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MODELS OF TRANSFORMATIVE TEACHING IN HIGHER EDUCATION: DYNAMIC DEVELOPMENT AND CHANGES IN THE ENVIRONMENT

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Abstract:
The paper examines the relationship between higher education learning outcomes and labour market needs, with the aim of developing a model that connects learning with applicable competencies. The objective of the study is to identify appropriate recommendations that can be implemented in practice. The research explores which educational models enable knowledge to become immediately applicable and competitive, thereby improving teaching processes in order to enhance students' employability and competitiveness in the labour market.

Keywords: *Transformative learning, collaborative networks, Education 5.0, competencies, labour market*

Introduction

Education for sustainability represents one of the major challenges faced by higher education institutions (HEIs) in the context of Society 5.0. This concept promotes engineers who are capable of responding to global changes and who possess the knowledge, skills, and mindset oriented toward sustainability. Challenges in business organizations characterized by volatility, uncertainty, complexity, and ambiguity (VUCA environment), as well as the need for new workforce competencies, represent both new demands and opportunities for higher education institutions. In order to identify appropriate solutions, the importance of collaboration between higher education institutions, as well as the establishment of partnerships with companies, is emphasized [1]. This paper aims to provide insight into the educational process that supports transformative learning experiences for the development of sustainability-oriented competencies, in accordance with the concept of Education 5.0 [2] [3] [4]. The concept of Education 5.0 was introduced in alignment with Industry 5.0 and Society 5.0 and represents a shift toward modern learning approaches. In this context, the

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lessons learned and validated educational practices will be presented, along with the expected environmental changes that may contribute to addressing contemporary challenges in the field of higher education.

1. Transformative Learning Experiences

Identification of the need for transforming higher education in the context of the labor market was obtained through a review of relevant literature and analysis of previous research. Recommendations from studies conducted within two international partnership projects (Erasmus+), focused on sustainability and the improvement of the educational process through collaboration among multiple higher education institutions and the industrial sector, highlight the importance of [1]:

- collaboration between higher education institutions and companies aimed at achieving sustainable development goals and developing research outcomes and solutions aligned with the concepts of Industry 5.0 and Society 5.0 [5] [6], within which the importance of international partnerships is particularly emphasized for creating new growth opportunities, facilitating knowledge and innovation transfer, and enhancing social capital [7];
- development of new pedagogical methods that are initially implemented during one semester and then modified and improved in subsequent semesters based on evaluation and gained experience, with the possibility of integrating these methods into existing course content;
- introduction of co-teaching models in the educational process and development of joint course content in collaboration with companies;
- development of competencies in ergonomics and students' soft skills (e.g., self-awareness, creativity, and design thinking);
- collection of student feedback based on learning experience (how students felt after the activities), learning outcomes (what students learned), and educational outcomes (key messages and benefits of co-teaching sessions);
- empowering students to become drivers of sustainable development through the development of knowledge, skills, and attitudes for sustainable action.

Regarding the methods and tools used in engineering education, the following approaches are highlighted in the available literature:

Table 1: *Identified educational approaches in IEM higher education*

Teaching approach	*Brief description*
Challenge-Based Learning (CBL)	Involves solving real-world problems and collaboration with industry. It is recognized for its potential to develop transdisciplinary competencies, problem-solving skills, teamwork, communication, and entrepreneurial mindset.
Life Cycle Engineering (LCE) and experiential learning	Encourages students to consider economic, environmental, and social impacts, combining data science and robotics.
Gamification	A game-based learning approach that leads to significant development of problem-solving competencies and other skills.
Project-Based Learning (PBL)	Introduction of the "FRIYAY" framework, which promotes project-based learning on Fridays and enables students to gain hands-on experience by working on problem-based projects.
Problem-Based Learning (PBL) and Design Thinking approach	Application of problem-based learning combined with design thinking in multi-layered project groups to develop problem-solving and soft skills.
Integration of tools, software, and simulations	Integration or simulation of tools to provide students with practical experience in real-world situations.
Service-learning initiatives	Development of assistive products, including feedback from professional institutions.
Flipped classroom	A teaching model in which students are introduced to new content at home through video lectures, presentations, or materials, while class time is used for discussion, exercises, problem-solving, and practical work with instructor support.
Laboratories	Redesign of engineering courses based on mixed methods such as lectures, case studies, and laboratory discussions, resulting in strengthened entrepreneurial mindset.
Educational collaboration outside the university	Collaboration between universities, schools, and companies aimed at introducing school students to IEM disciplines and professions.

Source: Adapted from Firescu [1]

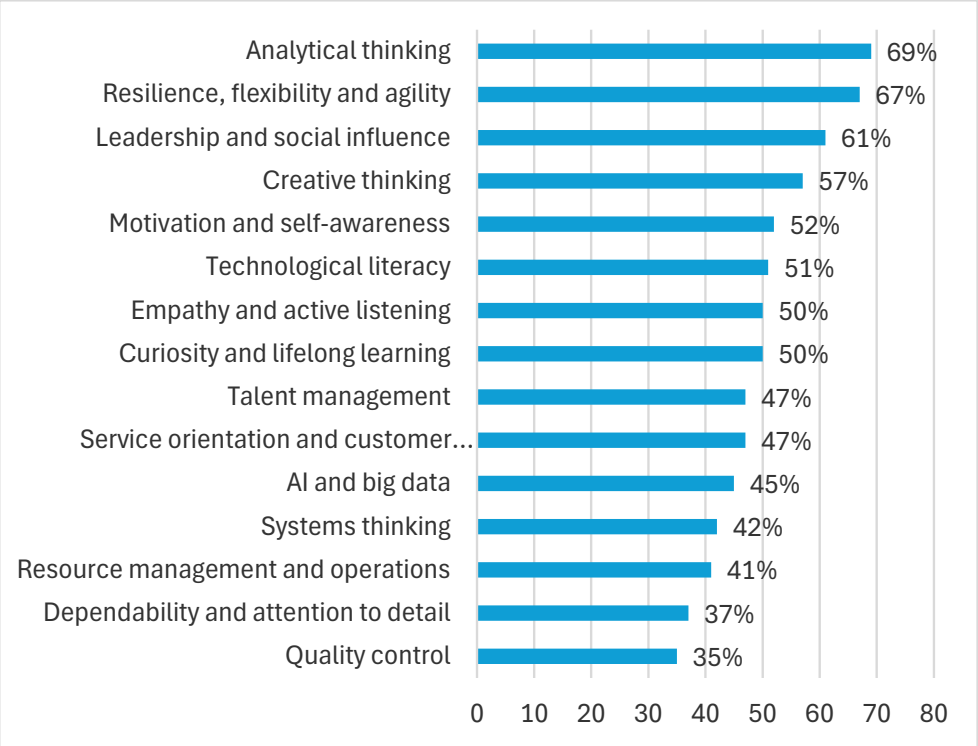
There is a research gap regarding sustainability competencies that students develop during the educational process, as well as a gap in knowledge related to the integration of sustainability into teaching practices in higher education institutions. Several challenges have also been identified, such as [1]:

- insufficient teacher training for the implementation of new methods, along with the need for continuous adaptability, as well as a lack of partnerships;
- limited resources for the creation of interactive teaching content. These limitations relate to learning resources, access to modern technologies, as well as implementation and maintenance costs;
- the necessity of continuous collaboration with industry and the business sector in order to update teaching content based on real-world situations, which represents an additional challenge for higher education institutions in the context of influencing financial decision-makers;
- the need for further research and knowledge on how co-teaching initiatives can respond to contemporary challenges in higher education;
- limited time and student motivation for participation in teaching evaluation.

2. Changes in the Environment

The Future of Jobs Report 2025 brings together the perspectives of more than 1,000 leading global employers, collectively representing over 14 million workers across 22 industry sectors and 55 economies worldwide, with the aim of analyzing the impact of these macro-trends on jobs and skills, as well as the workforce transformation strategies employers plan to implement between 2025 and 2030 [8]. Chart 1 presents the core skills identified as essential in 2025.

Chart 1: *Top 15 Key Skills in 2025*



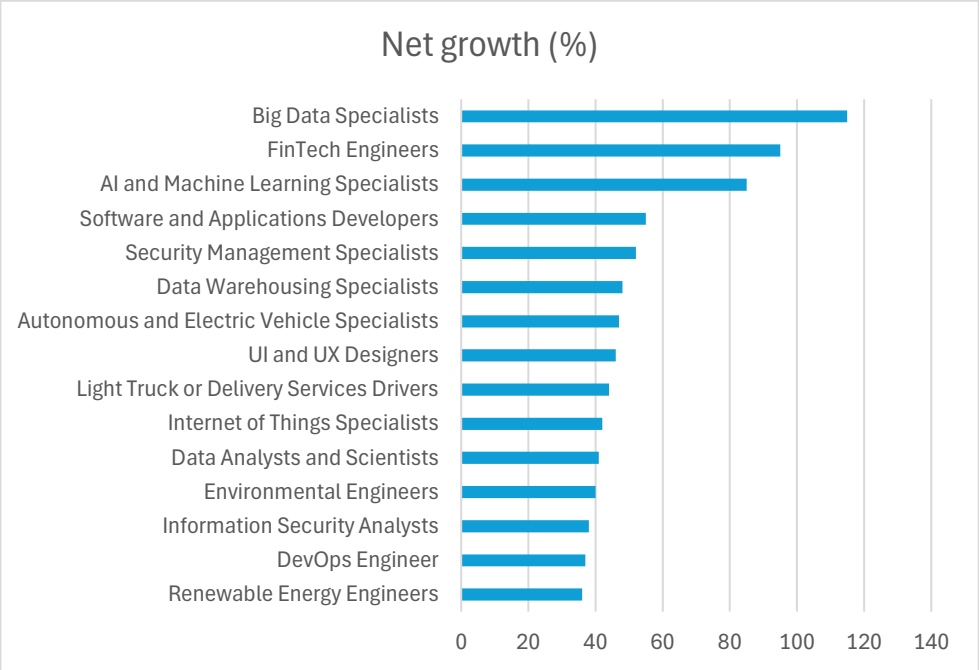
Source: Adapted from World Economic Forum (Future of Jobs Survey 2024) [8]

On average, approximately two-fifths (39%) of workers' existing skills are expected to be transformed or become obsolete between 2025 and 2030. Significant labor-market "churn" is also anticipated by 2030, reflecting a structural shift affecting around 22% of all jobs, including:

- around 170 million new jobs created (14%),
- around 92 million jobs lost (8%),
- resulting in a net increase of approximately 78 million jobs (7%).

Given the changing demands of the labor market, the need for upskilling and reskilling the workforce is expected to remain very high. Chart 2 presents the fastest-growing occupations in the 2025–2030 period, further highlighting the need to align new knowledge and skills with the requirements of the contemporary labor market.

Chart 2: *Fastest-growing occupations, 2025–2030*



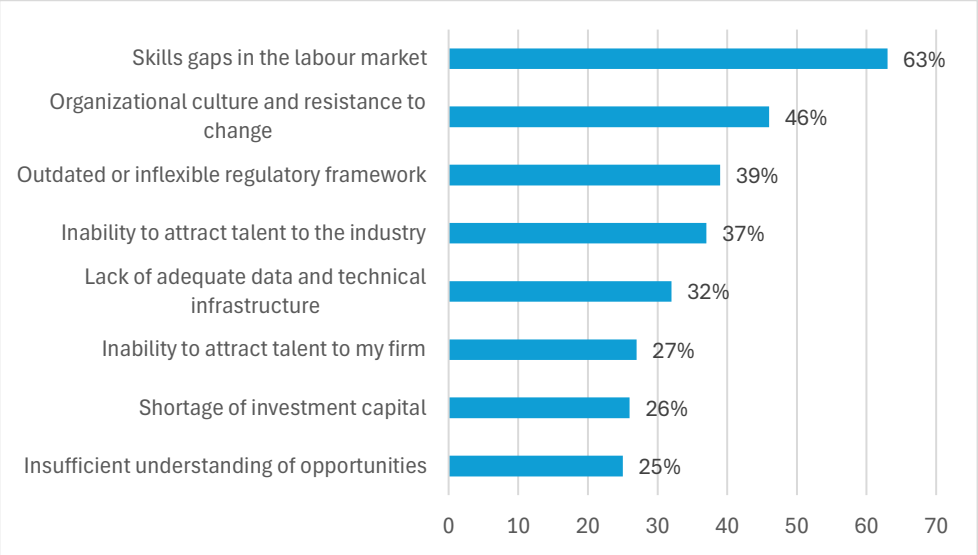
Source: Adapted from World Economic Forum [8]

If the global workforce consisted of 100 people, 59 of them would require additional training by 2030. Employers estimate that 29 could be upskilled for their current positions, while 19 could be reskilled and reassigned to other roles within the organization. However, 11 employees are unlikely to receive the necessary upskilling or reskilling, which could significantly jeopardize their employment prospects.

A shortage of skills is considered the greatest barrier to business transformation, according to respondents of the Future of Jobs Survey, with 63% of employers identifying this issue as a key obstacle for the 2025–2030 period. Accordingly, 85% of surveyed employers plan to prioritize employee upskilling, while 70% expect to hire workers with new skills. Additionally, 40% plan to reduce the number of employees whose skills are becoming less relevant, and 50% plan to redeploy workers from declining to growing occupations [8].

Chart 3 presents the obstacles that surveyed employers identify as factors that may hinder their organizational transformation.

Chart 3: *Barriers to Organizational Transformation, 2025–2030*



Source: Adapted from World Economic Forum (Future of Jobs Survey 2024) [8]

Although the requirement for a university degree remains among the important criteria for skills assessment, the significance of skills-based hiring and practical experience is increasingly recognized. Work experience continues to be the most common assessment mechanism in recruitment processes, with 81% of companies expecting to continue relying on it in the 2025–2030 period, while 43% of respondents indicate that a university degree will remain a hiring requirement through 2030.

3. Conclusion

Changes in the environment indicate that employers are increasingly focusing on work experience and skills-based hiring, rather than relying solely on résumés and formal education. Such trends pose a significant challenge for higher education. The dynamic development and changes in the internal and external environments of organizations require students to develop competencies during their studies that will make them competitive in the labor market. Key solutions include strengthening collaborative networks, developing joint curricula in cooperation with companies, implementing co-teaching, and creating innovative pedagogical methods, as well as monitoring their long-term impact on competency development.

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