ALL SECTORS OF THE ECONOMY UNDERLINE THE IMPORTANCE OF INNOVATIONS. FOR CREATING NEW INNOVATIONS WE NEED INDIVIDUALS THAT ARE CAPABLE TO PARTICIPATE IN DIVERSE EVERYDAY INNOVATION PROCESSES. ONE MAIN PROBLEM IS THAT UNIVERSITIES DON’T HAVE PROPER TOOLS TO MEASURE THE DEVELOPMENT OF THE STUDENTS’ INNOVATION COMPETENCIES DURING THEIR STUDIES. THERE IS NO SUFFICIENT DATA ON WHICH TEACHING AND LEARNING METHODS ARE EFFECTIVE, I.E. ABLE TO DEVELOP INNOVATION COMPETENCES. ALSO COMPANIES ARE LACKING TOOLS AND KNOWLEDGE TO ASSESS THESE COMPETENCIES IN VARIOUS SETTINGS: IN RECRUITMENT PROCESSES AND INTERNAL DEVELOPMENT ACTIVITIES.

IN THIS PAPER WE PRESENT THE EU FINANCED FINCODA PROJECT WITH A SIGNIFICANT NUMBER OF UNIVERSITIES AND INNOVATION-INTENSIVE COMPANIES FROM 5 COUNTRIES, AIMING AT PROVIDING SOLUTIONS FOR A SOLID PATH FOR FORTHCOMING INNOVATORS FROM UNIVERSITY TO COMPANIES. WE SHALL TEST NEW FORMS OF ENHANCING INNOVATION COMPETENCIES IN UNIVERSITY-COMPANY COOPERATION. REAL-LIFE LEARNING ENVIRONMENTS BRING ADDED VALUE FOR ALL STAKEHOLDERS AND LOWER THE STUDENTS’ THRESHOLD TO ENTER THE WORKING LIFE.

AS A MAIN TANGIBLE OUTPUT OF THE PROJECT WE ARE CREATING AND VALIDATING A SOFTWARE APPLICATION TOOL FOR INNOVATION COMPETENCIES ASSESSMENT, WHICH WILL BE AVAILABLE AS AN OER. WE SHALL ALSO ILLUSTRATE THAT - ESPECIALLY WHEN SPEAKING ABOUT INNOVATION COMPETENCIES – WELL-ORGANIZED AND STRUCTURED BEHAVIOUR ASSESSMENT CAN BE AT THE SAME TIME COST-EFFECTIVE, RELIABLE, AND VALID AND VALUE ADDING, COMPARED TO TRADITIONAL WRITTEN TESTS AND EXAMS.

EUROPEAN-WIDE CHALLENGES DEMAND MULTINATIONAL SOLUTIONS. INVESTMENTS TO INNOVATION COMPETENCIES DEVELOPMENT GAIN POSITIVE IMPACTS TO THE COMPETITIVENESS OF EUROPEAN COMPANIES. JOINT EUROPEAN PROCESSES IN ASSESSMENT OF LEARNING OUTCOMES ARE ALSO ONE KEY ASPECT IN THE CREATION OF A WELL-FUNCTIONING EUROPEAN HIGHER EDUCATION AREA.

KEYWORDS: INNOVATION COMPETENCE, COMPETENCE ASSESSMENT, INNOVATION PEDA GOGY, UNIVERSITY-COMPANY CO-OPERATION, HIGHER EDUCATION

1 INTRODUCTION

INNOVATIONS ARE IN A HIGH PRIORITY IN EUROPE. EU’S INNOVATION UNION INITIATIVE UNDERLINES THE IMPORTANCE OF INNOVATIONS IN ALL SECTORS OF ECONOMY. COMPANIES NEED INNOVATIONS FOR THEIR COMMERCIAL PURPOSES AND MORE WIDELY FOR SECURING THE COMPETITIVENESS OF EUROPEAN ECONOMY. PUBLIC ORGANIZATIONS NEED INNOVATIONS TO PRODUCE HIGH LEVEL SERVICES AND FOR COST-EFFECTIVE USE OF TAXPAYERS’ MONEY, ESPECIALLY NOW BECAUSE OF THE DEMOGRAPHIC CHANGE CAUSED BY RAPIDLY AGEING POPULATION OF EUROPE. IN ALL SECTORS OF THE ECONOMY INNOVATIONS CAN BE RELATED TO PRODUCTS AND SERVICES BUT ALSO TO THE WAYS OF WORKING AND THINKING. [1]

FOR PRODUCING INNOVATIONS WE NEED TRADITIONAL INNOVATORS WITH EXCEPTIONALLY GOOD COMPETENCIES IN PROBLEM SOLVING, SCIENTIFIC AND QUANTITATIVE REASONING AND CREATIVE THINKING. UNFORTUNATELY THESE FEW SUPER INNOVATORS ARE NOT ENOUGH AND WE NEED MORE AND MORE INDIVIDUALS THAT ARE CAPABLE TO PARTICIPATE IN EVERY DAY’S DIVERSE INNOVATION PROCESSES. EFFECTIVE PARTICIPATION IN THOSE INNOVATION PROCESSES REQUIRES INNOVATION COMPETENCIES THAT SHOULD BE IN THE QUALIFICATION FRAMEWORK IN ALL
university degrees. Innovation competences enable participation in innovation processes in businesses and organizations. They include individual competences such as problem solving skills and creativity, but also competences especially emphasized by the working life nowadays; interpersonal skills such as team working and communication skills, and networking skills such as ability to create and maintain networks. In addition, we must also highlight the fact that vast majority of today’s innovations are born in these kind of normal working processes where experts from different disciplines are working effectively together, and therefore multidisciplinary environments are crucial for innovation generation. Innovation competences are generic by nature and expected in all study fields/disciplines in Higher Education (HE) as well as in all industrial fields in businesses and organizations. [2, 3]

In universities the main problem is that universities don’t have tools to measure the development of students’ innovation competencies during their studies. Therefore we don’t actually know what teaching and learning methods are effective when aspiring the enhancement of innovation competencies, although we should organize higher education in a cost-effective way. Companies are lacking of tools and methods to assess innovation competencies as part of their knowledge management activities: in recruitment processes, in internal development activities and when subcontracting training services for their staff. Unawareness of the state-of-art of development of innovation competencies causes great economic losses for employers annually.

In this paper we present the EU financed FINCODA project with a significant number of universities and innovation-intensive companies from 5 countries, aiming at providing solutions for a solid path for forthcoming innovators from university to companies. We shall test new forms of enhancing innovation competencies in university-company cooperation. Real-life learning environments bring added value for all stakeholders and lower the students’ threshold to enter the working life. The theoretical framework is based on innovation pedagogy, the socio-cultural theory and the constructivist view of learning. The empirical findings show how innovation pedagogy is put into practice and how applied research, development and innovation operations in HEIs can create direct benefits to the businesses and other stakeholders.

2 THEORETICAL FRAMEWORK

Innovation pedagogy as a learning approach is a new way to link the everyday work at HEIs with the needs coming from the society. It aims to accelerate versatile innovation processes as well as to produce innovation competences to the students. Innovation pedagogy is based on the needs originating from the surrounding society and at the same time on where and how innovations are emerging [4]. Sociocultural learning theory forms the background for innovation pedagogy, which links different players in the society to work in cooperation with everyday day work in HEIs [5]. The cornerstones of innovation pedagogy and various opportunities to boundary crossing change the way how knowledge is assimilated, produced and used in a manner that can create sustainable innovations [4]. This paper is based on the socio-cultural theory and the constructivist view of learning developed to encompass the social and cultural customs of a particular community and its ways of operating. The study extends traditional individual based learning used in many contexts to include collaborative and networking based learning in order to support innovations.

According to innovation pedagogy, learning cannot be separated from the surrounding world, as the cultural operating models always steer learners and their activities. The relating sociocultural theories [6, 7] highlight the need to define the cultural toolkit and modus operandi of learning at a certain point in time and in a certain culture. The way we understand our surroundings and solve problems is greatly influenced by the typical activities in which we take part on a daily basis – a fact that places a special emphasis on learning environments in which pedagogical methods are applied in practice.

In addition to the central role of the learner, innovation pedagogy promotes practical activities as well as creating, constructing and cumulating knowledge. Scientific knowledge facilitates solving practical
problems, but sometimes a new practice born out of immediate need in a practically oriented situation results in a scientific breakthrough. Also in the field of learning theories in general, the interplay between theory and the practices in which theories are applied can be increasingly observed. Through collaborative learning, different actors are able to work together in dialogue in such a manner that their own expertise can be efficiently shared and combined in novel ways resulting in something more than the sum of its parts. [6, 8, 9]

A fruitful environment for innovation consists of individuals with different backgrounds and expertise working together on similar problems. These innovation communities can be tight teams meeting every day or network-like looser communities. The success of the communities is based on know-how and sharing knowledge as well as on the ability to combine different points of view and approaches. Innovations are more frequently generated where different fields of expertise meet. [4, 10]

Similarly, HEIs' research and development activities and working life cooperation should form a solid and interactive whole that can respond to the constantly changing expectations falling upon universities of applied sciences. Combining knowledge related to innovation activities on the one hand and pedagogy on the other can offer the theoretical foundation for improving expertise-based competitiveness. This process is at its most natural in the collaboration between higher education institutions and working life. It also underlines the challenge that innovation pedagogy aims to tackle by combining learning with producing and applying new knowledge. [4] Studying according innovation pedagogy in HEI environment encourages open innovations, 'combining internal and external ideas as well as internal and external paths to market to advance the development of new technologies' [11], which gives companies a good opportunity to involve students with various expertise to provide added value e.g. through idea generation and testing.

The contribution of innovation pedagogy is to provide the students, once they are ready to enter working life, with innovation competencies which include defined knowledge, skills and attitudes needed when being involved in diverse innovation processes. The methods applied and the way teachers and students interact constitute the basis for learning and thus enable the development of innovation competences. The methods used also facilitate intuitive and unexpected learning during the learning processes and make transmitting tacit knowledge possible when dealing with working life. In innovation pedagogy the learning outcomes can manifest themselves in the format of intuitive and tacit learning taking place in the learning situation. They can be e.g. experiences of cultural differences or of working with customers.

Innovation competences are learning outcomes that refer to knowledge, skills and attitudes needed for the innovation activities to be successful. The innovation competences drawn up at TUAS follow the European Qualifications Framework (EQF) [12] and comprise three levels: individual, interpersonal and networking innovation competences. The individual level includes e.g. independent thinking and decision-making, target-oriented and tenacious actions, creative problem-solving and development of working methods as well as self-assessment and development of one's own skills and learning methods. The students are thus able to self-assess and develop their own skills and learning methods. The interpersonal level focuses on the abilities to co-operate in a diversified team or working community, to take the initiative and to work responsibly according to the targets of the community, to work in research and development projects by applying and combining knowledge and methods of different fields, to work along the principles of ethics and social responsibility as well as to work in interactive communication situations. Finally, the networking level covers the abilities to create and maintain working connections, to work in networks, to co-operate in a multidisciplinary and multicultural environment as well as to communicate and interact in an international environment. Innovation competences are learned gradually as new information is added to the existing knowledge structures. [13]

In the assessment of innovation competencies the emphasis is performance-oriented and lies on interpersonal innovation competencies and networking innovation competencies. This sets special demands especially on the number and timing of assessments, assessment criteria and assessment methods. The first challenge is the need of several measurements during the study time in order to be able to measure the impact of teaching and learning methods in a reliable way. This involves diagnostic assessment to be added to formative and summative assessment methods to be able to define the starting level of a learner. The second challenge lies on assessment criteria; for example how to measure the ability to co-operate in a diversified team or work community or the ability to co-operate in a multidisciplinary and multicultural environment. This sets requirements also on the test
environment, where the learning environment must include group processes and multidisciplinary teams. Third, the challenge is put on assessment methods; the earlier mentioned assessment methods, diagnostic, formative and summative assessment, will need several assessment tools in this context. In addition to traditional and easy to use quantitative tools such as surveys and questioning, some other tools such as participatory evaluation, collaborative dialogue, peer assessment and self-reflection come useful. Finally, there will be a need for evaluation of the enduring effects of education, before an innovation competence assessment tool will capture its reliability. This refers to evaluation of constancy of learning outcomes and real educational impacts. The final objectives of learning outcomes are not only single competencies but also their holistic adaptation to practical situations. Evaluation of the enduring effects of education can first take place after some time from the end of the studies.

The development and assessment of innovation competences of students confronts teachers with unique decisions concerning teaching and learning methodology and how to assess the results of classroom efforts. Four European universities joined forces to give shape to an instrument that could aid in the development and assessment of innovation competence in a higher education setting. The venture also comprises a plan for training teachers to use the criteria, which the partners named Innovation Competencies Development (INCODE) Barometer. The set of criteria, the INCODE Barometer, can be used in self, peer and tutor assessment but, due to the complexity of the assessment, should be preceded by training that will familiarise the user with behavioural observation, errors frequently made by raters and the specific framework in which the assessment is to occur. The INCODE approach to innovation competencies aimed to give added value to OECD’s AHELO process focusing on the assessment of individual competences. [14, 15, 16]

3 METHODOLOGY

The partner universities in Fincoda project are TUAS (Turku University of Applied Sciences, Finland), HAW (Hamburg University of Applied Sciences, Germany), HU University of Applied Sciences/ Netherlands, MMU (Manchester Metropolitan University, UK) and UPV (Universitat Politècnica de València, Spain), and partner companies EENNW UK/ United Kingdom, Elomatic ltd/ Finland, Lactoprot/ Germany, ECDL Foundation/Netherlands, John Caunt Scientific Ltd.(JCS)/ United Kingdom, Carter & Corson Partnership Ltd/ United Kingdom, Celestica Valenciana S.A/ Spain, and Schneider Electric España SA/ Spain. Very throughout literature review - made by UPV at 2011-2012 and by using all main academic databases – gained us a huge amount of knowledge about innovation competencies for FINCODA project preparation. The innovativeness of the FINCODA project crystallizes to the reform of the assessment culture to meet the needs and practices of working life. A lot of preliminary work has been done among UPV, TUAS and HAW for identifying key indicators for innovation competencies. Now these findings and deductions are going to be researched further, applied, proof-tested and validated in close cooperation with innovation-intensive companies.

The theory of constructive alignment [17] suggests that all three main elements of education – namely aims, methods and ways of assessing learning outcomes – should be in line. A lot of effort has been put during recent years to the new methods of organizing higher education. HE has traditionally relied on individual competence, and innovation has also frequently been seen as an activity of some independently working “propeller-head”. As the world is becoming increasingly complex and the amount of information is growing, it has become even more evident that only a few can vanquish the collective strength of a group by individual actions. Interaction skills are important to help bounce one’s own thoughts off a group for feedback and develop them this way into even better and more competitive ideas. The significance of good networks and networking has similarly become more important. Networks create safety when actions can be brought forward with people other than complete strangers. Networks complement the competences of those participating in them with the principle of mutual benefit and trust.

According to the wide research ‘Oivallus’ - conducted by Confederation of Finnish industries - the business and companies are expecting their current and future employees to have innovation
competencies - especially such as abilities to cooperate and network - which cannot be assessed with traditional tools. [2] Our approach widens the perspective from individual level assessment to interpersonal and networking level competencies assessment. It means also more holistic approach in involving different stakeholders into the assessment pool: self-assessment, peer assessment and expert assessment.

An essential issue is also the driver factor of more holistic and systematic innovation competencies assessment. People tend to direct their efforts in learning to the issues that will later on be assessed. Therefore we see this factor very important in stimulating – not only students and workers – but also teachers and managers to concentrate in essential issues when planning and implementing education and other types of competencies development activities. People focus on learning that will be assessed. If they know that it's not only their individual performance that will be assessed, but e.g. their problem solving skills in a group, their ability to communicate with others, listen and make questions, they also aim to develop these abilities.

In HE pedagogic projects companies have traditionally been acting mostly in secondary roles, like targets of pilots or sources of information. Our approach is more holistic and it meets the original needs in a better way. Our young innovators development and assessment knowledge network involves key universities and companies from 5 countries as active operators to the same development alliance.

The project started in January 2015 and will continue three years. The methodology of our project can be summarized as follows:

- Mapping the needs and state-of-art on innovation competencies development and assessment in participating companies. The methods used are both quantitative and qualitative; an electronic survey and interviews
- Testing innovative methods for Innovators recruitment and development
- Creating a novel competence assessment barometer by utilizing the existing tools for behaviour assessment
- Creating the application software for the barometer and preparing a professional level toolkit for behaviour assessment
- Training of key personnel in participating organizations for behaviour assessment. This is also piloting of the novel toolkit
- Validating the novel version of the barometer in participating organizations and analysing the results from validation and adjustment of the barometer
- Exploitation and dissemination of main outputs

4 DISCUSSION

The main change between universities and companies FINCODA project is aiming at can be defined as a “from single knowledge transfer operations towards continuous cooperation in innovators training, recruitment and development”. This can be achieved by creating joint concepts, understanding and processes related to innovation competencies development and assessment. The approach is research based and very hands-on. In addition to new concrete methods and outputs the project is producing, the ambitious aim is to change the mind-set of persons involved in assessing competencies needed in innovation processes.

The new tools for assessing innovation competencies – key outputs of this project - are going to be utilized by companies in recruitment processes and development processes of their personnel. The
A competence assessment tool is needed; the evaluation of personnel development processes and training periods is demanding and their productivity is difficult to estimate in companies.

Universities get valuable information on their capability to enhance students’ innovation capabilities. This information has monetary value and it allows universities and policy makers to allocate funding where there is a sufficient return on investment. This is valuable also from the viewpoint of the EU educational policy; the assessing tool puts a competence-based curriculum in practice by making the achieved competences more visible than earlier. In universities new tools can be utilized in degree level – i.e. assessing the development of students’ innovation competencies during the degree studies. This information will serve several stakeholders: students may observe their development and direct more energy into the undeveloped competencies. The assessing tool will also help the students to make their learning outcomes more visible, which is especially important in recruitment situations making the employers aware of their competences. There is a huge potential already in our FINCODA partner universities; the total numbers of students exceeds 130 000 and staff almost 10 000. The changes in mind-set and practices that can be made at these universities will undoubtedly spread also to other organizations.

The tool will be merged to the curriculum of participating universities, which makes it an everyday assessment tool and therefore also the target for continuous development in higher education, where competence evaluation is and will be one of the major development issues in order to show the impact of the education. The opportunity to more comprehensively evaluate the impact of the education will make the tool attractive also for other higher education providers especially after the project. Usability and usefulness of the tool for the companies involved ensures the further development of the tool and its demand in the wider organizational and business sector.

The FINCODA project is planned to gain several impacts for the main stakeholders in different levels. Students in universities develop their competences towards real working life needs and are able to evaluate their own and peer student’s competences. Thus, they are more competitive both in national, European and global labour market. Staff of universities has a more updated and realistic understanding of working life expectations concerning employees’ competences. They will develop their teaching to the needed direction when having a more valid evaluation tool for learning outcomes of their students. They are also aware of competence requirements on European and international level. Companies’ staff, especially HR department and directors, are able to reliably evaluate the impact of various HR development processes and training periods which has a direct impact on company profitability and competitiveness. In addition they will have a valid tool for recruitment processes that will improve decision making also in international recruitment market where the impact of cultural differences has earlier not been easy to identify and evaluated.

As a main tangible output of the project we are creating and validating a software application tool for innovation competencies assessment, which will be available as an OER. We shall also illustrate that - especially when speaking about innovation competencies – well-organized and structured behaviour assessment can be at the same time cost-effective, reliable, and valid and value adding, compared to traditional written tests and exams. European-wide challenges demand multinational solutions. Investments to innovation competencies development gain positive impacts to the competitiveness of European companies. Joint European processes in assessment of learning outcomes are also one key aspect in the creation of a well-functioning European Higher Education Area.
REFERENCES


