

# Entrepreneurship education as a factor of society's modernization

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**Abstract.** Entrepreneurship education (EE) is often regarded as one of the most important elements of the policy of stimulating small business and self-employment, creating start-ups and innovative business projects. The implementation of EE in the system of professional training at a new stage in the development of society could significantly increase the potential of using universities in the process of economic growth. The article sheds light on the nature and features of EE, analyzes the prospects and difficulties of its integration with other areas of training. The study demonstrates great prospects for the implementation of EE into the program of higher education training. EE has to be concentrated around several important characteristics of entrepreneurship and entrepreneurs themselves. The implementation of EE at the curriculum and extra-curriculum activities at the institutions of higher education of Ukraine, the combination of theoretical, problem- and project-oriented learning with the immersion into practical activities concerned with business planning, creating and running, training of students in groups together with nascent and experienced entrepreneurs would be extremely useful and productive in terms of motivating more and more young people to take an entrepreneurial path and achieve prosperity and self-actualization. The practical realization of EE will contribute to the formation of more resilient and competitive local communities as well as a more inclusive, just, equal, and happy society.

## 1 Introduction

Private enterprise is not only the most important economic phenomenon of a market society, but also a key socio-cultural phenomenon that has made a significant contribution to the processes of modernization, the establishment of institutions, structures, value-motivational and behavioral models of a modern society. Although entrepreneurship has deeply embedded in the life of modern Ukrainian society, it has not to a full extent become the driving force behind the development of a civilized market economy and a highly developed social sphere. Private enterprise is influenced by many negative factors related to corruption, raiding, violent actions, non-compliance with contractual obligations, connections with the criminal world and corrupt officials, tax evasion, neglect of moral standards and demonstrative consumption of 'new Ukrainians' - all these occur against the background of social polarization and low quality of life of wide strata of society. Entrepreneurs themselves often demonstrate a low level of professionalism and profound anomic demoralization. In this sense, business in Ukraine is more inherent in the attributes of adventurous capitalism rather than a modern, rational variation of market relations. What can contribute to overcoming the above-mentioned maladies of Ukrainian entrepreneurship is entrepreneurship

education (EE), in particular at the level of higher professional education.

In recent years, many countries in the post-Soviet space have been discussing the need to introduce new organizational and managerial forms of interaction between the industrial and scientific-educational sectors, in particular scientific and industrial research centers based in leading universities. Such centers, which combine the financial, material, and technical resources with qualified personnel of universities, could become the driving forces of the innovative model of the country's industrial development. So, on the basis of the National Technical University of Ukraine 'Igor Sikorsky Kyiv Polytechnic Institute', the first in Ukraine innovative ecosystem Sikorsky Challenge, which is designed to attract creative youth to innovative entrepreneurship and which includes a start-up school, business incubator, venture fund and other elements of innovative infrastructure, was created and already has achieved resounding success. There innovative technological ideas are successfully nurtured, startup companies are launched and developed. Thus, Ukraine has certain successes – though local ones – in creating innovative infrastructure based on research universities. In recent years one can observe the growth of interest in entrepreneurship education. It is often considered as one of the most significant elements of the policy of

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stimulating small entrepreneurship and self-employment, creating start-ups and innovative business projects. However, even in the developed countries, the most advanced in terms of introducing education in the field of business administration, the issue of EE implementation remains quite relevant. As a matter of fact, there is an essential difference between conventional business administration and entrepreneurship education. Indeed, EE implies a broader approach, sets broader goals than business education that is more narrowly focused on creating and managing a business based on a scientific approach to management. The EE is aimed at the formation of entrepreneurial skills, approaches and models for solving problems in various fields of life, and not just in commercial activities.

Up until recently post-Soviet system of education displayed no signs of integrating this innovative and promising approach into the curriculum of contemporary higher education institutions. However, lately in a number of leading universities in Ukraine and other post-Soviet countries, an innovative environment has been created for potential entrepreneurs, for those who are willing and ready to start their own business. However, the degree of involvement of engineering students in this activity leaves much to be desired for a number of reasons, in particular, the lack of intellectual and socio-psychological preparedness as well as the lack of necessary knowledge and skills.

Despite its growing popularity, EE has not been sufficiently studied in the context of its integration with other specialized training models. In the framework of the ongoing paradigm shifts in modern higher education, a special place is occupied by the idea of combining business training with engineering education in order to form a broad social base for the development of industrial entrepreneurship. The development of private initiative in industrial sectors of the economy is particularly acute in post-Soviet countries that have experienced the de-industrialization phase – a sharp reduction in industrial production, the mass closure of plants and factories, the washing out of skilled personnel, and a catastrophic decline of the share of industry in total production. The implementation of industrial education in the system of professional training of engineering personnel at a new stage in the development of society could significantly increase the potential for using technical universities in the process of economic revival.

The major goal of this article is to reveal the prospects and difficulties of entrepreneurship education implementation in the Ukraine's system of higher education. In theoretical terms the article is inspired by life-enhancing philosophy and learning paradigm to be discussed below. The combination of these approaches allows for analyzing the peculiarities of EE as well as the prospects and difficulties of its implementation in the Ukraine's system of higher education. Methodologically, the paper is based upon the analysis of recent years publications on the issue of entrepreneurship education published in specialized Western academic journals mostly in the 2000-2010s. The publications were sorted

out according to their relevance: those papers which were directly devoted to the issue under examination and contained EE in the title or list of keywords were selected. The major bulk of publications analyzed in the given article come from the following journals: Education and Training, Journal of Small Business Management, Entrepreneurship: Theory and Practice, Journal of European Industrial Training, European Journal of Engineering Education, Industry & Higher Education, Journal of Small Business and Entrepreneurship, The Journal of Entrepreneurship, Entrepreneurship Theory and Practice, International Small Business Journal, International Journal of Entrepreneurial Behaviour & Research. The analysis of recent publications is provided in the relevant sections of the article.

The structure of the paper is determined by the following logic of explication of the presented problems. The first part of the work reveals the essence and specificity of entrepreneurial education, its functions, potential and limitations. The second part discusses the role and importance of EE in modern Europe, primarily in the EU countries, where over the past few years a policy has been implemented to expand this type of education at various levels of training. Based on several large-scale studies, the achievements and difficulties of implementing EE in higher education are analyzed. The third section of the article raises the question of the productive and creative potential of integrating entrepreneurship and engineering education.

## **2 Entrepreneurship education: concept, functions, opportunities and limitations**

The preparation of young people for the creation and development of their own business projects as a path to personal self-actualization and a driver of social development has a long and deeply enrooted place in the system of university training in all highly developed countries of the world.

In the literature one can find various definitions of the concept of 'entrepreneurship education'. The whole range of various definitions of the phenomenon can be divided into two categories – narrow and broad ones. The former put emphasis on the learning specific skills and knowledge pertinent to the initiation and successful running of business. The latter center on broader implications of this type of education, its usability in various spheres of the individual's life, both public and private. According to one, a rather narrow definition, EE should be understood as 'a conscious activity, the aim of which is to develop a student's readiness to observe and understand entrepreneurial activity and to be aware of its connections in the development of one's own personality' [1, p. 175].

EE is a focused activity that contributes to the formation of a certain way of students' thinking (mental models, ways of perceiving reality, worldviews) and relevant skills that can be utilized in the framework of entrepreneurial activity. An entrepreneurial way of thinking is understood as aspiration, ability, and willingness to translate ideas into social practice thanks

to the resources available to the individual. In brief, an entrepreneurial way of thinking promotes not just the creation of a business, but the implementation of sustainable development models. However, such an understanding of EE should be recognized as quite narrow, aimed mainly at stimulating entrepreneurship – whether it is the creation of small business or the formation of leaders of large companies.

A broad interpretation of the concept means the formation of entrepreneurially oriented and independent people capable of rational goal-setting and active solving of complex and difficult life situations. These abilities are required not only in business, but also in many other areas of life and circumstances – both ordinary and critical.

In this context it is noteworthy to put emphasis on dynamic and creative/productive force of knowledge making use of a life-enhancing philosophy put forward by Mikhail Bakhtin and Gilles Deleuze. The philosophy affirms the openness towards potentialities and transformation of life, possibility to create life beyond present experiences. Learning when considered in light of life-enhancing philosophy can also be seen as a process of self-creation, of becoming other [2, p. 60], and a road to self-actualization. They accentuate a sharp contrast between management and entrepreneurship education. The former is about various methods of control and governing in established organization settings, while the latter is about creating new ways of doing things, about re-creating old things in a new manner. People approach 'life as a multiplicity of becomings' [2, p. 63]. However, the authors stress that one can observe a certain contradiction in Swedish society between, on one hand, a cultivation of entrepreneurial approach in schools and, on the other, dominant values, norms, and discourse of society which promote large-scale high-technology driven growth and professional careers in major corporations [2, p. 68].

On the basis of the philosophy of becoming in two Swedish universities – Stockholm and Malmö – a master program in entrepreneurship was launched open to all students with diverse educational background. The specially designed program invited students to approach entrepreneurship as part of society rather than simply part of business. Students were expected to learn as much as possible from each other and would-be entrepreneurs. They worked together in small groups with business development projects in regard to real-life cases. An important conclusion has been made: heterogeneity drives creativity [2, p. 72]. The organizers also learnt that openness was important for learning to happen.

Eventually, the expansion of EE contributes to economic growth, the creation of new firms and jobs, and to the growth in the welfare of the whole society. At the same time, it should be emphasized that the benefits of developing entrepreneurial competencies go beyond purely financial profits, creation of new economic and commercial enterprises, the spread of start-up activities. In fact, it extends to other spheres of the life of individuals and society.

Additionally, EE can be considered not only at the individual, but also at the organizational and systemic level. In this case, it is understood as a comprehensive concept that modifies and explains the functioning of the entire educational institution and even educational system as a whole. In this context the purpose of education is regarded to promote the development of entrepreneurship, social activity, innovation, and creativity. In the framework of such an integrated approach, entrepreneurship is not just being introduced as a separate academic discipline or set of disciplines, but it becomes the main educational principle that guides the entire training model, an idea that combines the content and forms of all educational activities.

Numerous publications of the last two decades have emphasized the special role of the university in the development of entrepreneurial attitudes, intentions, and talents, in increasing the level of motivation for creating businesses. Scientists attempt to answer the questions 'What? How? When to teach?' within this type of education [3]. It is not easy to answer these questions, given the fact that efforts to introduce EE into university academic and extracurricular, basic and additional activities have yielded mixed results. Some studies have shown that under the influence of EE students demonstrated increased motivation and intentions to go into business [3, 4]. At the same time, there are studies that indicate that formal training in itself can reduce entrepreneurial motivation. The matter is that instead of cultivating an entrepreneurial spirit modern universities formally teach business and management and weakly affect the entrepreneurial culture itself.

Many authors call for a radical revision of the traditional approach adopted in pedagogy where well-known, classical methods and forms of teaching are used. It is not only about how important it is to apply active teaching methods, case studies, focus group discussions, disputes, debates, etc. It is about how to focus on students' requests and expectations, as well as to actively involve their everyday experience and cognitive models in the learning process. This issue has long been actively discussed in the context of the transition from the pedagogy of teaching, instruction (instruction paradigm) to the pedagogy of teaching, learning (learning paradigm) [5, p. 14]. The question is raised of an even deeper revision of the usual educational paradigm: the transition from purely functionalist ideas about what an entrepreneur should know and be able to, to comprehend the living experience of what it means to be an entrepreneur, to think and live like an entrepreneur, and to achieve success and to fail in business. The idea is to encourage current and potential entrepreneurs to reflect on the topic of their behavior and practices, the meaning and goals of their activities, and thereby stimulate creative and self-critical perception, awareness of the complexity and ambiguity of their activities, and evaluating the effectiveness of their current activities. Such an approach requires the active involvement of scientists, teachers, and practitioners (entrepreneurs, officials, representatives of business associations) in the study

process, in order to conduct a meaningful dialogue and jointly develop a model of practical learning [6].

Such a profound shift in the educational paradigm is dictated by the characteristics of entrepreneurial activity. Bird [7] describes entrepreneurial behavior as the result of a combination of rational reasoning and intuitive choice, thereby emphasizing that entrepreneurship includes creation and reflection, action and reflection; immediate response to environmental changes as well as intentional, pre-planned actions. This image of entrepreneurship as a specific activity to create new profitable enterprises requires an action-oriented approach. An entrepreneur is distinguished by his ability to take, in collaboration with others, the necessary measures to allocate resources in accordance with emerging opportunities.

### **3 Entrepreneurship education as 'learning by doing' and entrepreneurial socialization**

Recently, there have been a growing number of publications that substantiate the empirical, experiential nature of the process of learning entrepreneurship [8, 9], or 'learning by doing' [10]. It is understood that starting and doing business itself creates a learning environment in which business people search for answers to the questions of survival and development of their enterprises, decide how to act and with whom to do it. Business becomes a training organization, a sort of 'university' for entrepreneur. This does not at all preclude seeking advice, taking courses, attracting consultants, and other forms of training. However, they are all subject to the same goal, namely: the successful implementation of a business idea and business plan in life. Such training is a feedback or response to the actions of customers, suppliers, regulatory authorities, professional consultants, competitors, and other stakeholders. This training is carried out in the process of personal communication, and not by means of participating in formal forms of training [10, p. 19]. In general, this approach hinges on the results of scientific studies showing that entrepreneurs derive the lion's share of new knowledge and skills from practical experience [11]. Those with experience in building their own business are more successful at subsequent entrepreneurial activity: in particular, they more often set up a second and third start-up [12].

At present, there is no well-grounded and developed in detail theory of entrepreneurial socialization that allows researchers and practitioners to identify those factors and mechanisms that lead to the establishment of an entrepreneurial career, to the choice and successful conduct of business as a life project. However, a number of works shed light on the role certain elements of such a socialization play in guiding the individual to entrepreneurial path. For example, a study of the history of the formation and career development of the panel of entrepreneurs revealed the significant role of experience in one's youth, namely, important responsibilities in various spheres of daily life and early experience in doing business, for further choosing a definite life path.

Diverse labor and educational experiences also favorably affect the entrepreneurial motivation of youth. Specialized courses in entrepreneurship or business fundamentals can increase people's confidence in their own abilities, which is essential for starting a business career. A study of the top managers of the 500 largest American companies showed that they had solid experience – both in business and in other areas of life – before embarking on the path of a successful entrepreneur. Negative work experience in large organizations convinced some of them to choose an entrepreneurial career trajectory. Although there does not appear to be a single sequence of life events or experience patterns that lead to an entrepreneurial path, previous studies seem to indicate that early family and childhood experiences, education and training, and some work experience contribute to entrepreneurial behavior [13, p. 11]. Further studies of entrepreneurial socialization are likely to lead to the emergence of models that will better predict entrepreneurial behavior than models based solely on individual factors. Such models can underpin the development of more effective entrepreneurial training.

At the same time, the benefits of EE should not be evaluated solely in accordance with economic criteria by the direct results of training, in particular by the number of newly created companies among graduates of relevant educational programs. In addition to the immediate benefits, there are indirect positive outcomes of EE implementation that are long-term [14]. The frequency of founding new firms by university graduates depends on the type and content of EE as well as on students' profile. In some universities due to the introduction of EE the level of the founding of startups by graduates was extremely high (for example, Babson College in the USA, Twente University in the Netherlands).

### **4 Value of entrepreneurship education for modern society**

Let us now turn to the discussion of those important positive contributions that EE makes to the modernization of society. What is the significance of EE for modern society? The following key positive functions should be highlighted:

- 1) The formation of such a social environment that would be favorable for the initiation and development of business, for increasing the level of socio-cultural legitimacy of entrepreneurship and, thereby, for the growing attractiveness of business career for the younger generation. The fulfillment of this task should be based on scientifically verified facts obtained as a result of studying the barriers to involvement in entrepreneurship of both individuals and entire social groups. Of vital importance for countries with economies in transition is stimulating the development of entrepreneurial potential in productive areas of activity and deterrence in non-productive and especially destructive forms [15] and, thereby, contributing to the improvement of the business environment. The 'entrepreneurial spirit', about which Max Weber wrote so vividly, has a tendency to periodic fluctuations - in some periods of history it flares up,

whilst in others it fades out. EE is designed to give it a new impetus.

2) The distribution of entrepreneurs between productive and unproductive activities can have a significant impact on the innovativeness of the economy, the rate of economic growth, technical and technological progress, and the level of economic development of society. The widespread presence in society of incentives for unproductive entrepreneurship holds back competition, investment in industry, the growth of labor productivity, the introduction of advanced technologies, and the modernization of the economy. However, it should be emphasized that not only the modification in the structure of remuneration is important, but also the system of preferences of the entrepreneurs themselves, their goals and cultural factors, which can be modified under the influence of education.

3) The attraction of entrepreneurial talents to those areas of economic activity, which often remain of little demand, but they are the ones who make an indispensable contribution to the development of economic potential and improving the well-being of the whole society. In particular, we are talking about industrial production.

4) The development of entrepreneurial motivation among students by creating a high need for achievement, along with other components of entrepreneurial motivation complex, encouraging interest in business and the desire to create and develop their own innovative projects.

5) Giving encouragement for the formation among students of attitudes, approaches to solving problems, ways of thinking and patterns of behavior conducive to successful entrepreneurial activities.

6) Teaching specific entrepreneurial competencies for students, in particular the ability to see hidden opportunities, put forward innovative ideas, generate insights, find niches, and to fill in the 'structural holes' referred to in the structural theory of social networks [16]. An entrepreneur occupies a structural void when he unites previously unconnected individuals, groups, and organizations, contributing to the creation of a more integrated social structure.

7) Development of competencies demanded in the conditions of the post-industrial economy and highly mobile labor market: innovativeness, creativity, enterprise, ability to translate ideas into reality, rationality and the ability to reasonable risk, responsibility, as well as ability to conduct successful negotiations.

Despite the fact that EE is gaining popularity in recent years, there are a very limited number of publications in which the effectiveness of this type of training is empirically verified. One of the rare examples of this kind of research reveals whether the level of involvement in business is different among graduates of a master's program aimed at developing entrepreneurial competencies compared with graduates who studied in related programs. Graduates from different years (1987 – 1994) of one of the Norwegian business schools were studied. It turned out that graduates who specialized in training in the field of entrepreneurship showed better

results for all the characteristics that have entrepreneurial content (the number of self-employed, the number of firms founded after graduating from a business school, the number of people who founded firms and owned firms at the time of the survey, as well as the number of graduates who preferred self-employment). The study demonstrated the close relationship between specialized entrepreneurship training and subsequent entrepreneurial behavior – both actual and potential in the form of intentions to start a business or become self-employed in the future [17, p. 158]. At the same time, the authors noted a number of limitations of this study. In particular, the goal of entrepreneurship education is not only to help create more firms, but also to improve the quality of the business. The study did not in any way evaluate the qualitative characteristics of the established enterprises. Anyway, the data obtained speaks in favor of EE. Both the behavior and intentions of those who specialized in entrepreneurship differ from the behavior patterns of those who choose other areas of specialization. Based on this and a number of other studies, it can be concluded that entrepreneurship, at least in part, is determined by factors that lend themselves to formation and change in the learning process.

There have been repeated and yet unsuccessful attempts to develop diagnostic tests, procedures, questionnaires that would help in the process of entrepreneurial training. In the late 1990-s, on the basis of Schön's theory of practical training [18] and Kolb's model of action education [9], the 'entrepreneurial action ability' test was developed [19]. Such a learning model is akin to the so-called action research [20, 21, p. 126], in which an individual or group of people can learn from their own experience and make this experience accessible to others. The purpose of such training is to solve a practical problem, improve the activity, and increase its effectiveness. In the case of EE, this strategy implies an attempt to answer the question 'how?'. The emphasis is on enhancing the rationality of action, in contrast to the traditional approach, based on the priority of rationality of decision [19, p. 158]. A test of entrepreneurial action ability can serve as an important diagnostic tool to identify the relationship between the ability to act and the actual actions to create a business.

Another important aspect of EE is the learning model itself. Gibb [10, p. 24] distinguishes between traditional ("didactic") and entrepreneurial learning models, which are fundamentally different in their approaches to mastering the material, the role of teacher and student, the nature of educational tasks, and modeling of learning environment.

Thus, in the process of implementing EE the very paradigm of education in higher education is gradually changing, becoming more and more problem and project-oriented, aimed at a more harmonious combination of theoretical knowledge and practical skills, more flexible and open to new experience, requiring greater return and reflexivity by students and teachers.

## 5 Entrepreneurial education in Europe as a factor in the transformation of society

Since the 80s of the XX century in the USA and many countries of Western Europe EE programs are actively developed with the involvement of the state, business and civil society organizations. Since then, EE has become quite widespread on the European continent. Training programs have been introduced and adapted to the needs of different target groups. Various institutions have been involved in the development of EE curriculum. In recent years, the concept of EE, which became widely accepted and almost universally accepted, was used primarily in the USA in the 1990s. In the UK they prefer to use the phrase 'enterprise education' [10, p. 12]. In the British educational system, the emphasis was on the formation of the personal qualities of entrepreneur.

According to a large-scale study covering 31 countries, including 27 EU member states, approximately 5 out of 21 million students studying in European universities, are directly involved in certain types of EE. At the same time, 11 million students do not have access to any form of classroom or extracurricular activity that seeks to cultivate an entrepreneurial spirit [22, p. 22]. In this regard, a united Europe lags significantly behind North America, where the cultivating of entrepreneurial attitudes and skills has been lasting for a long period of time.

The implementation of EE is carried out on the basis of the Entrepreneurship Action Plan adopted in the EU in 2004, which created a strategic framework and set five major goals in the field of policies aimed at stimulating entrepreneurial dynamism. One of these goals concerns the development of entrepreneurial attitudes and style of thinking that would help EU countries successfully cope with the challenges of the modern era and attract a sufficient number of people in the field of private entrepreneurship [22, p. 13]. Despite the course officially adopted by the EU, discussions are ongoing regarding the need and specific forms of introducing EE at universities.

Until now, entrepreneurship courses have not been sufficiently integrated into the curricula of European universities, especially those countries that joined the EU in 2004. Entrepreneurship is taught mainly in economic specialties and in business schools. At the same time, the lion's share of professions does not include entrepreneurial disciplines in the curricula.

However, over time, the situation is changing: EE is gaining a wider field in the training of highly qualified specialists. One of the pioneers in the widespread introduction of entrepreneurial and business education is Finland. In the late 1990-s this small Scandinavian country began a comprehensive reform of the entire education system, one of the key components of which was the implementation of entrepreneurial modules at all levels of training. Gradually, entrepreneurial approaches to educational activities were introduced at all levels and now form a continuum from elementary school to college and university.

The pan-European policy of stimulating entrepreneurship sets the task of improving EE and more actively involving universities in activities to stimulate economic development. The documents of the European Commission note the importance of EE in the modern world: 'In addition to equipping young people with the skills needed for the 21st century, entrepreneurship education is a means to increase social inclusion; it can increase the number of entrepreneurs – social and commercial, and it can be a gateway for a greater integration of the framework for key competences for lifelong learning' [22, p. 7].

A large-scale study supported by the European Commission in 2012 revealed the effectiveness of EE programs offered by universities in four main areas: the development of key entrepreneurial competencies, intentions in relation to entrepreneurship, the impact on individual employment prospects, and the impact on the economy and society overall [22, p. 8]. The study was based on a comparison of various characteristics of graduates of two types of educational programs: those on which, along with the main specialization, training was also carried out within the framework of EE, and those that did not undergo entrepreneurial training. Those who underwent such training demonstrated more clearly expressed entrepreneurial attitudes and intentions, quickly found work after graduation, showed a greater inclination and ability to innovate, even being in the role of employees, and more often established their own companies. As the results of the study show, training in entrepreneurial programs positively affects almost all characteristics that are important both for entrepreneurs themselves and for the whole modern society. It is these characteristics that form the basis of a productive economic culture of society, contribute to its dynamism, innovativeness and competitiveness. In addition to improving entrepreneurial knowledge, the EE contributes to the development of entrepreneurial attitudes: it increases the level of initiative, enterprise, risk propensity and the need to achieve [23]. No EE effect is observed only in the sphere of self-efficacy and structured behavior. Entrepreneurship training also develops entrepreneurial skills – creativity, adaptability, analytic abilities, social networking, and motivation. Thus, the vast majority of key entrepreneurial competencies can be formed in the process of properly organized EE.

Hirsch et al. [24] accentuate various specific forms of entrepreneurial thinking that may well be utilized in the process of EE. They include structural thinking, bricolage, effectuation, and cognitive adaptability. 'Entrepreneurs think differently from nonentrepreneurs. Moreover, an entrepreneur in a particular situation may think differently from when faced with some other task or decision environment. Entrepreneurs must often make decisions in highly uncertain environments where the stakes are high, time pressures are immense, and there is considerable emotional investment. We all think differently in these strained environments than we do when the nature of a problem is well understood and we have time and rational procedures at hand to solve it. Given the nature of an entrepreneur's decision-making

environment, he or she must sometimes (1) think structurally, (2) engage in bricolage, (3) effectuate, and (4) cognitively adapt' [24, p. 7].

## 6 Implementation of entrepreneurial education in a training program for engineers

Of particular interest are those directions of introducing entrepreneurship education, which are concerned with its integration into the training program for engineers and other technical specialists and professionals. The potentially high prospects of this area for the stimulation of business activity are explained, first of all, by deep scientific and technical knowledge among engineers and the possibility of their application in creating high-tech startups in the knowledge economy. In a market economy, the development of small and medium-sized enterprises in the field of industrial production, which can give a significant impetus to the country's socio-economic development, is particularly relevant. The implementation of entrepreneurial skills training among engineering specialists can noticeably contribute to the development of small and medium enterprises in the manufacturing sector. Demand for this kind of education also exists among engineering students themselves, a sizeable part of which take interest in entrepreneurial activity in the future.

The discussion on the introduction of EE in the training program of engineers is part of a broader debate on the issue of the modernization of engineering education, its goals and forms, the need to overcome a narrow mono-professional approach and introduce interdisciplinary training programs. Many scientists support the idea of combining engineering knowledge with the competencies necessary to create and run a business organization. They emphasize the importance for engineers to possess also managerial abilities and skills as well as to be able and ready to create their own business structures that will concentrate advanced scientific knowledge and technologies, and to become the cores of innovation. In current conditions of the formation and rapid development of the knowledge economy, engineers are faced with increased requirements – the ability to design, create and manage complex technical and economic systems, solve creative problems that require not only high scientific and technical training, but also competencies in the field of the so-called 'soft skills', namely: leadership and team work, communication and time-management, problem-solving and creativity, adaptability, interpersonal skills, and productive work ethic. However, soft skills are expected to characterize employees at different positions and of various occupations. Potential entrepreneurs have to be trained in a specific set of qualities, attitudes, cognitive and non-cognitive abilities which altogether can be called entrepreneurial skills.

It is the development of these skills and competencies that will determine the success of professional activities in the 21st century, which was highlighted by the World Economic Forum in 2015. Among the key competencies were the ability to solve

problems comprehensively, critical thinking, creativity, people management, coordination with others, emotional intelligence, ability to assess the situation and make decisions, ability to negotiate, cognitive flexibility [25]. Apparently, modern education should also focus on the formation of these competencies. It is worthwhile to draw attention to the fact that a significant part of the competencies highlighted above is absolutely necessary for entrepreneurs.

Studies on the impact of entrepreneurial education on the level of business development give mixed results in different countries, due to the presence of a number of cultural, institutional and structural factors that mediate this influence. Nevertheless, all the data speak in favor of EE as a positive motivator for starting own business. An interesting experience was gained in Canada, especially among students of engineering specialties. It was found that 40% of engineering graduates who completed entrepreneurial training at universities established their own firms upon graduation [26]. A comparative study of the United States and South Korea demonstrated the importance of EE in creating a supportive business culture, especially for countries with not so deep-rooted entrepreneurial traditions [27].

A number of publications discuss examples of introducing EE in individual countries or universities in diverse socio-cultural contexts, in particular, in Greece [28], Spain [29], Holland [30], Belgium [31], Sweden [32], France and the USA [4], Finland [1], Canada [26] and several other countries.

The integration of engineering and entrepreneurship education is one of the possible and promising options for a harmonious, balanced combination of the classical (liberal) and utilitarian (professional) paradigms within the framework of a single direction of professional training. In fact, we are talking about symbiosis, the interpenetration of the traditional approach to training an engineering specialty and a new interpretation of the social role and mission of an engineer not only as a carrier of advanced scientific knowledge and technical expertise, but also as a socio-economic innovator, leader, intellectual, and holder of productive motivational qualities, transformer and integrator of society based on progressive and productive values. Moreover, the dissemination of such values among the general public, including those who are not directly involved in business activities, increases entrepreneurial potential and creates a favorable breeding ground for nurturing business talents, both commercial and social. Thus, the rest of society also benefits from the growth and expansion of carriers of productive values, attitudes and patterns of economic behavior.

An analysis of existing approaches to the training of entrepreneurs allows us to highlight the key limitations and shortcomings in the established model of EE:

- 1) It is inapplicable due to the low efficiency of classical teaching methods and forms that ignore the complex and diverse nature of the challenges, problems, risks and uncertainties that entrepreneurs face in their activities.
- 2) The historically established individualistic approach focuses on the personality of the entrepreneur, pushing into the background macro-social conditions and factors

of an institutional and structural nature that affect the development of business activity. Entrepreneur operates in conditions of high uncertainty. Learning to act in an uncertain business environment is one of the key tasks of the EE.

3) There is a narrow understanding in educational and academic circles of EE as learning how to establish and develop a business rather than how to efficiently act in ever-changing environment with limited information.

4) Rationalized systematic approach to teaching entrepreneurship by applying traditional theories and management techniques to entrepreneurial situations is poorly adapted to the social reality business people have to deal with – complex, unique, insufficiently defined, risky, and emotional conditions [6, p. 137]. This approach does not allow to plunge into the real world of entrepreneurship and to feel all the specifics of this activity. A number of studies show the effectiveness of situational entrepreneurship training, in particular through active inclusion in the family business. EE appears as a contextually determined, embedded in everyday activities, immersed in a system of social relations and obligations, as well as value and regulatory determined. Family and business act as two mutually overlapping communities of practice, fields of practice-based knowledge. EE proceeds through learning from intergenerational exchange, reproduction, and transformation [33].

The implementation of EE requires a thorough and comprehensive analysis of the macrosocial environment in which such changes will be introduced. There are several significant trends and factors that must be taken into account. First, the mass-scale expansion of higher education, which in the 1990-2000s acquired unprecedented proportions in most post-socialist countries. For example, if in the 1990/91 academic year 174.5 thousand people entered universities, institutes and academies in Ukraine, and 136.9 thousand graduates graduated, then in 2006 these indicators were 507.7 and 413.6 thousand respectively [34]. In other words, the higher education system instructs 3 times more specialists than in the late Soviet period. Second, the expansion of higher education took place in conditions of a deep economic crisis and sharp reduction of the real sector of the economy, de-industrialization of the country and a catastrophic drop in production volumes. Objectively, the national economy could not absorb such a large number of highly qualified specialists. Third, in parallel there was a sharp reduction in the training of specialists of the post-secondary vocational level, skilled technicians, craftsmen, and workers. Fourth, the increase in quantitative indicators in higher education was accompanied by a significant decrease in the qualitative characteristics of both students and graduates. Fifth, there have been radical changes in the structure of training of specialists, their distribution by industry. There was a mass decline in the sphere of technical, exact, and engineering sciences, a peculiar “flight from science” associated with the devaluation of professionalism and the pursuit of formal qualifications.

In addition to the general trends in vocational education noted above, the development of EE is also

influenced by specific factors associated with the historical processes of the formation and development of entrepreneurship itself. First and foremost, this area of independent economic activity has been banned for a long time. In the Soviet Union it was impossible to legally do business, in contrast to the socialist countries, where political regimes in most cases showed great tolerance for the carriers of entrepreneurial functions, allowing private initiative with varying degrees of freedom. The rigidity of the Soviet system in relation to businessmen negatively affected the processes of the revival of entrepreneurship in the new historical conditions: there were no generations directly related to entrepreneurial activity, and it had to be revived from scratch.

Second, the lost positive traditions of doing business and the deep economic crisis in which the formation of the private sector of the economy took place, led to the dominance of destructive socio-economic practices, the spread of unproductive forms of activity, in particular intermediary, speculative, financial operations, and the closure of industrial and manufacturing industries, the desire for quick and easy profit, narrowing the temporal horizon of economic activity, abandoning long-term investment.

Third, citizens of the newly independent states had a very vague and often wary and hostile idea of entrepreneurship, due to the lengthy process of indoctrination and massive state propaganda, which aimed to achieve the full delegitimization of private enterprise. Thus, there were no scientific and pedagogical staff, nor real entrepreneurs who could contribute to the development of EE and entrepreneurship itself.

Implementation of EE can bring both direct positive results (revitalizing entrepreneurial activity, improving the quality structure of small businesses, economic growth and improving living standards), and indirect (changes in the structure of training and employment: reducing the proportion of humanitarian, legal and economic students not related with business, profile).

At the same time, the implementation of EE is faced with a number of specific difficulties arising at the institutional level due to the conservatism of the educational institutions themselves. Among them, special attention should be paid to the following difficulties:

1) The concentration of business disciplines in business schools raises serious doubts and leads to negative consequences. As experience shows, the most innovative and viable business ideas arise in an environment related to technical, scientific, cultural creativity, among specialists who think extraordinary and are looking for ways to commercialize their creative ideas. The best option could be the introduction of EE in the framework of specialized training programs with a focus on entrepreneurship development opportunities within the framework of this program. For example, the implementation of diverse, development-oriented entrepreneurial competencies, disciplines and modules within the framework of engineering training to

stimulate business activity in the field of innovative industrial production.

2) The rigid structure of educational institutions creates difficulties for the implementation of multidisciplinary approaches. The integration of EE and education in a specific area - natural science, technical, social and humanitarian - requires overcoming a highly specialized framework. The question arises whether universities are ready to introduce such innovations. To what extent are educational institutions themselves entrepreneurial in essence, in organizational culture and everyday practices, or do they remain bastions of bureaucracy, formalism? [35]

3) Programs should be adapted to the needs of students of specific specialties, be professionally oriented. So, EE for engineering specialists should focus on innovative and technological models of entrepreneurship in the industrial sphere, on the possibility of creating and developing their own business using engineering knowledge, based on the commercialization of technical developments.

## 7 Conclusions

Thus, in the context of modernization of the higher education system, the implementation of EE may encounter serious obstacles at the systemic – structural and institutional – level. In other words, an objectively existing demand in society for the development of a productive entrepreneurial culture and the formation of relevant competencies on a large scale can be met with resistance. At this stage, hopes should be pinned on individual innovative universities that are ready to become pioneers in the implementation of EE, which is achievable thanks to wide university autonomy in accordance with the law of Ukraine ‘On Higher Education’. On the other hand, it is important to understand to what extent students and teachers are ready for this kind of innovation.

There are several formidable obstacles the implementation of EE in Ukraine will encounter. Some of them are explained by conservatism typical of post-soviet system of education with mimicry and pseudo-reforming. Others are generated by factors external in relation to the institute of education.

EE has to be concentrated around several important characteristics of entrepreneurship and entrepreneurs themselves. In our opinion, EE is expected to help overcome or at least minimize the following negative or even toxic aspects of current entrepreneurship in Ukraine: unproductive and counter-productive (e.g., speculative) forms of activity, tendency towards violence, authoritarian forms of management, close interconnections with political sphere, the spread of ‘shadow economy’ practices, and lack of sustainability (fast and easy profit-making, lack of ecological consciousness, no labor rights guarantee, etc.).

Regional authorities may well promote training for entrepreneurship and thus contribute to financially resilient local communities. This is very topical in the context of de-centralization process taking place in Ukraine during last several years. On the whole, the implementation of EE at the curriculum and extra-

curriculum activities at the institutions of higher education of Ukraine, the combination of theoretical, problem- and project-oriented learning with the immersion into practical activities concerned with business planning, creating and running together with nascent and experienced entrepreneurs would be extremely useful and productive in terms of motivating more and more young people to take an entrepreneurial path and achieve prosperity and self-actualization. The practical realization of EE will contribute to more resilient and competitive local communities as well as a more inclusive, just, equal, and happy society.

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