

HOW IS OPEN INNOVATION ADDRESSED IN UNIVERSITIES TODAY? AN OVERVIEW ON EXISTING CURRICULA IN EUROPE

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ABSTRACT

In a dynamic and globalized economy, Innovation, Innovation Management, and Global Innovation Management have become concepts used by the business world and subjects needed to be taught in universities. Derived from them, resulting from practical experience, Open Innovation is becoming an approach with more and more relevance for both academics and businesses. This chapter offers an insight into how widely open innovation is present in the content of academic programs in Europe today, by compiling the results of a recent study developed in a European project.

The content of this chapter is a compilation based on the Compendium on existing curricula in Europe on Innovation, Open innovation and Global Innovation Management (<https://goo.gl/VvoyQ>) developed within the European project No. 542203-LLP-1-2013-1-FI-ERASMUS-ENW, The European Academic Network for Open Innovation, by the following contributors: Carmen Buzea - University Transilvania of Brasov, Davide Chiaroni - Politecnico di Milano, Laura David - University Transilvania of Brasov, Simona Lache - University Transilvania of Brasov, Aysegul Daloglu - Middle East Technical University, Gulizar Karahan Balya - Middle East Technical University.

LECTURE CONTENT

The subject of open innovation has started to receive more and more attention in the business field and also by instructional agents at higher education institutions (Busarovs, 2013; Chesbrough, Vanhaverbeke, & West, 2014). A recent study performed in the context of the project the European Academic Network for Open Innovation identified, analyzed and compared the existing curricula on Innovation, Open Innovation, and Global Innovation Management (GIM) across Europe (goo.gl/d6tAUl). The aim was to collect systematic data on whether and how universities make use of the Open Innovation concept in their education programs.

The data collection was performed between February and May 2014 by using an online questionnaire hosted on the IT platform of the project. The target population were academics at public and private universities across Europe. They received the link of the questionnaire via email and were asked to give information on the following main items:

- list of the courses which deal with the topics of Innovation/ Innovation Management at different educational levels (Bachelor; Master; PhD):
- details on each course:
 - ✓ title of course;
 - ✓ type of class (mandatory or optional);
 - ✓ number of hours (in total; per week);
 - ✓ number of hours within the course specifically dedicated to the teaching of Open Innovation;
 - ✓ ECTS credits;
 - ✓ average number of students per class;
 - ✓ type of qualification (e.g. Economics, Engineering, etc.);
 - ✓ year when the course was introduced for the first time;
 - ✓ year when Open Innovation was introduced within the course;
 - ✓ language(s) used in teaching;
 - ✓ background knowledge or prerequisites (if required);
 - ✓ learning objectives and course topics;
 - ✓ references and readings on Open Innovation used in teaching; and
 - ✓ method of instruction (e.g. lectures, cases, on-field training, etc.).

108 institutions from 28 countries participated in the study, providing entries on 272 study programs at Bachelor, Master and PhD levels. Twenty countries were EU members and eight (Albania, Bosnia and Herzegovina, Croatia, Macedonia, Norway, Serbia, Switzerland and Turkey) were not EU members. The questions were mainly answered by university professors or associate professors, who had been the initiators of the curricula on open innovation or taught courses that were related to open innovation. Also, in some cases, the questionnaire was filled in by a person

in a management position of the higher education institution. Another common tendency of the respondents was the field they taught: business, economics, or engineering. Even though the UK is a country with an important contribution regarding higher education, the study received no responses from any UK university.

The results of the study are discussed below by the level of academic programs.

Bachelor Level

For the Bachelor level, 97 programs from 51 institutions and 23 countries were surveyed. Of the total number of Bachelor programs reported, 25 programs had Open Innovation as the topic. The 25 Bachelor programs with OI as the topic were taught in 17 institutions from 14 countries. Out of 25 programs, 22 were taught after 2010 and 3 were introduced in 2014, only ten of them in English, the rest in the maternal language. Many of the classes required background knowledge or had prerequisites in areas such as general management, strategic management, quality management, project management, informatics, organization processes, marketing, finance, law, research skills, basics of entrepreneurship, management of industrial production, machine design, automation and robotics, mathematics, operations research, and macroeconomics.

The courses had different objectives, for instance:

- to provide knowledge and understanding about innovation, to develop the skills to search for and assess innovative ideas, as well as to draw up a plan for commercialization;
- to explain the phases, risks and challenges related to the growth of business, especially in the case of highly innovative enterprises;
- to analyze alternative models for organizing innovation strategies and processes within commercial firms;
- to acknowledge the importance and meaning of networks and intellectual property rights in the management of technology and innovation;
- to provide practical and applicable knowledge about innovation management and the new product/service development process till introduction to the market, supported by the evaluation of commercialization, technology transfer and open innovation opportunities for business growth;
- to understand the context in which changes and innovations occur - organizational structure and the influence of culture, politics and leadership on innovation and changes; and
- to apply models for the implementation of innovations and changes in the organization.

As teaching methods, lectures, cases/seminars and practical tasks were used:

- students work in groups on different real product development projects given by start-ups,

R&D institutes or SME's; tackling a challenge introduced by the industry partner and design thinking methodology to develop relevant interventions;

- scanning of a company, after which a group of students have to improve the innovation process or the enabling processes of the company;
- cooperation with companies, visiting manufacturing companies, presenting scientific circle examples of innovative products/projects in 2D and 3D presentation;
- students work on a real innovation project with a start-up. The ideation phase is combined with a traditional brainstorming session and the use of an open-innovation platform; and
- cooperation in an experiment related to the EU project.

Other findings regarding open innovation classes were grouped as follows:

- the average length of courses was 97.12 hours, with a minimum of 16 hours and a maximum of 800 hours;
- the average length of the OI topic was 13.92 hours, with a minimum of 2 hours and a maximum of 100 hours;
- the average number of ECTS was 5.7, with a minimum of 0 credits and a maximum of 30 credits; from 25 courses only in 2 cases the number of credits was higher than 10; and
- the average number of students/class was 50, with a maximum of 350 students/class and a minimum of 10 students/class.

Open innovation was taken as a subject at Lappeenranta University, Finland for the first time in 2005, as an eight-hour course in a study program centered on innovation and technology management. Fontys University of Applied Sciences from Netherlands seemed to cover the open innovation topic in 100 hours scheduled in the last semester of an innovation management study program for the Bachelor level. Other universities that mentioned great interest in open innovation were Switzerland, Macedonia, Slovenia and Austria.

Master Level

157 programs from 80 institutions and 27 countries were surveyed for the Master level. Of the total number of Master programs reported, 50 programs had Open Innovation as a topic. MIP Politecnico di Milano was the first surveyed institution that taught OI as a topic, starting in 1990, integrated in the Innovation Management - MBA course. The first surveyed Master program (non-MBA) had been taught since 2000 by the Silesian University of Technology, as part of the course Managing innovation projects. Most of the Master courses (47 courses) were taught after 2005, with two starting in 2015. Similar to the courses at the Bachelor level, these courses also asked for background knowledge or prerequisites such as: prior business studies, mathematics, operations

research, informatics, macroeconomics, microeconomics, basic management, production and services management, general TIM; minimum years of practical experience; basics in Innovation Management; basic knowledge of economics and project management, and product development.

The objectives stated in the syllabi were:

- to provide comprehensive theoretical knowledge of the methods, approaches and tools used in innovation and knowledge management;
- to present practical examples and case studies;
- to develop the following skills: creative personality, creative thinking skills and methods, creative will and motivation, as well as skills to act as an innovation promoter in open innovation processes;
- to facilitate in-depth understanding of the challenges, mechanisms and approaches for the management of innovation, and of the strategies, structures, processes, and the kind of culture that enhance the innovative capability of firms;
- to identify external sources of innovation;
- to elaborate and specify how firms can benefit from open and user innovation;
- to apply methods of open and user innovation to reflect on how firms need to change their strategies, structures and processes according to more open innovation processes;
- to analyze the innovation needs of a company; and
- to describe all the phases of the innovation process as well as its context on the micro- and macro levels.

The teaching methods were centered on practical approach, including:

- practical skills with real procurement and negotiation services, problem solving;
- examples of innovative products in 2D and 3D presentation;
- case studies; students develop a case in small groups and present it to the class;
- simulations of consulting projects;
- field visits to firms and innovation departments of companies; visit of a Business incubator; development of innovation -related project application in national and EU projects;
- preparation of own business-oriented projects, including innovative project proposal, project documentation and draft application for project funding according to the EU structural funds procedures;
- networking, company side visits, creativity games;
- team of students designing an innovative product (service, toy or other) by means of consulting end-users, experts, the public, and then defending the project in front of a panel of experts (company managers, experts in innovation, state agencies representative etc.), who evaluate the quality of the innovation.

The number of hours specially dedicated to open innovation varied considerably from a minimum of 2 hours to a maximum of 77 hours (average time being 26.42). The numbers of ECTS may also vary from 120 ECTS to none, but in 53 courses in 10 cases the number of credits was higher than 10. The students attending these courses formed groups as large as 120 students/class, with a minimum of 10 students/class. The type of class was mainly mandatory (a were optional). The qualifications offered were mainly in the following fields: Business, Economics and Engineering, and additional qualifications were offered in Health – Nursing, Design engineering, Organizational theory, Project management, Personnel management, and Industrial engineering.

PhD Level

For the PhD level, 18 programs, at 18 institutions and in 10 countries, were surveyed. Of the total number of PhD programs reported, three programs had Open Innovation as a topic. As the results for the PhD level were scarce and referred only to the field of Economy, the objectives were tailored: the student will acquire skills and competencies related to theoretical aspects, as well as critical analysis competencies applied to the main concepts related with the economic science and the economic problem under analysis. The student should also understand the innovation economic problem in different contexts and evaluate several public interventions in the innovation process of competitiveness. The student should develop competencies to stimulate territorial innovation systems and the creation of an innovative environment.

Comments on the survey findings

Of the 272 programs surveyed (at Bachelor, Master and PhD levels), only 78 (28.6%) had Open Innovation as a topic: i) of the 97 Bachelor programs surveyed, 25 had Open Innovation as a topic (25.77%); ii) of the 157 Master programs surveyed, 50 had Open Innovation as a topic (25.8%); and iii) of the 18 PhD programs surveyed, 3 had Open Innovation as a topic (16.6%). These findings reveal a certain preoccupation for the topic at European universities, which are more and more open to the dialog with enterprises. However, there are still countries in Europe where the subject of Open Innovation is not tackled at all, although different approaches for bringing together actors in higher education, business and industry are in place. In this respect, there is need to promote the concept further for both academics and business partners.

No relationships concerning the geographical region, the size of the country, the size of the university, or the economic power of the country were found in association with the presence or lack of presence of a study program addressing open innovation topics.

Furthermore, there was a large variety of learning objectives and course topics, although the qualifications offered at Bachelor and Master levels were mainly in Economics, Business and

Engineering. Open Innovation was presented as a small section/ module of the course, both at Bachelor and Master levels: the average length of the OI topic was 13.92 hours for Bachelors (14.3% of the total number of hours) and 26.42 hours for Masters (21.58% of the total number of hours). These findings were confirmed by some of the stakeholders of open innovation topics. For example, Dr Marcin Baron from the University of Economics in Katowice recommends a gradual introduction of open innovation in the university: first several hours in a course of innovation management (as an example), and passing slowly from applying open innovation to a specific business situation to the more advanced content on the concept, until it can be implemented as a self-standing area of teaching. Some other ideas are proposing open innovation as a course shared by many study programs, most preferable with transferable ECTS (as Prof. Kristina Zgodovova from the Technical University of Kosice suggested).

The teaching was based mostly on lectures and seminars, at Master level with a higher level of applications, exercises and field work. Another difference between the Bachelor and Master programs concerned the depth of the knowledge taught: at the Bachelor level the objectives were focused mostly on the nature, basics or dynamics of innovation processes, while at the Master level the objectives aimed at revealing the processes, strategies and structures of innovation, and training students to discover, evaluate and implement the sources of innovation. Open innovation should offer what it stays for: field experience, real study cases and collaborative projects, to represent a kind of “knowledge without borders”, as prof. Marina Dabic from the Faculty of Economics and Business, University of Zagreb, stated. She also noted that even though students can sometimes be reluctant, meaning that in order to understand and to apply open innovation one needs to change his/ her mind set to comprehend the novelty. The same idea was mentioned by Elena Caspina, postdoc at Scuola Superiore Sant Anna, Pisa, who mentioned that learning and practicing open innovation means thinking out of the box, and this can be a challenge for both academics and students.

The references included in the curricula usually combined national literature with English bibliographies, being represented for a large majority in books, while articles and papers were fewer in number. Chesbrough's books (2003, 2006) were used frequently as bibliographic resources, along with the work of Tidd and Bessant (2009).

There was no rule that institutions which had study programs with a topic in Open innovation at the Bachelor level would continue to offer study programs with a topic in Open innovation at the Master level. A possible explanation is that no real penetration in the education policy at the university level regarding open innovation was in place. The large majority of the courses were the results of individual or small teams' efforts and not of a coherent educational policy. One recommendation for increasing the importance of open innovation in the university curricula is to activate a bottom – up approach, making use of the advantage of the existence of the students'

use of technology as digital natives and the existence of a “digitally connected world”, as Assoc. Prof. Sandra Dingli from the University of Malta suggested, and to “remove walls between fields” (Prof. Marina Dabic, University of Zagreb); at the same time, for a successful implementation of an OI course, being aware of the time factor may be important, as well as of the needs of proximity between the participants, or taking into consideration the necessity of incentives, such as being partners in an European projects (postdoc Elena Caspina, Scuola Superiore Santa Ana, Pisa).¹

As a result of the presented research, it can be stated that Open Innovation has begun its development across European higher education institutions. The state of the art of curricula development indicates that a general, unique framework for curriculum design would be beneficial for enhancing the infusion of Open Innovation into higher education at the European level.

KEY TAKE-AWAYS

- Open innovation, as a subject tackled in academic curricula has gradually derived from related concepts: innovation, innovation management and global innovation management.
- Although European universities do not offer stand-alone study programs in this topic, courses or course modules discussing open innovation are present in some of the programs dedicated mainly to students in Business, Economics and Engineering at all levels (Bachelor, Master, Ph.D.).
- Due to the ‘out of the box’ approach open innovation assumes, its implementation needs setting their minds for novelty by all the actors involved: students - future specialists acting as employees or entrepreneurs, professors - teaching innovation and open innovation at universities, and company representatives - benefiting from the added value this concept brings to the business world.

REFERENCES

- Busarovs, A. (2013). Open Innovation: current trends and future perspectives. *Humanities and Social Sciences: Latvia*. 21 (2), 103–119.
- Buzea, C., Chiaroni, D., David, L., Lache, S., Daloglu, A., & Karahan Balya, G. Compendium on existing curricula in Europe on Innovation, Open innovation and Global Innovation Management. Retrieved from <https://goo.gl/ds0mm4>.
- Chesbrough, H.W. (2003). *Open Innovation: The new imperative for creating and profiting from technology*. Boston: Harvard Business School Press.
- Chesbrough, H.W., Vanhaverbeke, W., West, J., eds. (2014). *New Frontiers in Open Innovation*. Oxford: Oxford University Press.
- Tidd, J., & Bessant, J. (2009). *Managing Innovation: Integrating Technological, Market and Organizational Change*. Chichester: John Wiley and Sons.

¹ Videos on Testimonials on Open Innovation Curricula are available on OI-Net platform: <http://oi-net.eu/m-oinet-network/videos/display>.