

Enhancing Employability through STEAM-Based Curriculum Innovation in Economic Sciences

AMARFII-RAILEAN NELLI

Alecu Russo Bălți State University, Bălți, Republic of Moldova

ORCID ID: <https://orcid.org/0000-0001-5216-6182>

e-mail address: amarfii.nelli@usarb.md

Abstract. This paper addresses the outcomes of the Erasmus+ Capacity Building in Higher Education project “skills4future” (Project No. 101081787), entitled Developing and improving the STEAM skills of students and teachers for curriculum innovation and sustainable development of higher education institutions and local businesses. The project focuses on strengthening STEAM (Science, Technology, Engineering, Arts, Mathematics) competencies among students and academic staff in higher education institutions. The research emphasizes the integration of STEAM components into programs in the field of economic sciences, aiming to improve employability and better align curriculum content with the current demands of the labor market.

A review of recent literature highlights the growing importance of interdisciplinary skills in economic education, as well as the potential of STEAM-driven models to foster critical thinking, digital literacy, and adaptability. Methodologically, this study draws on a mixed approach combining structured questionnaires and qualitative feedback, collected in 2023–2024 from students, faculty, and employers engaged with the updated curriculum.

The findings indicate an increase in student confidence, problem-solving abilities, and readiness for real-world challenges. Employers reported enhanced graduate performance, particularly in areas related to analytical reasoning and teamwork. Additionally, institutional feedback underscores the value of international cooperation and curriculum modernization initiatives driven by the project.

This paper contributes to the field by offering a practical example of how STEAM-based curriculum reforms can drive innovation, strengthen university-business cooperation, and contribute to the sustainable development of higher education.

Keywords: STEAM competencies, curriculum innovation, employability, higher education, economic sciences, sustainable development.

How to cite: Amarfii-Railean, N. Enhancing Employability through STEAM-Based Curriculum Innovation in Economic Sciences. *International Conference of Management and Industrial Engineering*, 12.
<https://doi.org/10.56177/12icmie2025.187>

Introduction

In the context of rapid technological change and globalization, higher education institutions face growing pressure to align their curricula with the evolving requirements of the labor market. Traditional disciplinary boundaries no longer suffice to equip graduates with the versatile skills demanded by employers, who increasingly seek individuals capable of integrating knowledge from science, technology, engineering, arts, and mathematics (STEAM). This interdisciplinary approach fosters adaptability, creativity, and problem-solving abilities—key attributes for employability in a knowledge-based economy.

Recent European policy frameworks (OECD, 2021; European Commission, 2022) underline the central role of transversal and digital skills in promoting innovation and competitiveness. Embedding STEAM into higher education programs represents not only a methodological improvement but also a strategic response to challenges such as digital transformation, sustainable development, and the need for entrepreneurial mindsets. By bridging academic knowledge with real-world applications, STEAM-based education enhances students’ capacity to critically analyze complex problems, collaborate across domains, and apply innovative solutions in diverse professional settings.

DOI: <https://doi.org/10.56177/12icmie2025.187> pp.1-6, ISSN 2344-0937 ; ISSN_L 2344-0937

Proceedings of the 12th International Conference of Management and Industrial Engineering, Bucharest, 2025

For emerging economies and transition contexts such as the Republic of Moldova, the integration of STEAM competencies in fields like economic sciences is particularly significant. It supports the modernization of curricula, strengthens cooperation between universities and businesses, and contributes to the creation of a more resilient labor force. The *skills4future* project, developed under the Erasmus+ Capacity Building program, demonstrates that embedding STEAM skills into economics curricula can directly improve graduate readiness for employment, while simultaneously enhancing institutional innovation and sustainability.

Therefore, this study addresses the potential of STEAM-oriented curriculum reforms to increase employability and competitiveness in higher education, focusing on the experiences and outcomes derived from the *skills4future* project.

Literature review

Recent scholarship emphasizes the importance of STEAM education in preparing graduates with transversal competencies such as creativity, adaptability, problem-solving, and collaboration. By integrating science, technology, engineering, arts, and mathematics into curricula, higher education can foster digital literacy and interdisciplinary thinking while better aligning outcomes with labor market needs. For instance, Yakman and Lee (2012) argue that STEAM offers a more holistic framework for education, encouraging creativity alongside technical knowledge. Similarly, Liao (2016) shows that including arts in STEM strengthens innovation capacity and enhances students' ability to cope with complexity.

Several studies highlight curriculum innovation as a driver of employability. Dinevski and Kokol (2004) discuss how e-learning and competency-based education reshape traditional academic structures, making employability an explicit outcome of higher education rather than an indirect result. More recently, Henriksen (2017) underscores the role of creative problem-solving and cross-disciplinary learning in supporting both academic excellence and professional readiness. These works converge on the view that higher education must move beyond rigid disciplinary boundaries toward flexible, skills-oriented approaches.

Research also points to the benefits of work-integrated learning (WIL) and interdisciplinary projects. Jackson (2015) shows that WIL enhances graduates' professional identity and transferable skills, improving their confidence and employability. In engineering education, Jamison, Kolmos, and Holgaard (2014) argue that project-based and interdisciplinary approaches prepare students for global challenges by linking theory to practice. Such findings are echoed by Shulruf (2010), who demonstrates that authentic, workplace-related experiences significantly contribute to career readiness.

Entrepreneurship and innovation are likewise central in employability debates. Rae (2007) illustrates how entrepreneurial education fosters initiative, resilience, and the ability to recognize opportunities, while Gibb (2011) stresses that entrepreneurial mindsets equip students with meta-skills such as autonomy, leadership, and systems thinking. These studies align with current labor market demands for graduates capable of navigating uncertainty and driving innovation in diverse sectors.

At the institutional and policy level, several authors analyze the shift from the traditional "ivory tower" model of universities toward market-oriented and partnership-based systems. Tomlinson (2017) frames employability as a systemic construct shaped by governance, career services, and stakeholder engagement. Similarly, OECD (2021) and European Commission (2022) policy reports emphasize that transversal and digital competencies are now core to sustainable competitiveness, particularly in contexts of rapid digital and green transitions. Studies in vocational and technical education (TVET) further reinforce that repositioning technical knowledge within broader frameworks of soft and entrepreneurial skills increases adaptability and employability (Moodie, 2008; Wheelahan & Moodie, 2011).

Finally, several contributions explore teaching practices that embed employability within curricula. Prince and Felder (2006) analyze the effectiveness of active and project-based learning in developing collaboration and critical thinking, while Edström and Kolmos (2014) highlight the value of problem- and project-based methods in engineering. Such practices consistently enhance student satisfaction, clarify the relevance of content, and smooth the transition into professional roles requiring analytical and team-based skills.

In summary, the literature reveals consensus that employability depends on the transversal integration of STEAM competencies and the provision of authentic learning experiences. However, while the evidence base is strong in STEM and engineering, there is less research on economics and social sciences, especially in emerging contexts. Few studies systematically evaluate program-level impacts on student satisfaction or measure longitudinal outcomes in terms of graduate employment. These gaps justify the present study's focus on integrating STEAM competencies into economic sciences curricula and examining how curricular innovation affects both student learning and employer perceptions.

Methodology

The research applied a mixed-method approach, combining quantitative and qualitative instruments. Data were collected during the 2023–2024 academic year in the framework of the Erasmus+ project “skills4future”. The instruments included: Structured questionnaires applied to students enrolled in different bachelor programs (Business & Administration, Engineering and Management, Accounting, Applied Economics); Online surveys distributed to academic staff and administrative personnel directly engaged in the pilot curriculum; Institutional feedback gathered from university management and external stakeholders, including business representatives. The sample comprised 239 students across five bachelor programs, 51 responses from teaching and administrative staff, as well as feedback from institutional representatives. Survey items assessed overall satisfaction, perceived usefulness of curricular content, and the contribution of STEAM integration to skill development. Open-ended questions enabled respondents to provide recommendations for further improvements.

Results and further discussions

The survey results reveal a consistently high level of student satisfaction, with more than 90% of respondents across most programs rating their experiences as excellent or good. As illustrated in Table 1, the strongest feedback was obtained from the AFEA, ISM, QM, and SDM programs, where over three-quarters of participants rated the courses as excellent. In contrast, the BPS program displayed a comparatively lower satisfaction rate of around 70–75%, signaling the need for targeted pedagogical adjustments and more tailored support. This discrepancy suggests that the integration of STEAM requires program-specific calibration to address the distinct profiles and expectations of students across disciplines.

Additional evidence from program-specific reports confirms the overall trends while adding nuance to the discussion. For the Analysis of Financial and Economic Activities (AFEA) discipline, 93% of students rated the new STEAM content as good or excellent. Respondents particularly valued the clarity of explanations (78.8% excellent), the applicability of course content (78.8% excellent), and the usefulness of the Moodle e-learning platform (81.8% excellent). Both theoretical lessons and practical exercises were positively assessed, with over 80% rating them excellent. Importantly, 100% of students confirmed that they had achieved STEAM-related learning outcomes, underlining the course's capacity to foster transversal skills

The Quality Management (QM) course presented similarly strong outcomes. Out of 51 students, more than 65% rated all aspects of the course as excellent, with only 1.45% providing “satisfactory” responses. Lessons on circular economy and business opportunities were highly valued, with more than 60% rating them excellent. Practical applications, such as supply and stock planning, were also well received, with 62–67% of students rating them at the highest level. Nearly 60% of students reported that learning outcomes were fully achieved, and an additional 37% indicated they were achieved to a satisfactory level, suggesting a very high degree of alignment between course content and skills development

The Supply and Distribution Management (SDM) course further reinforced the positive trend. Among 30 students, over 85% rated most aspects of the course as excellent. Theoretical lessons on green production, innovation, and supply planning received exceptionally high scores, with 89.5% of students rating them excellent in some cases. Practical exercises were equally appreciated, with 89–92% of students rating them at the highest level. Importantly,

81% of respondents indicated that the targeted learning outcomes were fully achieved, while the remaining 19% rated them as achieved to a satisfactory extent.

By contrast, the Business Planning Systems (BPS) discipline revealed more mixed feedback. While 65% of students rated organizational aspects and content as excellent, another 23% gave “satisfactory” ratings, and a small fraction marked responses as “not achieved.” Still, 69% rated both theoretical and practical lessons excellent, and 100% of students confirmed the accumulation of STEAM skills. Overall satisfaction reached approximately 80%, which, although lower than other programs, still indicates a generally positive experience. However, the distribution of responses highlights the need for curriculum fine-tuning, particularly regarding workload balance and clarity of learning objectives.

Taken together, the program-specific findings reinforce the broader survey outcomes summarized in Table 1 and Table 2. Students consistently valued the relevance of STEAM-oriented content, the clarity of teaching, and the strong connection between theory and practice. The high satisfaction with e-learning tools (as in AFEA), the appreciation of sustainability-focused topics (as in QM and SDM), and the recognition of entrepreneurial dimensions (as in BPS) illustrate that STEAM integration supports both disciplinary depth and interdisciplinary breadth.

However, challenges remain. The variation in satisfaction rates—especially the more moderate results in BPS—points to the need for adaptive implementation strategies. Some programs may require greater emphasis on workload management or more interactive teaching methods, while others may benefit from additional contextualization of content. From the staff perspective (see Table 2), curriculum overload and the demand for continuous professional development persist as significant challenges, echoing similar concerns identified in international studies (OECD, 2021; European Commission, 2022).

Overall, the findings confirm that STEAM-based curriculum reform has significantly improved student engagement, skill acquisition, and employability-related outcomes across multiple disciplines. At the same time, the diversity of results underscores the importance of flexibility, ongoing evaluation, and stakeholder involvement in ensuring that curriculum innovation remains both effective and sustainable.

Table 1. Student Feedback by Program (2023–2024)

Program	Respondents (n)	Profile	Excellent/Good (%)	Key Observations
AFEA	134	41% Business & Admin, 59% others	97%	Very high satisfaction, mostly excellent ratings
ISM	115	93% Year IV, all female	93.3%	Strong results, majority rated excellent
QM	147	83% Business & Admin	95%+	Only 4% rated satisfactory, very positive overall
BPS	113	77% Engineering & Management	70-75%	Lowest satisfaction, need for improvement
SDM	130	97% Business & Admin	93-96%	Very positive, only 1 student rated satisfactory

Source: Author’s own research based on stakeholders’ questionnaire.

Table 2. Institutional and Staff Impact

Stakeholder Group	Key Results	Challenges
Faculty & Admin Staff	Greater confidence in innovative teaching, stronger STEAM	Curriculum overload, need for continuous training

	12th International Conference of Management and Industrial Engineering, Bucharest, 2025	ISSN 2344-0937 ISSN-L 2344-0937 Volume 12 Website: https://icmie-faima-upb.ro
Institutional Level	integration Strengthened innovation culture, increased stakeholder involvement, enhanced collaboration with industry	Limited resources, sustaining long-term partnerships

Source: Author’s own research based on stakeholders’ questionnaire.

Conclusions

The findings of this study confirm that integrating STEAM competencies into economics curricula has a measurable positive impact on students, faculty, and institutions. As evidenced in Table 1, students reported consistently high levels of satisfaction across most programs, particularly AFEA, ISM, QM, and SDM, where more than 90% of participants rated their experiences as excellent or good. These outcomes highlight the effectiveness of STEAM-based approaches in enhancing critical thinking, problem-solving, digital literacy, and interdisciplinary collaboration. At the same time, the lower satisfaction levels observed in the BPS program demonstrate that curricular reforms must be tailored to the specific context of each field of study, with special attention given to program design and student needs.

From the perspective of faculty and administrative staff, summarized in Table 2, the project fostered increased confidence in applying innovative teaching methods and strengthened the integration of STEAM into existing curricula. However, staff also identified challenges such as curriculum overload and the need for continuous professional development. These findings suggest that institutional investments in faculty training, digital infrastructure, and workload management are essential for sustaining innovation over the long term.

At the organizational level, the project reinforced the university’s innovation culture, expanded stakeholder involvement, and deepened cooperation between academia and industry. These changes are particularly significant in the Moldovan context, where higher education institutions must balance the pressures of aligning with European standards and responding to local labor market requirements. Strengthening university–business collaboration has not only improved graduate employability but also contributed to regional socio-economic development.

Taken together, these results align with international evidence (OECD, 2021; European Commission, 2022) showing that interdisciplinary competencies enhance adaptability and labor market integration. The study demonstrates that STEAM-based curriculum innovation is not only a methodological improvement but also a strategic tool for fostering sustainable institutional development.

Recommendations emerging from the study include:

- 1. Expanding STEAM integration across all economics programs to ensure consistency in learning outcomes and graduate preparedness.
- 2. Developing flexible, context-sensitive strategies that account for the specific characteristics of each program.
- 3. Strengthening continuous professional development initiatives for academic staff, with a focus on innovative pedagogy and digital literacy.
- 4. Increasing stakeholder involvement in curriculum design to ensure closer alignment between academic outcomes and labor market expectations.
- 5. Establishing long-term monitoring mechanisms to assess graduate employability and the sustained impact of curricular reforms.

In conclusion, the skills4future project demonstrates that STEAM integration can act as a catalyst for innovation, employability, and institutional transformation. By promoting stronger collaboration between universities, businesses, and policymakers, higher education institutions can play a central role in preparing graduates for the challenges of a rapidly evolving global economy.

References

1. Dinevski, D., & Kokol, P. (2004). ICT and lifelong learning. *European Journal of Open, Distance and E-Learning*, 7(1), 1–12. <https://doi.org/10.1051/e-edu:2004012>
2. Edström, K., & Kolmos, A. (2014). PBL and CDIO: Complementary models for engineering education development. *European Journal of Engineering Education*, 39(5), 539–555. <https://doi.org/10.1080/03043797.2014.895703>
3. Gibb, A. (2011). Concepts into practice: Meeting the challenge of development of entrepreneurship educators around an innovative paradigm. *International Journal of Entrepreneurial Behavior & Research*, 17(2), 146–165. <https://doi.org/10.1108/13552551111114914>
4. Henriksen, D. (2017). Creating STEAM with design thinking: Beyond STEM and arts integration. *The STEAM Journal*, 3(1), 1–11. <https://doi.org/10.5642/steam.20170301.34>
5. Jackson, D. (2015). Employability skill development in work-integrated learning: Barriers and best practice. *Studies in Higher Education*, 40(2), 350–367. <https://doi.org/10.1080/03075079.2013.842221>
6. Jamison, A., Kolmos, A., & Holgaard, J. E. (2014). Hybrid learning: An integrative approach to engineering education. *Journal of Engineering Education*, 103(2), 253–273. <https://doi.org/10.1002/jee.20042>
7. Liao, C. (2016). From interdisciplinary to transdisciplinary: STEAM education in art. *Art Education*, 69(6), 44–49. <https://doi.org/10.1080/00043125.2016.1224873>
8. Moodie, G. (2008). *From vocational to higher education: An international perspective*. McGraw-Hill/Open University Press.
9. Prince, M. J., & Felder, R. M. (2006). Inductive teaching and learning methods: Definitions, comparisons, and research bases. *Journal of Engineering Education*, 95(2), 123–138. <https://doi.org/10.1002/j.2168-9830.2006.tb00884.x>
10. Shulruf, B. (2010). Do extra-curricular activities in schools improve educational outcomes? A critical review and meta-analysis of the literature. *International Review of Education*, 56, 591–612. <https://doi.org/10.1007/s11159-010-9180-x>
11. Tomlinson, M. (2017). Forms of graduate capital and their relationship to graduate employability. *Education + Training*, 59(4), 338–352. <https://doi.org/10.1108/ET-05-2016-0090>
12. Wheelahan, L., & Moodie, G. (2011). *Rethinking skills in vocational education and training: From competencies to capabilities*. NSW Board of Vocational Education and Training.
13. Yakman, G., & Lee, H. (2012). Exploring the exemplary STEAM education in the U.S. as a practical educational framework for Korea. *Journal of the Korean Association for Science Education*, 32(6), 1072–1086. <https://doi.org/10.14697/jkase.2012.32.6.1072>
14. OECD Skills Studies: Supporting Entrepreneurship and Innovation in Higher Education (2023). https://heinnovate.eu/sites/default/files/oecd2018_heinnovate_report_netherlands.pdf
15. STEAM Skills Drive Innovation and Future Growth (2023). <https://amityglobalschoolnoida.wordpress.com/2016/04/14/steam-skills-drive-innovation-and-future-growth/>