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**UNDERSTANDING INNOVATION.
INNOVATION EDUCATION –
A STUDENTS’ PERSPECTIVE**

**ZROZUMIEĆ INNOWACJE.
INNOWACYJNA EDUKACJA –
PERSPEKTYWA STUDENTÓW**

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Summary: The author of this research offer the hypothesis that university education is the most important condition for the development of an innovation-oriented economy and that the creation of an innovation society requires the modernization of university education. Innovation education has been identified as a key contributor to the enhancement of the innovative behavior of individuals, organizations and economies. It is widely believed that countries’ social and economic well-being will depend to an ever greater extent on the quality of their citizens’ education: the emergence of the so-called ‘knowledge society’, the transformation of information and the media, and increasing specialization on the part of organizations, all of which call for high skill profiles and levels of knowledge. This study builds to examines an individual’s understanding of the term innovation. By looking at undergraduate and postgraduate students in Poland represented by the Warsaw School of Economics it is hoped to ascertain what role education plays in developing the notion of “innovation” and innovation education with the purpose of assessing it.

Keywords: innovation, innovation education, university education.

Streszczenie: Autorka tego badania proponuje potwierdzenie hipotezy, że kształcenie uniwersyteckie jest najważniejszym warunkiem rozwoju gospodarki zorientowanej na innowacje oraz że tworzenie społeczeństwa innowacyjnego wymaga modernizacji szkolnictwa wyższego. Edukacja w zakresie innowacji została zidentyfikowana jako kluczowy wkład w poprawę innowacyjnych zachowań jednostek, organizacji i gospodarek. Powszechnie uważa się, że dobrobyt społeczny i gospodarczy poszczególnych krajów w coraz większym stopniu zależeć będzie od jakości edukacji ich obywateli: od funkcjonowania społeczeństwa wiedzy, od transformacji informacji i mediów. Rosnąca specjalizacja ze strony organizacji wymaga, aby jej pracownicy mieli wysokie umiejętności i określony poziom wiedzy. Niniejsze badanie analizuje postrzeganie przez jednostkę pojęcia innowacji. Wzięli w nim udział studenci studiów licencyjnych oraz magisterskich reprezentujący Szkołę Główną Handlową w Warszawie. Autorka podjęła się wyzwania, aby określić, jaką rolę odgrywa edukacja w rozwijaniu pojęcia „innowacji” oraz ocenie edukacji innowacyjnej.

Słowa kluczowe: innowacja, edukacja innowacyjna, wykształcenie wyższe.

1. Introduction

The term innovation is quickly entering the lexicon of the global business community. It has touched every facet of strategic discussions within organizations. Yet prior research shows that how an individual perceives the definition of the term “innovation” may be greatly influenced by their individual education as well as culture [Fruehauf et al. 2017].

For an individual, a nation and for humankind, to survive and progress, innovation and evolution are essential. Innovations in education are of particular importance because education plays a crucial role in creating a sustainable future. “Innovation resembles mutation, the biological process that keeps species evolving so they can better compete for survival” [Hoffman, Holzhter 2012, p. 3].

Innovations are the most important factor of the competitiveness of countries in a global economy and the most important condition for their growth and development. The role of innovation as a tool of anti-crisis management and as a factor of stable and sustainable economic growth is generally acknowledged.

Despite the seeming simplicity of the innovation process, its nature still remains a puzzle for contemporary scientists, opening an area for a wide ranging discussion. For this reason, multiple efforts of various countries for the artificial stimulation of innovative activities have been characterized by their low effectiveness and do not allow for the formation of an innovation-oriented economy.

This explains the high popularity of the study of the sense and conditions required for the formation of innovation and a knowledge based society.

A considerable literature has accumulated on the discipline of innovation and innovation management [Crossan, Apaydin 2010; Ortt, van der Duin 2008] yet remains sparse in the area of innovation education and innovation education programs (IEPs).

The term “innovation” is considered critical for industries such as manufacturing. How the term is understood by individuals and how it is disseminated becomes critical for companies to create and foster innovation in the workplace. Indeed, creating an understanding of what “innovation” means is crucial in successfully disseminating it within the environment. A second issue is placed within understanding innovation education and the importance put on it.

The author of this research puts forward a hypothesis that university education is the most important condition for the development of an innovation-oriented economy and that the creation of an innovation society requires the modernization of university education. This study is built on examining an individual’s understanding of the term innovation. By looking at undergraduate and postgraduate students, it is hoped to ascertain what role education plays in developing the notion of “innovation” and innovation education with the purpose of assessing it.

This study looked to address the following research questions:

- How is the idea of innovation disseminated?
- How is innovation education assessed by students at the Warsaw School of Economics in Poland?
- Do students perceive any correlation between innovation and entrepreneurship?

2. Literature review – the concept of innovation

The term innovation is derived from the Latin term *innovare* (to make something new) and most definitions about innovation highlight the exploration and exploitation of new knowledge. Innovation is the production, diffusion and use of new and economically useful knowledge [Lewrick et al. 2011]. The first point to make is that innovation is not invention. Invention must be seen as the initial step “*in a long process to bringing a good idea to widespread and effective use*” [Tidd et al. 2003, p. 38]. Innovations are the commercialisation of inventions. However, the concept of innovation has evolved significantly in recent times. It appears that the complex theories of innovation can be explained by the increasing extent of social ingredients in the explanation of innovativeness. Originally based on tangible forms of capital and the necessity of pull and technological push, innovation management is today integrated in a much larger system [Lewrick 2007].

Innovations play an important role in the development of modern socioeconomic systems [Hartono, Sheng 2016; Wu 2016; Wu et al. 2016]. Due to the innovative activities of business, the level of the satisfaction of public needs grows [Coad et al. 2016].

Innovations are a driver of a development of innovational society [Jackson et al. 2015] and the most important condition for the formation of an innovation-oriented economy [Jegade et al. 2016]. Innovations ensure the increase of the economic effectiveness of modern economic activities [Xie, Li 2015] and create possibilities for the satisfaction of the growing needs of people, which increase with the growth of the global population [Gatarik, Born 2015; González-Pernía et al. 2015].

Innovation, therefore, is to be regarded as an instrument of necessary and positive change. Any human activity (e.g. industrial, business, or educational) needs constant innovation to remain sustainable.

3. Innovation education

Innovation education has been identified as a key contributor to enhancing the innovative behavior of individuals, organizations and economies.

A university which operates on a very competitive educational market must emphasize the improvement of the service it provides and the product itself, which is education in a specific field. Cultural changes, the decrease in the number of potential clients due to the demographic decline in Poland, the large number of universities (public and non-public), the increasingly higher expectations of clients-students, force universities to self-improve. At the same time, in recent years, the image of a university is being built which should help students to enter the labor market. Amendments to the Law on Higher Education, the emphasis on practical education are in line with the expectations of a university formulated by students - acquiring practical, useful knowledge that can be easily applied to work.

Education not only needs new ideas and inventions that shatter the performance expectations of today's status quo; to make a meaningful impact, these new solutions must also "scale," that is grow large enough to serve millions of students and teachers or large parts of specific underserved populations [<https://robertslavinsblog.wordpress.com/2011/09/28/education-innovation-what-it-is-and-why-we-need-more-of-it/>, 2018]. Lack of innovation can have profound economic and social repercussions. America's last competitive advantage, warns Harvard Innovation Education Fellow Tony Wagner, its ability to innovate, is at risk as a result of the country's lacklustre education system [<https://www.forbes.com/sites/ericaswallow/2012/04/25/creating-innovators/#1d6c31c77202>, 2018].

It is widely believed that countries' social and economic well-being will depend to an ever greater extent on the quality of their citizens' education: the emergence of the so-called 'knowledge society', the transformation of information and the media, and the increasing specialization on the part of organizations all call for high skill profiles and levels of knowledge. Today's education systems are required to be both effective and efficient, or in other words, to reach the goals set for them while making the best use of available resources" [Cornali 2012, p. 255]. According to a report from the Organization for Economic Cooperation and Development (OECD) "the pressure to increase equity and improve educational outcomes for students is growing around the world" [Vieluf et al. 2012, p. 3].

The situation regarding the Polish market is very similar, although certain steps have been undertaken to change the status quo. On October 2, 2007 the Commissioner for Regional Policy, Danuta Hübner, approved the decision of the European Commission accepting the Innovative Economy Program for implementation. On October 30, 2007 the Council of Ministers adopted a resolution regarding the adoption of the Innovative Economy Program.

The Innovative Economy Program is one of the six national programs of the National Strategic Reference Framework, which is financed from European funds. It is a program aimed primarily at entrepreneurs and Universities who intend to implement innovative projects related to research and development, modern technologies, investments of high importance for the economy or the implementation and application of information and communication technologies.

An example of one such programme is Innovative education starting from kindergarden up to University. University of Young Researchers supports gifted secondary school students, and students of high schools in developing creativity and scientific passion. On the other hand the Academic Center of Creativity is a program addressed to universities that educate future teachers. During 2007-2013, under the Program, entrepreneurs, business environment institutions, research and scientific units as well as public administration institutions received support to the amount of EUR 10,186 billion for the implementation of various types of projects that contribute to increasing the innovation of the Polish economy and Polish enterprises. Of that amount, EUR 8.658 billion come from the European Regional Development Fund

(ERDF) and the remaining EUR 1.527 billion from the national budget [https://www.poig.2007-2013.gov.pl/WstepDoFunduszyEuropejskich/Strony/o_poig.aspx].

The program aims to support broadly understood innovation. This will be both direct support for enterprises, business environment institutions and scientific units providing high quality services to enterprises, as well as systemic support ensuring the development of the institutional environment of innovative enterprises. The program will support actions in the field of product, process, marketing and organizational innovation, which directly or indirectly contribute to the creation and development of innovative enterprises. The program was also used by, inter alia, universities, research and development institutions and public administration. As a result, innovative technologies are created, access to e-services is increased, and the scientific base is modernized [https://www.poig.2007-2013.gov.pl/WstepDoFunduszyEuropejskich/Strony/o_poig.aspx].

Another programme is called: Intelligent Development, which is also supported by the European Union. The programme operation is directed for 2014-2020. The program has been approved by the European Commission. The Intelligent Development Program will support the conduct of scientific research, the development of new, innovative technologies and activities to improve the competitiveness of small and medium-sized enterprises. Its main goal will be to stimulate the innovativeness of the Polish economy, by increasing private expenditure on R & D and creating the demand of enterprises for innovation and research and development. [<https://www.funduszeuropejskie.gov.pl/strony/o-funduszach/dokumenty/program-inteligentny-rozwoj-dokument/>]. To the best of the knowledge of the author none of the programmes developed by the Ministry of Education has been introduced directed towards higher education institutions.

4. Research design

A questionnaire was developed and tested by US students, and was administered during obligatory Management class in May 2017 in Poland. The questionnaire was also possible to be filled in by a link given to the students using a Google form. The questionnaire used open format questions to grasp the students' understanding of the term innovation and innovation education. This is the first stage of research which will be supplemented later by a qualitative research.

This study used a survey tool consisting of 13 questions in total¹. Questions 1-7 focused on participants' demographic information. Collection of this data was considered critical to understanding the impact of culture (regional, national, and educational) on the development of each participant's understanding of innovation. Questions 8-10 gave each participant the opportunity to define the terms "innovation"

¹ The first draft of the questionnaire was developed by Justin Fruehauf from the Robert Morris University in the USA, and in its later stage was amended by the author to include the entrepreneurship spectrum in the research. The preliminary research was published in the Proceedings of the Make Learn and TIIM International Conference 17-19 May 2017, Lublin, Poland, and used very simple coding.

and “innovation education” as well as to describe their experiences with innovation during their tenure as a university student. Question 10 was not taken into consideration as nearly all students did not answer it: how is innovation taught at this institution? Students pointed out that question 10 and 11 meant the same thing for them. Question 12 provided the participants with the opportunity to share any additional information they felt would be relevant to the study. Question 13 asked the students if they perceive any correlation between innovation and entrepreneurship. Table 1 presents sample content including main characteristic of the respondents.

Table 1. Sample content

Polish Students			
Total	Age Range	Major	Degree
103 Students Total: 57 Female 46 Male	Age 18 – 29 Age 18/19: 2 Total 2 Male >19: 98 Total 57 Female 44 Male	Finance 8 Female 7 Male Logistics 27 Female 36 Male Management 22 Female 3 Male	Bachelor’s Degree 90 Total 49 Female 41 Male Master’s Degree 8 Female 5 Male

Source: own development, $n = 103$.

The study focused on undergraduate university students at the Warsaw School of Economics. As stated in the literature review, innovation has been a topic of much interest in the Polish economy since 2007. Poland was chosen for the study given its rise in economic standing in the EU and the call from the World Bank to explore more innovation opportunities to keep the Polish economy growing. According to the World Bank Regional Director for the EU, Arup Banerji, “If Poland wants to continue its ascent and meet the rising expectations of citizens, it needs to build on its reform successes – such as prudent fiscal policy – but also initiate new reforms around innovation and progressive labor market regulations and institutions.” The survey was administered live in classes in an open question format. The researchers felt this was necessary to capture each participants’ individual understanding of the terms “innovation” and “innovation education” with as little bias as possible. The survey results were collected and compiled for analysis.

5. Results and discussion

The need for innovation education has become acute. “It is widely believed that countries’ social and economic well-being will depend to an ever greater extent on the quality of their citizens’ education: the emergence of the so-called ‘knowledge

society', the transformation of information and the media, and increasing specialization on the part of organizations all call for high skill profiles and levels of knowledge. Today's education systems are required to be both effective and efficient, or in other words, to reach the goals set for them while making the best use of available resources" [Cornali 2012, p. 255].

Table 1 demonstrates that the ratio of male students to female students, while not identical, is close enough to provide any indications of diversity of definitions of "innovation" and "innovation education" between the genders.

After compiling the data using Microsoft Excel, the researcher searched for patterns in the answers. When asked to define the terms "innovation" and "innovation education" a number of interesting patterns presented themselves. In some instances students from one group of specialization used terminology to a greater extent than their counterparts, in other instances there was an overlap of terminology, both scenarios are presented in the tables below, followed by discussion.

Table 2. Terms used to define "Innovation"

Term	Answers
„New” solution	36%
New, revolutionary Idea	12%
Improv(e, ing)	36%
Technology	7%
Creativity	2%
Change, Progress	7%
Thinking outside the box	2%

Source: own development, $n = 103$ students.

As presented in Table 2, for Polish students innovation refers mainly to new solution 36% and improving 36%. As one of the students stated: "To put it in short I would say innovation is the application of better solutions that meet new requirements, unarticulated needs, or existing market needs". New, revolutionary idea is inclined with innovation for 12% of students. In the USA thinking outside of the box is very often accentuated and not so much in Poland, as only 2% of students named such meaning. Terminology was equal between genders when put in the context of percentages of each gender participants, thus gender was not a factor in the answers given in this study. Interestingly, the participants used the word "product" as a part of their definition as well. Very often the word creativity is used interchangeably with the word innovation, this was not the case in the following research. Students were also asked to define the term innovation education. The results are presented in Table 3.

The majority of answers (41%) were given to the statement that innovation education helps to understand what is innovation and teach students how to be

Table 3. Understanding the term innovation education

Innovation education (Coding)	Polish students sample
Helps to understand what is innovation, and teach how to be innovative	41%
Sharing knowledge (peer to peer learning)	2%
Using innovative tools, equipment, technology advancement	14%
Implementing new ideas for education purposes/ looking for new opportunities	9%
Teaching news skills for future innovative processes	6%
Adapting new, more engaging methods and effective teaching strategies	22%
Linking theoretical and practical skills	5%

Source: own research, $n = 103$.

innovative. The second most popular answer was directed towards adapting new, new engaging methods and effective teaching strategies.

As the data are of a qualitative character it was necessary to assess the correlation between the understanding of innovation, and innovation and innovation education $\rho = -0,12778$ which shows there is no correlation between the two concepts.

In neither case did age or major concentration of study appear to be a factor in the terminology chosen by the participants. Innovation education was implicitly interpreted as innovation for education –particularly the delivery of education.

Students were asked to assess how innovation is taught. Although the question was quite general we meant to find out in which direction the answers would go. The answers were quite wide, starting from the assessment of the education process to the explanations of ways of how to teach innovation. Table 4 presents the answers obtained. The answers were coded into nine possible categories.

Table 4. Teaching innovation

Teaching innovation-coding	Answers
Through business projects we take part in, students activity in students organisations	12%
Mixing companies experience and university knowledge to create something valuable for both. To create synergies	3%
It is taking place during classes, conferences, workshops, skills seminars	18%
New ways of teaching (interactive, interesting) by faculty teachers	13%
Average, SGH lacks new ways of teaching, low level of practical implementation	12%
I am not familiar with it. Too early to say	8%
Poor	1%
Innovation cannot be taught	1%
It is not being taught	30%

Source: own research, $n = 103$.

The answers are quite interesting. Some of the students were trying to assess the education by pointing out how innovative education is at SGH, whilst the others were pointing out ways how SGH is being innovative in terms of delivering the courses. The most striking is the answer given by 30% of students who report that innovation education is not being taught. 12% of students assessed it as an average pointing out that SGH lacks new ways of teaching and there is a low level of practical implementation. This shows an urgent need to adjust the curriculum to changing market needs.

Entrepreneurship and innovation are widely regarded as an important basis for competitive advantage in a rapidly changing international business environment, enhancing the capabilities for sustainable business growth, economic activity and the wealth of nations [Crossan, Apaydin 2010; O'Connor 2013]. Entrepreneurship relates to the discovery, evaluation and exploitation of opportunities in the process of business start-up, creation and growth; entrepreneurial dynamism is key to economic renewal and growth [Shane 2012; Lewrick et al. 2011]. Innovation relates to the development, adoption and exploitation of value-added activities in economic and social areas; a key factor for competitiveness and growth [Crossan, Apaydin 2010; Lewrick et al. 2011].

Despite the linkages and synergies between the two disciplines, entrepreneurship and innovation education and training remain two distinctively unique disciplines; each with its own separate body of knowledge and outcomes [Shane 2012]. Therefore it was interesting to see what correlation – if any – students perceive between these two notions of entrepreneurship and innovation. Students offered very wide range of answers which were categorised into nine categories which are presented in Table 5.

Table 5. Correlation between entrepreneurship and innovation

Entrepreneurship and innovation – coding	Answers
Two terms are strongly related to each other. (we should be innovative when we want to set up a business. If you want to implement innovation you need to possess entrepreneurial skills)	40%
Entrepreneurship is part of innovation. Entrepreneurship accelerates innovation.	15%
Innovation can be a basis for a new company. Innovation is about going forward	24%
I believe every entrepreneur is an innovator	24%
Innovation and entrepreneurship means taking risk for a future profit	3%
Innovation and entrepreneurship improves current solutions	4%
Without innovation there is no entrepreneurship	1%
Two terms are totally different. Entrepreneurship can exist without innovation	4%
There is little correlation. You can be an entrepreneur using old schemes	1%

Source: own research, $n = 103$.

The above table indicates interesting results. For many students, innovation and entrepreneurship are linked to each other (40%). Students are aware that we should be innovative when we want to set up our own business and that successful

entrepreneurs' projects have a high level of innovation. This is line with the viewpoint of Drucker (1909-2005) that innovation and entrepreneurship are interlinked. He explains and analyses the challenges and opportunities of a new entrepreneurial economy. "Innovation is the specific tool of entrepreneurs, the means by which they exploit changes as an opportunity for a different business or service. It is capable of being presented as a discipline, capable of being learned, capable of being practiced." [Drucker 1985, p. 32].

Students perceive strong correlations both ways. Innovation is a prerequisite for entrepreneurship and the other way around. This shows a very open approach of Polish students. They are aware that in order to be entrepreneurial, one needs to be innovative as well. This research calls for a greater attention to link entrepreneurship and innovation programmes. This does not exclude teaching them separately, but including both at one module. Innovation is the specific tool of entrepreneurship by which entrepreneurs exploit change as an opportunity for a different business or service.

Bolton and Thompson define the entrepreneur as a person who habitually creates and innovates to build something of value around perceived opportunities (p. 16).

6. Conclusions

The research results offer interesting insights. First of all, students perceive innovation in the wider perspective. Secondly, innovation education is not assessed highly by students of the Warsaw School of Economics, and thirdly there is an urgent call for combining entrepreneurship and innovation as in one module, as currently very often these two notions are regarded separately. It must be stated that the research results cannot be generalized to the whole population of business students in Poland, as the sample is not representative. The research sheds light on the students' perception of innovation and innovation education.

To create innovations, we need innovators, and lots of them. Although innovation is often a spark originated in the mind of a bright person, it needs an environment that can feed the fire. This environment is formed and fed by educational institutions, societal culture, and an advanced economy. Csikszentmihalyi underlines the importance of creating a stimulating macro-environment which integrates the social, cultural, and institutional context, and also a microenvironment, the immediate setting in which a person works. "Successful environment [...] provide(s) freedom of action and stimulation of ideas, coupled with a respectful and nurturant attitude toward potential geniuses" [2013, p. 140]. Control over such an environment, he reasons, is in the educators' hands.

The research calls for embracing entrepreneurship and innovation education to be combined into one module, pointing out to the role of educators.

Then, when the invention is created, it must fall onto fertile ground like a seed and be cultivated to grow and bear fruit. Csikszentmihalyi writes, "Creative ideas

vanish unless there is a receptive audience to record and implement them [...]. Edison's or Einstein's discoveries would have been inconceivable without the prior knowledge, without the intellectual and social network that stimulated their thinking and without the social mechanisms that recognized and spread their innovations" [2013, p. 6]. The audience is not only the educators but also the students, parents, policy makers, and all other members of society who act either as implementers or consumers of the innovation.

According to the famous Bulgarian scholar Georgi Lozanov [1988)], learning is a matter of attitude, not aptitude. This is where the greatest potential for improving education lies. As the renowned cognitive scientist, Daniel Willingham writes, "[...] education makes better minds, and knowledge of the mind can make better education" [Willingham 2010, p. 165]. The most important goal, therefore, should be to cultivate innovative people, grow their autonomy, self-efficiency, and foster an entrepreneurial mindset or "a critical mix of success-oriented attitudes of initiative, intelligent risk taking, collaboration and opportunity recognition" [Zhao 2012, p. 5]. To help develop new survival skills, effective communication and critical thinking skills, and nurture curious, creative, critical thinking, independent and self-directed entrepreneurs, we must change the ways of our school system and the ways our teachers are prepared. It may be worthwhile to extend the commonly used term "career readiness" to "life readiness." Coherent systemic support is essential for growing innovations.

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