

**Jelena ŠAKOVIĆ JOVANOVIĆ**, full professor

(Faculty of Mechanical Engineering)

**Aleksandar VUJOVIĆ**, full professor

(Faculty of Mechanical Engineering)

**Božidar POPOVIĆ**, associate professor

(Faculty of Science and Mathematics)

*University of Montenegro*

## **THE ENHANCEMENT OF ENTREPRENEURIAL COMPETENCIES AMONG STUDENTS OF TECHNICAL SCIENCES**

### **1. Introduction**

In the Western Balkan countries, young people have long shown a preference for “secure” employment, preferably in public institutions. Research conducted within the REBUS project [1] has shown that the awareness of young people about their own entrepreneurial potential is relatively low, which is why the capacities of talented students have rarely been fully activated after employment [1].

As students of technical faculties are traditionally oriented toward acquiring professional and analytical skills, communication, creativity, and teamwork have often remained in the background. However, the modern labor market increasingly requires engineers not only to possess advanced technical knowledge but also well-developed entrepreneurial competencies — the so-called “soft skills.” Therefore, strengthening entrepreneurial competencies is particularly important for engineering students, since these disciplines have a strong potential to foster innovation and influence broader social development.

A key challenge lies in motivating engineering students to systematically develop their soft skills, given that they primarily focus on technical competencies. Nevertheless, in recent years, students have been increasingly gaining valuable experience through international projects and collaboration with industry, which has encouraged them to work on developing their soft skills, apply theoretical knowledge in practice, identify market needs, and create

innovative solutions. Analyses also show that the integration of entrepreneurship programs into engineering curricula aims to develop an entrepreneurial mindset through a combination of theory and practice applied to real-world problems [2]. Contemporary studies further emphasize that the educational needs of engineers are specific and that models based on creativity and experiential learning can effectively connect technical problem-solving with the commercialization of innovations [3].

Through a series of project activities, the University of Montenegro has enhanced the development of entrepreneurial and soft skills among students of technical disciplines, which has stimulated their creativity, self-confidence, and sense of responsibility, and contributed to a stronger formation of an entrepreneurial mindset among future engineers.

## **2. Entrepreneurial Competencies and Education**

Entrepreneurial competencies are most commonly defined in contemporary literature as a combination of knowledge, skills, and attitudes that enable an individual to recognize opportunities, develop and test ideas, take initiative, and manage risks in real-world contexts (Figure 1) [4].



*Figure 1. Entrepreneurial Competencies*

Modern approaches in higher education are shifting the focus from traditional lectures to experiential, project-based, and interdisciplinary learning, where students learn entrepreneurship “by doing” - through problem identification, solution design, prototyping, and user validation. Models such as

case studies, simulations, mentoring, and the combination of curricular and extracurricular activities have proven to be the most effective for developing an entrepreneurial mindset among students of technical disciplines [2]. Empirical studies confirm that interdisciplinary and challenge-based formats, which connect engineering, project management, and entrepreneurship, contribute to strengthening entrepreneurial competencies [4].

In line with the trend of digitalization in education, the importance of digital and gamified approaches is becoming increasingly evident [5, 6]. These models naturally align with the concept of the “entrepreneurial university” and the triple helix of university–industry–government, in which the university becomes an active driver of innovation and a partner to both the business sector and public institutions, enabling students to recognize the market potential of technologies and to develop competencies relevant for innovative ventures [2], [10].

Mentoring programs, particularly in STEM fields, significantly contribute to the growth of entrepreneurial competencies [5, 9]. Creativity and innovative thinking remain key components, especially in engineering and ICT fields [7].

### **3. The Experience of the University of Montenegro in Developing Entrepreneurial Competencies among Students of Technical Sciences**

The development of entrepreneurial competencies among engineering students at the University of Montenegro has, in recent years, been directed toward an integrated model that combines formal learning, practical challenges, and international cooperation. By connecting the academic environment with industry and partner universities, students are enabled to bridge the gap between theory and practice through experiential learning and to work on real-world challenges, thereby developing creativity, self-confidence, and responsibility. For some students, this process has even led to concrete entrepreneurial ideas or improvements in products and processes within companies.

A special contribution to this process is achieved through the combination of different approaches to learning and competency validation. Within UoM programs, a synergy of three learning modes is applied - face-to-face teaching (F2F), e-learning, and learning through practice - accompanied by partial innovations in the ECTS catalogue and the introduction of new courses, with the aim of further encouraging teamwork, problem-solving, and the development of

relevant soft skills. Programs at the University of Montenegro have been innovated in this direction through the implementation of international projects with prestigious universities, as well as through collaboration with domestic businesses.

International mobility and training at partner universities have contributed to the development of communication, teamwork, and students' self-confidence in multicultural environments, which is particularly important for engineering professions focused on innovation and technology development. At the same time, through cooperation with companies, seminar, final, and master's theses are increasingly being based on real-life case studies, allowing students to test their technical knowledge and gain a better understanding of market needs.

The development of competencies is also supported by infrastructural mechanisms (innovation hubs, laboratories, and centers) that connect the university, industry, and students. Student competitions and pre-acceleration programs further strengthen their ability to present ideas publicly, formulate market-oriented arguments, and work under evaluation pressure.

The digital and international dimension of learning has been expanded through the inclusion of UoM in COIL/VCL programs, which enable students to collaborate virtually with peers from foreign universities and to develop intercultural communication and digital collaboration skills. A pedagogically significant aspect of this approach is the use of the Level5 model, implemented through the Rebus [1] and E-Viva [8] projects, which allows students to assess their progress in three dimensions

- knowledge, skills, and attitudes - through self-evaluation and mentor validation, thus gaining a clearer insight into their own entrepreneurial competency development.

*Table 1: Levels of self-assessment*

<b>LEVEL</b>	<b>KNOWLEDGE</b>	<b>SKILLS Capabilities</b>	<b>ATTITUDES Emotions/Values</b>
5	Know where else...	Transferring	Incorporation
4	Know when...	Discovering	Commitment
3	Know how...	Deciding	Appreciation
2	Know why...	Imitating	Perspective taking
1	Know-that...	Perceiving	Neutral

The experience of the University of Montenegro shows that entrepreneurial competencies among engineering students are most effectively developed through an integrated approach that combines curriculum innovation, the blending of formal and non-formal learning, work on real-world challenges, international trainings, competitions, and COIL programs. Such a model, increasingly implemented by the University of Montenegro, not only contributes to the education of more competent engineers but also empowers young people to become proactive drivers of innovation and social change.

#### **4. Conclusion**

The paper confirms that entrepreneurial competencies among engineering students are most appropriately viewed as an integrated combination of knowledge, skills, and attitudes, and that their development is most effectively supported through experiential, project-based, and team-oriented learning, accompanied by mentoring and work on real-world problems. Contemporary approaches in engineering education emphasize that such models contribute to the development of an entrepreneurial mindset and enhance the ability to transform technical solutions into market-relevant innovations.

In this regard, the experience of the University of Montenegro demonstrates visible progress in developing entrepreneurial competencies among engineering students through an integrated approach: innovations in teaching practices and the encouragement of teamwork, stronger connections between seminar, final, and master's theses and industry, international trainings that have particularly strengthened soft skills, as well as the expansion of competition and COIL/VCL opportunities. The introduction of structured self-assessment mechanisms has further strengthened students' awareness of their own competency development. Accordingly, the case of the University of Montenegro shows that even within smaller national ecosystems, it is possible to build a sustainable model for developing entrepreneurial competencies through the synergy of curricular innovations, industry collaboration, and international educational experiences.

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