences in the group but what it does is make it to a better team, differences can be solved by listening to each other." S7*

acknowledge the dynamics of their different roles in the whole process. The teacher does not really participate in the group work, but has an important role in supporting if there are problems in the group work. The teacher is more of a facilitator and provides frames for the project.

> *"I think the main advantage of working this way is that the interaction with other ideas causes an evolution of ideas." S11*

When the work is done mainly in groups, the ideas are shared more, everyone's opinions are heard and the group can reach a result that everyone is content with. It is also good to offer help to each other if someone is struggling to complete individual assignments. When working together as a group one also learns to distribute responsibility away from oneself, to delegate, to let go of control and trust the group and other members with their own responsibilities. Communication is often a challenge in project work, as there has to be real interaction. Working together is good for learning communication and sharing of information. Group work is one of the main skills to learn and often also quite a challenge in hatchery work. Working with different kinds of people will inevitably be part of real life situations; thus learning how to solve interpersonal conflicts and improve group dynamics is an important skill to learn. The project is real, and the dynamics between members and arguments can get more intensive because of the pressure the real situation brings. The aim is not to just do group work, but to really learn how to work in a group and be involved in it.

> *"It's a very good thing because they complement each other. People with a lot of work experience also have a lot of flexibility, and maybe people who never have worked in such a situation have a naive way of thinking that also improves the group, because they may say things that they don't know are inappropriate but maybe generate something that in another way couldn't have been raised. So for me it's very important, this multidisciplinary nature of the work." T5*

Independent work and work in small groups are framed with regular meetings, where the whole hatchery group is present. In the regular meetings students present what they have done, and hatchery participants discuss the subject and work out problems. Also the work plan can be updated if needed. Although the common regular meetings are very important, it is good to organise meetings only for the students sometimes, because in these meetings the atmosphere is usually more open and rich for new ideas. The meetings and sharing of information can take place also outside the university. For example cafes and virtual environments are also practical spaces. Different locations outside school hours may advance the development of ideas. The method could also be applied to virtual studies. This would allow also international research hatcheries, where work would be done online. This could be one of the ways how the research hatchery method could be developed and applied in a new way.

In research hatcheries, it is not necessary for everybody to know and learn everything in theory, but one aspect is that the students get to apply their own knowledge and expertise in practice according to their roles and tasks. There is also forming of shared expertise and students can teach each other resulting in peer-to-peer learning. In this kind of studying, students learn both content and tacit knowledge by discussing and observing other participants of the hatchery. The group should be seen as a resource for the project which enables each other's know-how to be available to others. That is why it is valuable to have groups which are versatile, for example, from their personal background, age, gender, previous knowledge and experience and field of study. A diversified group brings benefits in the form of different points of view which can complement each other and improve the group's thinking and help in reaching the goals.

"Some people with a lot of experience may think they know a lot and some people may think they know nothing – both are wrong because nobody knows everything and nobody knows nothing. They have to adjust." T5

Like mentioned above, versatility in the group creates conditions for new ideas to emerge. However, with a very diversified group there might be more challenges that should be taken into consideration. There might be practical and organisational difficulties such as time management and coordination of

the work and, importantly, it should be considered that more time might be needed for integration of the group. Diversity also brings challenges, because expectations of people differ and reaching agreements might not be so easy. People have to adjust, and it is important to pay attention to the group dynamics.

> *"Yes, our group was multidisciplinary: we have from business persons to engineers passing by architects. And this was very valuable because each one has a different view of the problem. The challenge is having to arrive to an agreement in some cases. I think that when a team is multidisciplinary it is better because you can see the point of view that you would never think about." S10*

PICTURE 5. *Studying together in KDG research hatchery.*

Guidance and support

One of the main differences of the research hatchery learning method compared to ordinary lecture teaching for the students is that they have a great opportunity to get guidance and support in multiple ways throughout the process. In addition to guidance and support from the teacher, the students get it from more experienced students who act as tutors for their group, and also peer support is always available for participants (see Figure 4). The students can also be supported by arranging lectures from outside speakers who have experience in the field and organising visits to the real world partner's facilities to give back-up to the work. All of these networks that are formed in the process provide support to the work.

> *"To trust the students that they are creative and good. Try to be there for them as much as possible [---] just be available that is important also." T1*

So even if research hatchery method gives more freedom to the students, there is also more guidance and support available when needed; freedom is not contrary to coordination. If it seems that the freedom results in frustration, it is important to make note of it and offer some more guidance. Students need the feeling of success and not of frustration, even if this method overall demands more self-direction and activity from students. Teachers in research hatcheries can get support from more experienced colleagues, from the working life partner and from the university that provides facilities and practical support. The university, or in some cases the outside partner organisation, needs to be supportive and flexible to adapt to a new kind of method – so that rules and policies allow it.

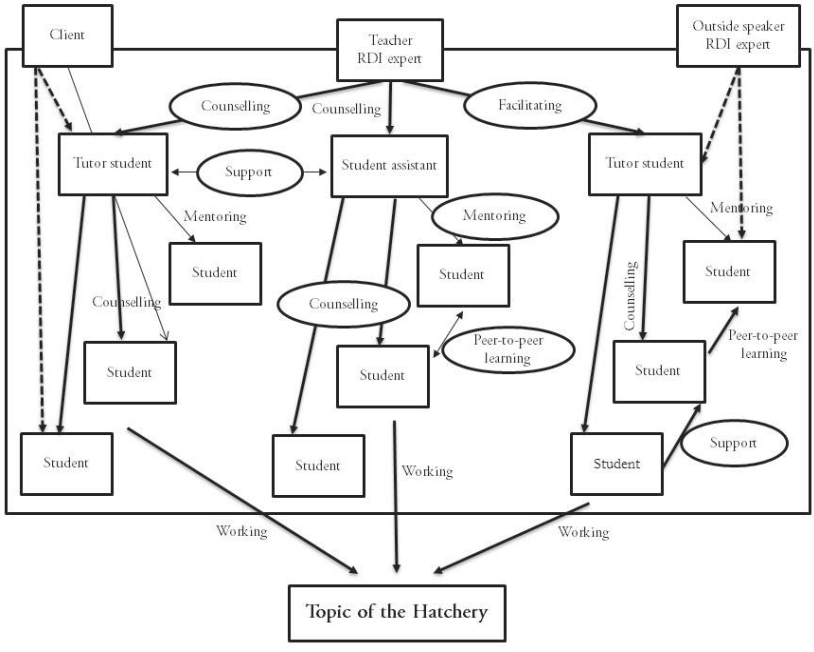


FIGURE 4. *Counselling and support are also an essential part of research hatchery work.*

Networking

Working life connections and networking on different levels (see Figure 4) are an integral part of the research hatchery method. Networks are used more and more because not everything can be done alone. Students learn how to make connections and thus gain confidence, getting more comfortable to speak to people – even if getting taken seriously as a student talking to someone from outside with more experience can be a challenge.

Connections to working life improve networking capabilities. Examples of networking approaches are e.g. use of the LinkedIn network, to have inspirational lectures, a dream coach (a teacher of some other subject to prepare and support in contacting) and networking events where students get the opportunity to have contact with real life situations. One part is the networking between the students to improve their communication and teamwork. Another part is the contact with the outside organisation for which the work is done. Even if that organisation would not directly be a valuable

link for a future career, the networking skills improve in the process. Also there may be existing relationships that could be involved in the project. Working with a real life connection also demonstrates to students the importance of information, how to get it and how to use it for the benefit of the project. Connection to real life also brings motivation which results in being more involved and learning more.

> *"They [students] start using LinkedIn for this project. Say, we have a problem with plastics, anybody here who could help us with this? Then they get a reaction from within the LinkedIn company network. And in this network we do not have only the students, we have external people from companies or people who are sympathetic to this approach. And they help them." T2*

The working phase is cyclical. The same steps are repeated several times: group meetings, guidance in groups, personal counselling, peer-to-peer learning, self-studying. Also the learning goes through cycles and new information is built on former knowledge. There may be frustration and confusion also in this phase, which is normal but good to acknowledge. Research hatchery type of work can feel exhausting because of these moments of frustration, but it is also rewarding with moments of encouragement and flow.

CHECKLIST FOR WORKING

- Be available and flexible
- Act as a mentor or a facilitator
- Monitor how the timeline, planned actions and goals are going
- Adjust and solve problems immediately together with the group
- Give guidance and counselling
- Trust the students and the process and encourage students to trust themselves
- Reserve the space for regular meetings

3.4 THE CLOSING PHASE

When the work is coming to an end, it is important to finalise the research hatchery process. In the closing phase, presentations of findings and feedback discussions are the main elements. The teacher also makes sure that students return every task, report and working hour follow-up, assesses students and gives marks for the study attainment.

The presentation of findings can be, for example, in the form of a seminar presentation, final written or video report, depending on the assignment. For students, presentations of findings are a good way to develop reporting and presentations skills and train seminar practices. And for the whole research hatchery, it is a good way to sum up the results of the work. This meeting is also a great opportunity to invite the client to hear the results and give feedback of the work. The final meeting can also be organised as a seminar for dissemination of the results of the project and other teachers, and students or otherwise interested parties could be invited to the seminar as well.

"Here students learn a lot of things that are impossible to learn in other environments. They learn to work together, they learn to work with unexpected results, they learn to gather information, they learn to interview people, and help them to see what the problems are, they learn to define problems, not only to solve them." T5

In a final group meeting, it is good to discuss together and assess how the planned timeline was held, how the project succeeded, how the group succeeded overall and individually, and what was learned. It is also valuable to think together what should be considered next time, how the work process could be improved upon and how the learning objectives were achieved. The project may also raise further questions and suggestions, which could be outlined as a basis for future research hatcheries.

"To be open-minded, leaving away the stereotypes and trying to learn from both the process and peers." S12

Especially in this kind of a learning method the assessment and evaluation should be more dialogic and support development (INCODE Barometer can be used as basis). For students, it is important to get verbal feedback in addition to a grade. The feedback can be given together in a group, in small groups and personally, and it should be compared to self-assessment. In the research hatchery, students should be better aware of what they have learned. They should not just see a mark from an exam, but know they can solve a real life problem.

"Just do it, as they say, because you learn a lot, it's not always easy but you get stronger because you have more knowledge about these things." S5

CHECKLIST FOR THE WHOLE PROCESS

- Agree on clear goals and learning objectives
- Use enough time for teaming and getting to know the subject
- Give support and feedback
- Find the golden mean for guidance and freedom
- Emphasise the role of communication
- Be flexible and ready to change, and have open mind
- Tolerate failures
- Trust the process

4 RESEARCH HATCHERY AS A CRADLE FOR NEW INNOVATORS

In the previous chapters, the method and experiences of the research hatchery have been presented, and different characteristics and working phases have been described. This guide has brought up good practices and possible traps of the research hatcheries to encourage new teachers and RDI experts to explore the concept by applying it in their work. The examples of practices are hoped to increase consciousness for such approaches and provide good pedagogical practices to other educational institutions. The interviews show that learning in the research hatchery differs from traditional learning environment. There were many challenges and different learning situations that were faced in the process of working in a research hatchery; however the overall experience for the majority of participants was positive. All of the teachers and students who were interviewed would recommend the method to others.

> *"I'll absolutely recommend this method for all the subjects where it could be implemented. It's a funny and motivating method and I feel I've learned more from these tools, implementing them to real situations." S12*

Reaching innovation competencies

Research hatchery method requires a new kind of thinking from teachers and students. It is about "unlearning" old habits and ways, and learning new skills for teaching and learning. The method challenges the teachers and students

to learn new roles as a teacher and a learner compared to traditional teaching methods with lectures and exams. It also challenges teachers to combine RDI projects and working life situations more closely to students' every day work in the studying environment. The method shows how the desired learning outcomes can be reached in a different kind of learning environment, and how the students can gain insight themselves, instead of just being presented with information.

In addition to subject-specific learning outcomes, the overall learning objectives of the method could be divided into individual, interpersonal and networking innovation competencies (Kairisto-Mertanen et al. 2010; Perez-Penalver et al. 2012; Watts et al. 2013). Ability to find, utilise and apply information, ability to work in a group and networking capabilities are examples of innovation competencies. Research hatcheries are ways to turn above mentioned challenges into possibilities: students also learn to manage unexpected situations and to manage stress, to see mistakes also as a possibility to create new as well as to notice the real benefits of group work and the multidisciplinary approach, for example. Teachers might learn new teaching skills, techniques and methods that are less traditional, but also another aspect for a teacher is to learn not to be too involved in the project, but observe it more objectively as it advances and to be able to close the project. It is also important to acknowledge that the learning outcomes themselves are often the most important thing while using the method – the results of the project being secondary, even though most often they are what motivates and drives students to do their best.

Motivation – essential ingredient in creating innovations

The interviews indicate clearly that working in a research hatchery is motivating. For a teacher, it is motivating to see the students gain experience and become more self-reliant and confident. For students, the motivation comes, among other things, from working on a real assignment, responding to a real need, for a real-life partner and seeing a happy customer in the end. The motivation also comes from applying theory into practice, but also from the opportunity and freedom to create and develop own ideas and see how the ideas become concrete. Co-creative efforts of the group, sharing of ideas

> *"Motivating teacher translates motivation to the students." T5*

and discovering everyone's strengths that benefitted the project are also seen as motivators. Motivation is an essential ingredient in creating anything new, solving problems and being engaged to the task.

The aim of the research hatchery method is to enhance innovation competencies, e.g. to give students experiences of success and insight, and let them feel confident when experimenting with something new. The goal in creating innovations is to give confidence and to make students realise that innovations do not need to be something spectacular, but for example improvements in ordinary things, such as how something familiar could be done better. The research hatchery method itself is an innovation adding to the way things are usually done.

> *"The simple fact that you can actually achieve whatever you want if you work hard enough for it, that's something you don't always have in class. That's what I personally find inspiring in the research hatchery." S8*

The experiences of research hatchery pilots in the different universities have shown that this method brings learning closer to real life situations and provides the students with competences required in working life. The research hatchery method is one example of new learning environments where students can gain experience and where innovation competencies can be produced – and also where innovations can be created. The interviews gave evidence that the same elements are needed both when working in the research hatchery and when creating innovations (Figure 5). An innovation can be created when there is a problem to be solved. The interviews brought up that the creation of

> *"Totally. Innovation is the rope that will get us out of the pit of the crisis. Innovation is very difficult with standard forms of work, so we have to reinvent ourselves and to do nothing better than contact with other ideas." S11*

innovations requires different people and an open, supportive, respective and dialogic atmosphere, where ideas can be shared. It also requires involvement, confidence, time and freedom to make mistakes. Therefore the research hatchery can be referred to as a cradle for new innovators.

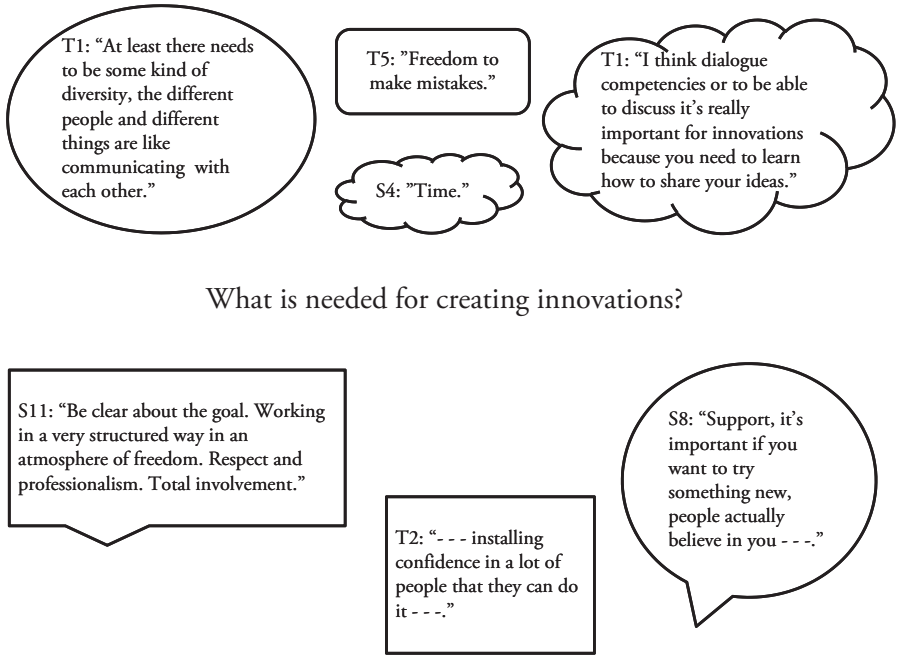


FIGURE 5. *What is needed for creating innovations.*

REFERENCES

INCODE web page: http://www.incode-eu.eu/en/

Kairisto-Mertanen, L., Penttilä, T. & Nuotio, J. 2011. On The Definition Of Innovation Competencies In Innovations For Competence Management, Conference proceedings. eds. Torniainen; Ilona, Mahlamäki-Kultanen, Seija, Nokelainen Petri & Paul Ilsley; Series C, reports and other current publications, part 83, Lahti University of Applied Sciences, Esa print Oy.

Kairisto-Mertanen, L., Penttilä, T & Putkonen A. 2011. Embedding innovation skills in learning – developing cooperation between working life and Universities of Applied Sciences, in Towards Innovation pedagogy. A new approach to teaching and learning in universities of applied sciences, ed. by A. Lehto, L. Kairisto-Mertanen, T. Penttilä TUAS Reports 100. Turku University of Applied Sciences.

Kairisto-Mertanen, L., Räsänen, M., Lehtonen, J. & Lappalainen, H. 2012. Innovation Pedagogy – Learning Through Active Multidisciplinary Methods. Revista de Docencia Universitaria. REDU. Monográfico: Buenas prácticas docente en la enseñanza universitaria. 10 (1), 67-86. Recuperado el (25.4.2012) en http://redaberta.usc.es/redu

Kallio, A., Harmaakorpi, V. & Pässilä A. 2013. Ammatillisen aikuiskoulutuksen arviointi ja kehittäminen innovaationäkökulmasta. Retrieved from http://www.amke.fi/www/fi/liitetiedostot/vanhemmat/AIKEraportti_taitto.pdf [Accessed 3 September 2013]

Kanerva-Lehto, H.; Lehtonen, J.; Jolkkonen, A. & Riihiranta, J. 2011. Research Hatchery – a Concept for Combining Learning, Development and Research. In Towards Innovation pedagogy. A new approach to teaching and learning in universities of applied sciences, ed. by Lehto, A., Kairisto-Mertanen L., Penttilä, T. TUAS Reports 100. Turku University of Applied Sciences.

Lehto, A., Kairisto-Mertanen, L. & Penttilä, T., ed. 2011. Towards Innovation pedagogy. A new approach to teaching and learning in universities of applied sciences. TUAS Reports 100. Turku University of Applied Sciences.

Manley, K. (2008). Implementation of innovation by manufacturers subcontracting to construction projects. Engineering, Construction and Architectural Management, 15(3), 230.

Oliver, R. 2001. Developing e-learning environments that support knowledge construction in higher education. ECU Publications Pre. 2011. Edith Cowan University. Research Online.

Pérez Peñalver, M., Aznar-Mas, L-E. & Watts, F. 2012. To adapt or to die when leaving the university: to promote innovation competence may be the key. INTED2012 Proceedings. 6th International Technology, Education and Development Conference. Valencia, Spain. 5-7 March, 2012. 2731-2736

Petropoulou, O., Altanis, I., Retalis, S., Nicolaou, C.A., Kannas, C., Vasiliadou, M., & Pattis, I. 2010. Building a tool to help teachers analyse learners' interactions in a networked learning environment. Educational Media International Vol. 47. No. 3. 231-246.

Räsänen, M., Kairisto-Mertanen, L. & Penttilä, T. 2013. The Role of Social Learning Environment in the Context of Innovation Pedagogy in Higher Education. Proceedings of the Participatory Innovation Conference PIN-C 2013, 18th-20th June Lahti, Finland. Lappeenranta University of Technology LUT, Scientific and Expertise Publications – Research Reports No. 6.

Sáenz, J., Aramburu, N., & Rivera, O. 2009. Knowledge sharing and innovation performance. Journal of Intellectual Capital, 10(1), 22.

Thomas, H. 2010. Learning spaces, learning environments and the dis'placement' of learning. British Journal of Educational Technology Vol 41. No. 3. 502-511.

Thomas, D. & Brown, J. 2011. A New Culture of Learning: Cultivating the Imagination for a World of Constant Change.

Watts, F., Aznar-Mas, L.E., Penttilä, T., Kairisto-Mertanen, L., Stange, C. & Helker, H. 2013. Innovation Competency Development And Assessment In Higher Education. INTED2013 Proceedings. 7th International Technology, Education and Development Conference. Valencia, Spain. 4-5 March, 2013. 6033-6041.

Watts, F., Garcia-Carbonell A., & Andreu-Andrés Mª Á. 2013. Innovation Competence Development – INCODE Barometer and User Guide. TUAS Course Material 82. Turku University of Applied Sciences.

APPENDICES

APPENDIX 1 – INTERVIEW QUESTIONS

1. Describe shortly the experience of working at the research hatchery, what are the first things that come to mind?

2. Did you encounter any problems while working at the research hatchery? How did you solve them? What did you learn from them?

3. Did you have the freedom to make suggestions and develop the project during the process? Were you able to affect the goals of the project, how the work was done or your own work?

4. Was working/teaching in research hatchery inspiring/motivating? If it was, what was particularly motivating?

5. What skills and knowledge did you learn at this research hatchery? Please, compare your experiences at research hatchery with traditional teaching method with lectures+exam.

6. What supported your learning in the research hatchery the most?

7. Was the work done more together or independently? Do you think the way of working, together or independently, supported your learning? How did you feel about group work in the research hatchery as compared to non-research hatchery studying?

8. Was the working group multidisciplinary? If it was, do you think it was valuable to the project? Was it challenging? If it wasn't multidisciplinary, do you think it would have been useful?

9. Was there a connection to working life in the project? If there was, how it came up? What advantages do you think it brought that the project was done in connection to working life?

10. Were networks created during the project, for example, did you get connections to working life? Did working in the research hatchery increase your networking capabilities?

11. Were new innovations created in the research hatchery? (innovation is an idea, practice or object, that is considered to be new) What do you think is needed for creation of innovations?

12. How would you develop the ways of working at research hatcheries? What weaknesses/challenges does the method have?

13. What advice would you give to a person who is starting his / her work at a research hatchery?

14. Would you recommend research hatchery method to others? Why/why not?

APPENDIX II – INTERVIEWEES

S1 = TUAS Student 1

S2 = TUAS Student 2

S3 = TUAS Student 3

S4 = TUAS Student 4

S5 = KDG Student 1

S6 = KDG Student 2

S7 = KDG Student 3

S8 = KDG Student 4

S9 = HAW Student

S10 = UPV Student 1

S11 = UPV Student 2

S12 = UPV Student 3

S13 = UPV Student 4

T1 = TUAS Teacher

T2 = KDG Teacher

T3 = HAW Teacher 1

T4 = HAW Teacher 2

T5 = UPV Teacher

PUBLICATION DESCRIPTIONS IN INCODE PARTNER LANGUAGES

IN ENGLISH

This handbook presents a new pedagogical method – the research hatchery – on a practical level, offering experiences and implications relating to the method. Research hatcheries are part of the innovation pedagogy approach adopted at TUAS, and they have also been applied in the project Innovation Competencies Development (INCODE).

In today's society, it is an urgent task to raise a new generation of professionals, whose conceptions of producing, adopting and utilising knowledge make innovative thinking and creating innovations possible. INCODE strived to connect professional working life with professional education by enhancing innovation potential in higher education institutions. The guide at hand sums up experiences from research hatchery pilots from INCODE partner countries.

The main focus of the handbook, however, is to offer step by step guidelines on how to implement the method in practice. The guide highlights good practices and possible challenges of working with research hatcheries. It encourages educators to explore and apply the method in their work.

The descriptions of pilots with interviews of key players – students, teachers and RDI experts – show, on a practical level, how teaching and learning can become more versatile and interesting to both teachers and students by applying the new research hatchery approach.

SUOMEKSI

Tämä käsikirja esittelee uutta pedagogista menetelmää – tutkimuspajaa – käytännön tasolla, tarjoten kokemuksia ja johtopäätöksiä menetelmään liittyen. Tutkimuspajat ovat osa Turun ammattikorkeakoulussa kehitettyä innovaatiopedagogiikkaa, ja nyt pajamenetelmää sovellettiin myös Innovation Competencies Development (INCODE) projektissa.

Nyky-yhteiskunnalla on kiireellinen tehtävä kasvattaa uuttaa asiantuntijasukupolvea, jolla on kyky tuottaa, omaksua ja hyödyntää tietoa innovatiivisesti ja luoda uusia innovaatioita. INCODE projektissa pyrittiin yhdistämään työelämän ja koulutuksen asiantuntijuudet yhteen lisäämällä innovaatiovalmiuksia korkeakouluissa. Tämä opas kerää yhteen kokemuksia INCODE projektiin osallistuneiden maiden tutkimuspajapiloteista.

Käsikirjan päätarkoituksena on opastaa, kuinka toteuttaa menetelmää käytännössä. Opas tuo esiin tutkimuspajatyöskentelyn hyviä käytänteitä ja mahdollisia sudenkuoppia. Sen tarkoituksena on rohkaista kouluttajia perehtymään menetelmään ja soveltamaan sitä osana työtään.

Tutkimuspajapilottikohteiden kuvaukset ja avainhenkilöiden haastattelut – opiskelijat, opettajat ja TKI-henkilöt – osoittavat käytännön tasolla, kuinka opettamisesta ja oppimisesta voi menetelmää hyödyntämällä tulla monipuolisempaa ja kiinnostavampaa niin opettajille kuin opiskelijoillekin.

EN ESPAÑOL

Este manual presenta la práctica de un novedoso método pedagógico denominado Vivero de Investigación (Research Hatchery) y aporta, a su vez, experiencias e implicaciones relacionadas con dicho método. El Vivero de Investigación forma parte de un enfoque pedagógico para desarrollar la innovación adoptado en TUAS, enfoque que se ha aplicado también en el proyecto Innovation Competencies Development (Desarrollo de Competencias de Innovación. INCODE).

Una tarea urgente en la sociedad actual es la formación de una nueva generación de profesionales cuya idea de producir, adoptar y utilizar el conocimiento facilite el pensamiento innovador y las innovaciones creativas. INCODE lucha por conectar la vida laboral con la formación profesional superior. Esta guía incorpora experiencias de pilotaje del Vivero de Investigación en países socios de INCODE.

El manual se centra principalmente en ofrecer una guía de cómo llevar el método a la práctica paso a paso. La guía subraya buenas prácticas y posibles retos de trabajo con el Vivero de Investigación. Anima a educadores a explorar y aplicar el método en sus respectivos trabajos.

AUF DEUTSCH

Dieses Handbuch präsentiert praxisorientiert eine neue pädagogische Methode – „Research Hatchery“ und stellt damit verbundene Erfahrungen und Rahmenbedingungen vor. „Research Hatcheries“ sind Teil des innovationspädagogischen Ansatzes, der von der Turku University of Applied Sciences (TUAS) entwickelt wurde. REHAs wurden ebenfalls im Projekt Innovation Competencies Development (INCODE) erprobt.

In der heutigen Gesellschaft ist es eine wichtige Aufgabe, eine neue, fachlich qualifizierte Generation heranzubilden, deren Verständnis der Produktion, Anpassung und Nutzung von Wissen innovatives Denken und Innovationen möglich macht. INCODE versucht, Arbeitsleben und fachliche Ausbildung durch die Stärkung von Innovationspotentialen im tertiären Bildungsbereich zu verknüpfen. Der vorliegende Leitfaden fasst Erfahrungen aus den Pilotversuchen der REHAs in den INCODE-Partnerländern zusammen.

Das Hauptaugenmerk liegt jedoch darauf, eine Leitlinie für die Implementierung dieser Methode in der Praxis anzubieten. Er präsentiert gute Praxisbeispiele und mögliche Herausforderungen für die Arbeit mit REHAs. Er ermutigt Lehrende, diese Methode in ihrer Arbeit auszuprobieren und einzubinden.

Die Beschreibungen der Pilotversuche durch Interviews der Akteure – Studierende, Lehrende und F&E-Experten – zeigen anschaulich, wie Lehren und Lernen durch die REHA-Methode vielfältiger und interessanter werden kann, sowohl für Studierende wie auch für Lehrende.