How Well Has the Romanian Higher Education Prepared Graduates for the Labor Market Changes in the Last Decade? A PRISMA-Guided Systematic Review of Outcomes and Demand Trends

Daria Elisa Vuc[1], Viorela-Denisa Stroe[2]

[1,2] Doctoral School of Economics I, Faculty of Economics and Business Communication, Bucharest University of Economic Studies, Romania
[1]daria.vuc@economie.ase.ro
[2]denisa.stroe@economie.ase.ro

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Abstract: Persistent skills mismatches and overqualification among Romanian graduates highlight a gap between higher education outcomes and labor market needs. Technological transitions have amplified the demand for transversal, digital, and green competences, yet Romanian universities remain largely theoretical and slow to adapt. Objective: This systematic review aimed to synthetize evidence on the evolution of employability skills in Romania (2015-2025) and assess the alignment between higher education and labor market requirements. Eligibility criteria: Peer-reviewed empirical and theoretical studies from 2015 to 2025, addressing employability, skills mismatch, higher education, and digital competencies in Romania were included. Information sources: Data were retrieved from Scopus, Web of Science, and relevant EU institutional repositories. Methods: Following PRISMA 2020 guidelines, 36 studies were selected through a multi-stage screening (identification, eligibility, inclusion). Quantitative, qualitative, and mixed-method studies were synthetized thematically. Results: The findings show persistent skill mismatches, limited internship opportunities, and weak university – industry collaboration. Limitations: The review excludes non-English and grey literature and relies on cross-sectional data, limiting generalization and longitudinal insight. Conclusions: Romania's higher education system shows gradual progress toward skill alignment, but needs structural reform to meet technological, digital, and sustainability challenges.

Keywords: employability; skills mismatch; higher education; Romania; competences for labor market.

JEL Classification: I23; J24; O15; O33; A12.

Introduction

With the emergence of technological progress and generative artificial intelligence, the forces of labor demand and supply began to face disruptions which pushed labor markets to re-orientate and rewrite the rules of employability. The immersion of AI and sustainability spurred ongoing debates revolving around what skills remain competitive and relevant in an ever-changing world and how graduates might adapt to the new trends to easily enter the labor market based on the competences they acquire during education years. Higher education institutions are responsible for shaping curricula to fit the requirements of the labor market, because misalignments often lead to poor employability outcomes for graduates. In the case of young people who also happen to be fresh graduates, the very first years in the labor market could be critical (Arellano-Bover, 2022).

At the European Union level, employability is a policy priority, as it has the ability to enhance people's lives and improve the socio-economic context. In 2024, the EU employment rate for recent graduates, no matter the attained level, varied across countries: the highest employment rates were recorded in Germany (90.5%) and the

Netherlands (91.6%) and the lowest percentages in Romania (75%), Greece (73.2%) and Italy (69.6%) (Eurostat, 2025). As Eurostat statistics prove, recent graduates' employment rates are highest among those who have completed tertiary education. The employment rate of recent tertiary graduates overcame 90% in Lithuania, Malta, Poland, Slovakia, Germany, the Netherlands, Hungary, Bulgaria and Estonia, while in Italy and Greece the indicator was below 80% in 2024 (Eurostat, 2025).

The main objective of this paper is to synthetize the existing knowledge on the theme of graduates' employment in Romania and to explain how the higher education system may facilitate the school-to-work transition by adapting curricula to new skills and competences requirements in the labor market, and to propose practical and policy implications to minimize educational and employability mismatches. Therefore, this systematic literature review explores the following research questions:

(RQ1): What is the recent performance of Romanian higher education in graduate labor-market outcomes?

(RQ2): How have labor-market demands for competences and qualifications evolved in key Romanian sectors since 2015?

(RQ3): Which skill gaps or mismatches are consistently reported, and where are higher education curricula misaligned with employer needs?

(RQ4): What interventions are associated with better employment outcomes?

This systematic review holds importance in the research field of education and labor economics as it adds to the existent literature views on Romania's higher education system's adaptability to the demands of the labor market over the last decade. Because of the lack of PRISMA-based systematic reviews on the topic of higher education and graduates in Romania, hence the originality of our paper. This systematic literature review lays the foundation for potential future research on the Romanian higher education system and employability of graduates in the context of a dynamic labor market which redefines the market demands and trends. Regarding the collecting of data and its analysis following the PRISMA checklist, the research steps are explained in detail in the Research Methodology section.

1. Literature Review

As the macroeconomic situation of a country can highly influence the state of the labor market and employability, it is essential to monitor how each disruption affects graduates' entering the workforce. Skills transitions have a major impact on the evolution of workforce, in terms of digitalization and sustainability (green transition). On the one hand, the digital disruption started to gain shape during the COVID-19 pandemic, a period which surged in unemployed workers, and when re-employment strategies targeted the development of digital and social skills (Dartanto *et al.* 2023). Then, with the emergence of generative AI and the release of Chat GPT in November 2022 (Marr, 2023), previous skills were called into question: what will be replaced by technology and what will remain relevant? Digital literacy is surely one of the most important skills that HEIs should integrate in curricula, so as to mitigate the market shocks induced by technological transformations (Pastore & Choudhry, 2022). The 2024 Digital Decade report shows that there is a basic digital skills coverage of 27.7% in Romania, compared to the EU's average of 55.6% (European Commission, 2024), despite the country's efforts to find strategies to improve this indicator, like the "The Skills4IT Coalition", established in 2015, and the "SMART-Edu 2021-2027" strategic initiative for digitalization of education, established in 2020 (Kralj, 2024).One the other hand, the circular economy transition encourages educational programs to align training programs with the vital skills needed for developing circular systems (Trevisan *et al.* 2025). The study by Trevisan *et al.* (2025) discloses that existent courses on sustainability in higher education focus on "resilience cross-cutting skills" and "specialized or technical skills", while there is a need for skills like "environmental and social awareness", and "reverse logistics and operational management skills", meaning that HEIs should combine both green and digital skills for better graduates' outcomes (Trevisan *et al.* 2025). Moreover, if too many changes happen at the same time, and because it takes time to develop and implement curricula, educational programs should continue to focus on foundational knowledge and, when it comes to sustainability, these programs must deliver generic skills that enable students to adapt easily and to master more domains than the one they specialize in (Allais, 2024). The shifts towards learner-centered teaching means ensuring both professors and students adapt to technology-supported learning environments and that an effective design of classes is based on virtual mobility, interdisciplinary teamwork, and online project tools, which makes e-learning a strong driver of sustainability competences (Barth & Burandt, 2013).

2. Research Methodology

This paper is a PRISMA-based systematic literature review, following a checklist of objectives, source of information, eligibility criteria, search methods, process of data collection and main findings. The review and its protocol were not registered publicly.

2.1. Database Search Strategy

Papers in our database were collected from two reputable scientific databases: Scopus by Elsevier and Web of Science (WoS) during October 2025. Detailed search strings for advanced search queries were used in the two databases, as follows:

1) *In Scopus*: (TITLE-ABS-KEY (Romania OR Romanian*) AND TITLE-ABS-KEY ("higher education" OR university* OR tertiary OR "HEI" OR bachelor* OR master* OR phd) AND TITLE-ABS-KEY (employab* OR "employment rate*" OR "graduate employ*" OR mismatch OR "skill gap*" OR overqualif* OR underemploy* OR "time to job" OR "job placement") AND TITLE-ABS-KEY (skill* OR competenc* OR qualification* OR "digital skill* OR "green skill*" OR transversal OR "soft skill*")) AND (PUBYEAR > 2014 AND PUBYEAR < 2026);
2) *In WoS*: TS = (Romania OR Romanian*) AND TS = ("higher education" OR university* OR tertiary OR "HEI" OR bachelor* OR master* OR phd) AND TS = (employab* OR "employment rate" OR "graduate employ*" OR mismatch OR "skill gap*" OR overqualif* OR underemploy* OR "time to job" OR "job placement") AND TS = (skill* OR competenc* OR qualification* OR "digital skill*" OR "green skill*" OR transversal OR "soft skill*") AND PY = (2015-2025).

Before assessing for eligibility criteria, there were initially 24 returned results in Scopus and 54 returned results in WoS. This outlines a rather under-researched topic about Romania, despite its importance for an effective transition of graduates from university to the labor market.

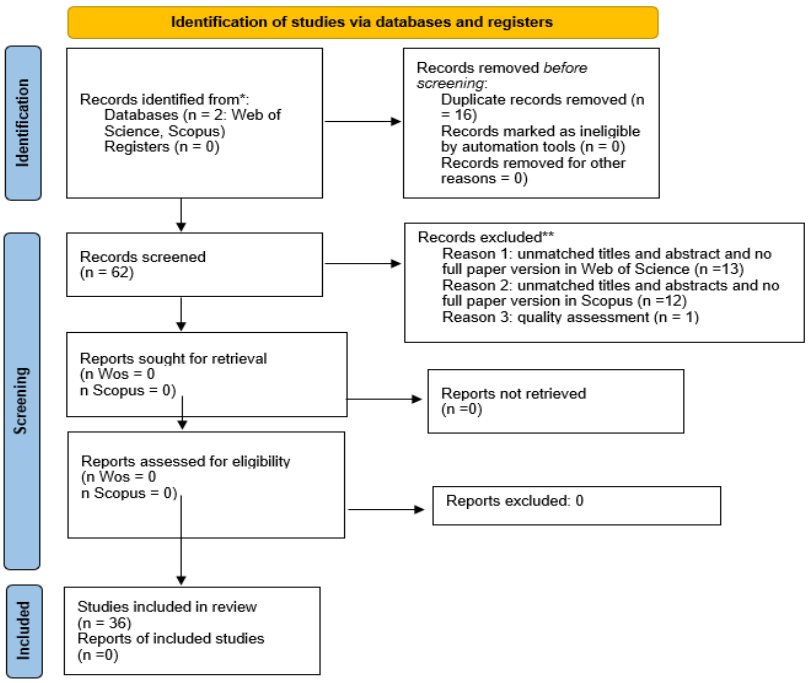
2.2. Eligibility Criteria

Only papers referring to Romania, as well as cross-country studies including it, were taken into consideration for the review, with a focus on writings based in the years 2015 to 2025, both qualitative and quantitative, in the English language, of researchers worldwide, for the inclusion/exclusion criteria.

2.3. Paper Selection

As a first step, papers' titles and abstracts were checked for relatedness to this study's topic and goal.

Figure 1. PRISMA Diagram Flow



Source: Authors' own research

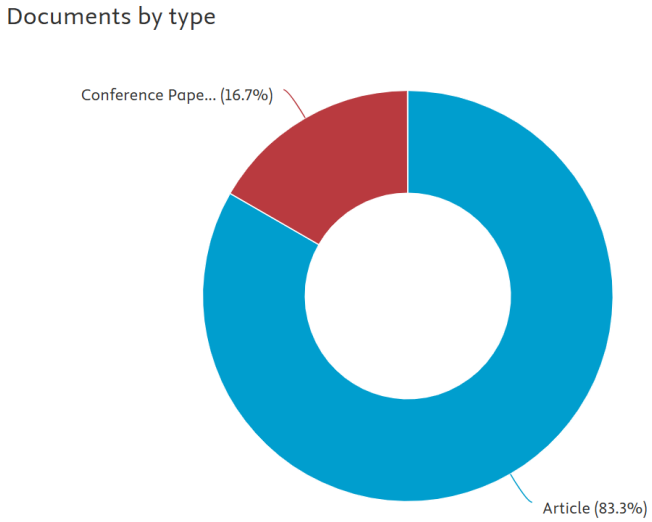
Secondly, multiple criteria were checked simultaneously, such as available author information, duplicates, and open and free access to papers. After following these steps, the final database remained with 12 papers from Scopus and 24 papers from Web of Science. The PRISMA diagram flow is represented by Figure 1.

3. Research Results

Out of the 12 sources extracted from Scopus, 10 are articles and 2 are conference papers, as in Figure 2. The number of papers is distributed unevenly across the years: 1 paper in 2017, 1 paper in 2018, 2 papers in 2019, 3 papers in 2020, 1 paper in 2022, 2 papers in 2023, 2 papers in 2025, and no papers in 2021 and 2024, as in Figure 3. Out of the 24 sources in Web of Science, one is an early access paper; 8 are articles and 16 are proceeding papers. There are 4 papers published in 2015, 2 papers in 2016, 4 papers in 2017, 1 paper in 2018, 4 papers in 2019, 2 papers in 2020, 1 paper in 2021, 3 papers in 2024 and 3 papers in 2025, as in Figure 4.

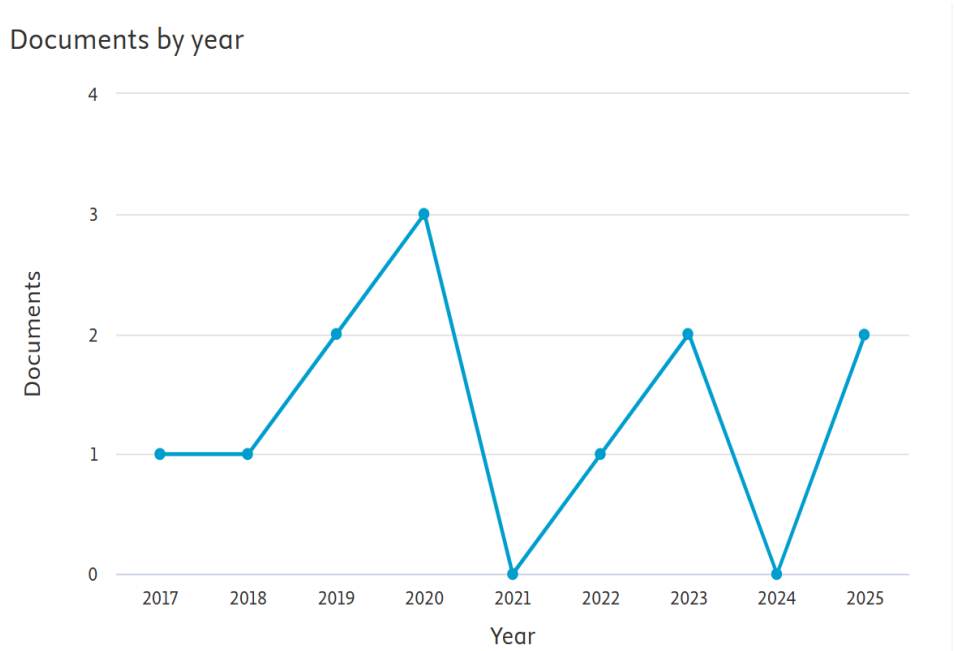
The main discoveries are summarized in Table 1 and explained in full detail in the Discussions section of this paper.

Figure 2. Type of papers (Scopus)



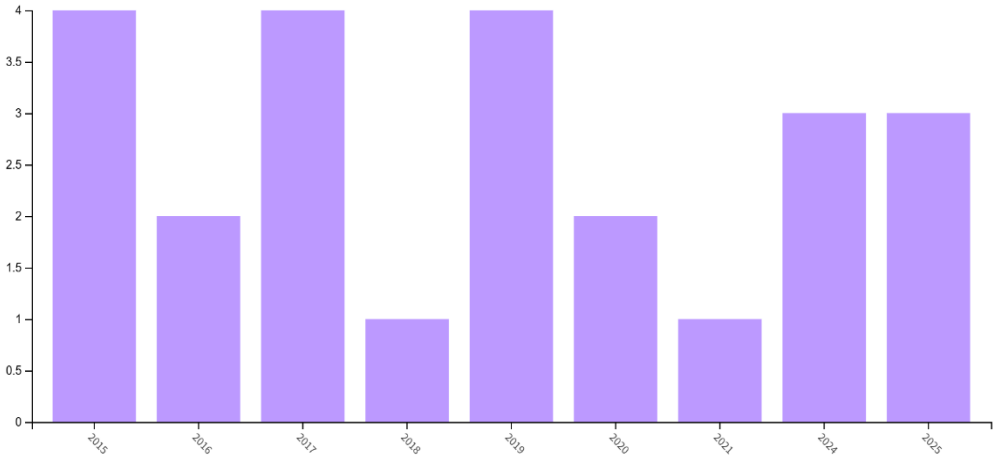
Source: Authors' own research extracted from Scopus database

Figure 3. Publication year (Scopus)



Source: Authors' own research extracted from Scopus database

Figure 4. Publication Year (WoS)



Source: Authors' own research extracted from Web of Science database

Table 1. Main findings

Legend	Author(s)	Year	Main Findings
S1	Grama & Todericiu	2025	The article highlights the persistent gap between higher education programs and the ever-changing demands of the labor market, a misalignment made evident by the lack of formal integration of transversal skills. To address this challenge, the paper underscores the necessity of a systemic curricular reform focused on integrating transversal skills across all study programs, strengthening university-industry collaboration and implementing authentic assessment methods to enhance graduate adaptability and employability.
S2	Lovin & Savu	2025	The article recommends continuous professional development and lifelong learning strategies as essential interventions for maintaining employability in a changing labor market. It also stresses the need for stronger university–industry collaboration, internships and practical training modules to align academic outcomes with employer expectations.
S3	Rebelo *et al.*	2023	The central finding of the article is that the gap between higher education and labor-market needs can be effectively reduced through the systematic and participatory co-creation of curricula. The study demonstrates that moving from superficial partnerships to deep structural collaboration, where industry partners are involved at every stage: from design to teaching and assessment, is the key intervention. This approach not only enhances essential skills such as Critical Thinking but also ensures that academic programs become relevant and directly aligned with the practical demands of the professional world, ultimately improving graduates' employability.
S4	Maer Matei *et al.*	2023	The study shows that Romanian employers value both cognitive skills (*e.g.*, analytical, problem-solving, computer skills, English communication) and non-cognitive skills (*e.g.*, teamwork, communication, decision-making) when hiring economics graduates. The weight assigned to each skill depends on company size, ownership, sector and recruiter characteristics. Graduates combining above-average cognitive and non-cognitive skills are more likely to succeed in the labor market.
S5	Roșu	2022	Entrepreneurial education is crucial for improving employment prospects of Physical Education and Sports graduates in Romania, but low student interest and a mismatch between training and intended entrepreneurial activities limit its effectiveness, requiring more practical and engaging approaches.

Legend	Author(s)	Year	Main Findings
S6	Gavriluță	2020	Employability in Romania was constrained by a multi-level disconnect between universities, students, and employers; addressing socio-human skill gaps and aligning expectations required both educational and public policy interventions.
S7	Roman *et al.*	2020	The use of computational tools in Chemical Engineering education enhances graduate employability by developing digital skills, theoretical understanding and practical application abilities, effectively overcoming the limitations of traditional teaching methods.
S8	Pricina G.N.	2020	Graduate employability depends on practical skills, experience, and personality traits and effective solutions require systemic interventions that go beyond curricular adjustments or company-level measures to reduce the structural incentives for emigration.
S9	Gora *et al.*	2019	Student employability depended primarily on the quality of the educational process and active engagement in practical and research activities. Infrastructure and equipment alone were insufficient; they were effective only when integrated into high-quality, competence-oriented teaching and research. Universities had to develop curricula and pedagogical approaches focused on relevant skills to bridge the gap between higher education and labor-market requirements.
S10	Vîlcu *et al.*	2019	Employability of Romanian technical graduates depends on a combination of professional, technical, and transversal skills. Systematic analysis using hierarchical PCA identifies the highest-impact competencies, providing a data-driven basis for aligning curricula with labor-market priorities and reducing the gap between theoretical training and real-world employment requirements.
S11	Bordean & Sonea	2018	The study found that students' career intentions were strongly influenced by their perception of required competencies; however, this perception was often misaligned with actual labor-market needs. The critical gap underscored the need for higher education to not only teach competencies but also actively shape a correct and realistic understanding of their application in professional careers.
S12	Anastasiu *et al.*	2017	The study confirmed that bridging the gap between academia and the labor market requires systemic collaboration between universities and employers. Employability improved when theoretical learning was complemented by practice, mentoring and soft-skill development. The decisive factor was the alignment of curricula with the real-world project management and entrepreneurial competences demanded by the construction industry.
W1	Caragea *et al.*	2025	The article concluded that universities needed to move urgently from a reactive approach to AI to a proactive one, with the most important step being the implementation of mandatory AI literacy courses to ensure that students developed the competencies required to use these technologies ethically, critically and effectively.
W2	Constantin & Iacob	2025	The article concluded that universities needed to move urgently from a reactive approach to AI to a proactive one, with the most important step being the implementation of mandatory AI literacy courses to ensure that students developed the competencies required to use these technologies ethically, critically and effectively.
W3	Pantea	2025	Qualitative interviews show overqualification is widespread among Romanian graduates, especially in call centers; employers value practical experience over theory, highlighting the need for internships and better university-workplace alignment.
W4	Botezat *et al.*	2024	Quantitative evidence links early skill mismatches with later career outcomes; internships and Master's programs reduce mismatch, and policy reforms should connect secondary and tertiary education to labor market demands.
W5	Brezuleanu *et al.*	2024	Employability depends on both university adaptation and workplace factors; universities should promote entrepreneurship, business

Legend	Author(s)	Year	Main Findings
			incubators, and stronger academic counselling to improve transition to employment.
W6	Păunescu *et al.*	2024	Socioeconomic status affects employability; student perspectives should guide employer recruitment; policymakers should partner with education institutions to design lifelong upskilling programs.
W7	Stăiculescu *et al.*	2021	Universities should include compulsory practical stages, job fairs, business experts in teaching, and active employer involvement in governance to improve graduate employability.
W8	Butum *et al.*	2020	International competences, communication, teamwork, adaptability, and analytical thinking are crucial for Economics and Social Sciences students preparing for globalized labor markets.
W9	Mohanu *et al.*	2020	Research participation builds key soft and professional skills - time management, communication, teamwork, and analytical ability - and should be incentivized by universities
W10	Gabor *et al.*	2019	A digital platform helps track employability skills acquisition via competence mapping, indicator assessment, and personalized training recommendations.
W11	Nastase *et al.*	2019	Entrepreneurial education should be integrated across disciplines; Romanian universities lag behind EU peers in transforming into entrepreneurial institutions.
W12	Grosseck *et al.*	2019	Low digital tool use in academia reflects weak digital literacy; Romania ranks last in EU digital skills, with continuing need for ICT competence and teacher digitl training.
W13	Oproiu *et al.*	2019	STEM students value teamwork, adaptability, professionalism, and leadership; however, interest in entrepreneurship declines as technical focus increases.
W14	Cojan *et al.*	2018	Case study in the automotive sector emphasizes transversal competences - digital, analytical, critical thinking, and employer collaboration in e-learning and real-time simulations.
W15	Butum, L.C	2017	International experience enhances employability; students value flexibility, responsibility, social and professional skills, and universities should promote exchanges and partnerships.
W16	Goia *et al.*	2017	Internships are vital for transition to work; mentoring quality and academic supervision improve outcomes; companies should budget internships recognizing interns' real contributions.
W17	Deaconu & Nistor	2017	Employers prioritize transversal skills (communication, teamwork) over purely technical ones; professionalism increasingly defined by adaptability and soft skills.
W18	Nicolau & Lache	2017	Internationalization raises education quality and competitiveness; calls for better lab equipment and mentoring for new teaching staff.
W19	Brătianu & Vătămănescu	2016	Critical thinking, data analysis, and learning to learn are essential; students rely too heavily on traditional teaching; knowledge building should be between professors and students.
W20	Fleacă *et al.*	2016	Raising tertiary attainment requires transversal skills, update curricula aligned with technology, and financial support for educational reforms.
W21	Echevarria-Cruz *et al.*	2015	Quantitative study shows that students with prior internships or part-time jobs perform better in recruitment; mentorship and exposure to skilled professionals enhance employability, while awareness of university career counselling services remains very low.
W22	Epure & Mihaeș	2015	Study emphasizes aligning university curricula with labor market needs through collaboration between universities and businesses; employers value teamwork, communication, digital, language, and entrepreneurial skills, identified via employer surveys.
W23	Stanciu & Tinca	2015	Accounting students lack training in information security; universities must introduce IT-security courses to reduce risks in the profession.
W24	Pavaloiu *et al.*	2015	Simulated enterprise learning (CONPROF) develops practical, managerial, and digital skills through virtual companies.

Source: Based on authors' own research

5. Discussions

(RQ1): What is the recent performance of Romanian higher education in graduate labor-market outcomes?

In a paper from 2015, namely source W22 in our database, a better alignment of university curricula with labor market demands was considered to be linked to fruitful collaborations between universities and private businesses, even in terms of designing study programs. What was believed to be embraced by employers at that time were interpersonal skills, such as team-work and communication skills, computer skills, adaptability to new situations, foreign language fluency, and commercial entrepreneurial skills. According to the same study, one way to decide on the taught competences was based on surveys conducted by employers (Epure & Mihaeș, 2015). In 2017 (source S12), the performance of technical higher education graduates, especially in civil engineering, was limited by persistent unemployment and overqualification. Many graduates could not find jobs matching their specialization, revealing that universities provided strong theoretical knowledge but insufficient practical skills relevant to employers' needs (Anastasiu *et al.* 2017).

In a quantitative study from 2016 (source W19), skills like researching, collecting and interpreting data, information and knowledge, problem solving, creative and strategic thinking, and the ability of learning to learn are key in being better prepared for the workforce. Graduates in the study recognized that improving "skills for searching, collecting and systematizing information" are an imperative in university and the development of these thinking skills should be directed by students themselves first, and not place the whole responsibility on professors. However, the results of the study outlined that the traditional way of teaching and learning was preferred by students, meaning that professors should be the ones doing "all the hard work of processing and transferring information and knowledge". The need for research capabilities was found again in a paper from 2020 (source W9), stating that skills like "promptness and efficient time management, results orientation, communication and interaction, teamwork, computer literacy, the ability to analyse and question things" could be all fostered with encouraging students to engage in research activities due to: i) the whole concept of research, from gathering data to organizing, analyzing and disseminating it; ii) participation to conferences, even in international contexts, delivering presentations and networking. The Bucharest University of Economic Studies really stimulated student research through many incentives, even financial ones (Mohanu *et al.* 2020). A study from 2019 (paper S9) showed that the quality of the educational process had a direct positive impact on students' skills, competencies, and knowledge, enhancing employability; research activities further increased competencies and perceived employability, while practical activities had mediated effects. Infrastructure and equipment alone had little direct impact (Gora *et al.* 2019).

Nevertheless, new knowledge mechanisms must be founded on a two-way effort basis between students and professors (Bratianu & Vatamanescu, 2017). Article S11 did not measure direct labor-market outcomes but rather students' career intentions. These intentions were influenced by perceived competencies: optimism predicted an entrepreneurial career path, while leadership and networking predicted a managerial path, suggesting how educational preparation shaped future professional trajectories (Bordean & Sonea, 2018).

In a study from 2019 (S10), Romanian technical graduates needed professional, technical, and transversal skills to integrate quickly into the labor market. Key skills included adaptability, data analysis, multitasking, and working in flexible teams (Vîlcu *et al.* 2019). In paper S8, Romanian graduates faced challenges in finding employment matching their qualifications due to gaps between employer requirements and local labor supply, and emigration of skilled workers. Practical skills, experience, personality traits, and adaptability were valued more than formal qualifications (Pricina, 2020). Source S7 illustrated that students in Chemical Engineering perceived that digital skills gained through specialized software significantly enhanced their employability, improving both theoretical understanding and practical competencies (Roman *et al.* 2020).

In 2019, before the pandemic, respondents to a questionnaire in paper W12 stated they did not use digital tools much, meaning that the members of the academic community preferred sharing information and education resources in person (Grosseck *et al.* 2019). With reference to DESI 2018, Romania had not made improvements in digital literacy of its citizens in that year, occupying the last position (European Commission, 2018). In 2025, Romania continues to rank last in the European Union for basic digital skills, as approximately only 28% of people have at least a basic level, despite the country's efforts to implement targeted programs (European Commission, 2025). There are many ICT graduates in Romania but the country struggles to retain specialists which ends up in stagnation in the IT sector (European Commission, 2025). Nevertheless, even in 2019 it was considered that professors could be more efficient with the help of new technologies, so digital literacy is crucial for the teaching staff, as well (Grosseck *et al.* 2019).

Study S6 qualitatively assessed graduate performance as problematic, characterized by a dual crisis of quality and retention. From the students' perspective, the labor market was marked by pessimism, limited opportunities, and a strong tendency toward emigration. Employers, conversely, perceived a decline in the theoretical preparation of graduates. This created a dual crisis: a crisis of quality in the local workforce and a crisis of talent retention, as the most skilled graduates preferred careers abroad (Gavriluță, 2020).

Paper S5 noted that employment prospects for Physical Education and Sports graduates in traditional roles (*e.g.*, teaching) were "extremely low," indicating weak program performance in supporting placement in conventional labor markets. Entrepreneurship was presented as a highly viable alternative; however, low student interest - only 28% participated in related projects, which posed a significant barrier to improving outcomes through this route (Roșu, 2022). Article S2 directly addressed RQ1 by analyzing labor-market outcomes of graduates from Romanian faculties of physical education and sports. It identified a weak but statistically significant positive correlation between the skills and competencies acquired during studies and income level, standard of living, and job quality. Graduates who perceived they had developed more skills reported better-paid jobs and smoother transitions into employment (Lovin & Savu, 2025).

Article S4 did not directly measure performance (*e.g.*, employment rates) but suggested it was defined by the relevance of graduates' skills to employers (Maer Matei *et al.* 2023). The findings indicated that non-cognitive skills (communication, teamwork, decision-making) were highly valued, implying that graduates possessing these skills achieved better labor-market outcomes (Cedefop, 2019). Furthermore, employer preferences varied by company size and sector, indicating that performance was also conditional on aligning a graduate's profile with specific demands (Humburg & van der Velden, 2015). Source S3 did not directly measure the recent labor-market performance of Romanian graduates. Instead, it identified a significant deficiency in Critical Thinking (CT) within the Business and Economics curriculum, implicitly suggesting a performance gap. The study's premise was that traditional, theory-based teaching methods limited graduates' preparedness, thereby negatively affecting their potential labor-market outcomes (Rebelo *et al.* 2023).

The question was not directly addressed by paper S1. The article only provided contextual evidence, highlighting that approximately 37% of employees' current skills in Romania would become obsolete by 2030, indirectly indicating a structural challenge for higher education in performance regarding graduate employability (Grama & Todericiu, 2025). Performance in the Business Administration field declined, as shown by paper W1. While over 50% of graduates found employment in their graduation year, they were mostly in jobs below their qualification level (*e.g.*, sales agent, data entry operator). This indicates a significant qualification mismatch. Furthermore, the graduation rate itself was decreasing, showing a weakening internal performance of the academic programs (Caragea *et al.* 2025). Article W2 did not directly measure graduates' labor-market performance. Instead, it operated on the premise that developing an "AI skill set" had become essential for ensuring future employability, suggesting that labor-market outcomes would increasingly depend on these new abilities (Constantin & Iacob, 2025).

(RQ2): How have labor-market demands for competences and qualifications evolved in some Romanian sectors since 2015?

Paper S12 mentioned a 2015 study on the construction and engineering sectors revealed a high demand for a combination of technical expertise and transversal competences (project management, entrepreneurship and leadership). The demand was clearly shifted toward applied, interdisciplinary and soft skills that allow adaptability and problem-solving (Anastasiu *et al.* 2017). Labor-market demand had increased for transversal and internationally relevant skills, including critical thinking, problem-solving, teamwork, organizational, and entrepreneurial skills, as discussed in article S9 (Gora *et al.* 2019). In article S10, employers emphasized general-professional skills (domain-specific knowledge, application of theory, critical reflection), technical skills (equipment design and use, reading and creating technical schematics), and transversal skills (negotiation, organization, project presentation, team coordination), reflecting dynamic and competitive market requirements (Vîlcu *et al.* 2019). Source W13 focused on a perception analysis through a questionnaire addressed to STEM students in 2019 and the results described professional and interpersonal skills such as teamwork, adaptability and professionalism as important skills, as well as entrepreneurial and leadership skills. However, the study showed that as the number of technological school graduates was higher, the students' interest for entrepreneurial and management skills was lower (Oproiu & Ianoș, 2019).

Between 2018 and 2025, Romania's skills outlook evolved from concerns about demographic decline and sectoral shifts to a focus on technological transformation and digitalization. The 2018 forecast projected only 2.8% employment growth up to 2030, well below the EU average of 6%, and a 10% drop in labor supply, with most

openings requiring medium qualifications and only 35% demanding high-level skills. By contrast, the 2025 forecast shows a more optimistic trend, with employment growing faster than the EU average (0.6-0.9% annually versus 0.3-0.4%), driven by higher participation among women and older workers, Key growth sectors include ICT, business services, and healthcare, while low-skill and routine jobs continue to decline. The share of workers with higher education is expected to rise around 32% by 2035, reflecting Romania's gradual shift toward a knowledge-based economy where Stem, digital, and problem-solving competences, alongside adaptability and lifelong learning, are crucial for competitiveness (Cedefop, 2018, 2025).

In source S8, employers demanded standards close to Western norms, including digital skills, foreign language proficiency, continuous professional experience, and practical competencies; character, ethics, and maturity were emphasized (Pricina, 2020). The integration of simulation software and computational tools in Chemical Engineering programs aligned with current labor-market requirements, emphasizing ICT skills and the ability to use digital tools for complex problem-solving and "what-if" scenario analysis, as discussed in article S7 (Roman *et al.* 2020). Study S6, conducted in 2017–2018, indicated that employer demands had shifted significantly toward the candidate's socio-human dimension. Beyond a solid theoretical foundation, employers prioritized a combination of human qualities such as reliability, punctuality, and respect; essential soft skills like face-to-face communication and teamwork; and professional attitudes, including clear career objectives and commitment to continuous development (Gavriluță, 2020).

In what concerns Business and Economics Master's degree's graduates, paper W17 illustrated perceptions of the assessment and employment processes, and ranked transversal competences, like communication and interaction in a team, above professional ones in employers' preferences. Obviously, professional competences play an important role in the recruitment process, and the paper showed that Economics graduates were employed based on their skills of "collecting and processing data and knowledge of calculus and interpretation", and technical expertise was not such a central aspect (Deaconu & Nistor, 2017). With so many distortions in the economy and labor market, the actual meaning of professionalism faced re-invention, in the sense that soft skills might be more sought after than hard skills by employers in times of change (Staiculescu *et al.* 2021).

In the sports sector (S5), labor-market requirements focused on entrepreneurial skills and initiative, as traditional employment opportunities (*e.g.*, sports teachers) were very limited. Students preferred to start businesses in service-related areas, indicating a shift in market demands toward business management and adaptability skills (Roșu, 2022). Source S3 did not provide a historical analysis of labor-market requirements since 2015. Rather, it focused on the then-current high demand for transversal skills, specifically Critical Thinking (CT). The needs analysis conducted in Romania for the Business and Economics field confirmed that employers sought graduates who could apply theoretical knowledge to real-world problems, emphasizing the importance of problem-solving, logical analysis, and effective communication skills (Rebelo *et al.* 2023). Although study S2 focused on a specific academic field, it highlighted that labor-market demands increasingly valued both domain-specific expertise and transversal competences such as adaptability, teamwork, and continuous learning. In the sports industry, ethical behavior, teamwork, and openness to change were emphasized, while gaps persisted in management and communication skills. The article did not analyze the evolution of labor-market requirements over time (*e.g.*, since 2015) but focused on assessing the current state of skills and misalignments (Lovin & Savu, 2025).

Paper S1 showed how labor-market demand evolved along two main axes: advanced technological competences (AI, Big Data, Cybersecurity) and transversal competences (critical thinking, creativity, resilience, communication). Transversal competences were universally valuable and essential across all analyzed fields (Grama & Todericiu, 2025). Paper W1 does not analyze the evolution of employer demands. Instead, it analyzes graduate outcomes, which show that the labor market absorbs Business Administration graduates primarily into non-managerial and non-strategic roles, suggesting a discrepancy between the program's intended purpose (developing leaders) and the actual job market reality (Caragea *et al.* 2025). Study W2 did not analyze the historical evolution of labor-market demands. It focused on the impact of a very recent technology (ChatGPT, launched in 2022) and argued that its emergence created an urgent, current need for AI competencies, forcing universities to adapt their curricula to meet this new market requirement (Constantin & Iacob, 2025).

The findings from the chosen database are in line with a Cedefop (2023) report on national qualifications in Romania which emphasizes the development of transversal, digital, entrepreneurial, and analytical competences as central to our country's qualification framework. It underlines teamwork, communication, adaptability, and problem – solving as key employability skills, while promoting digital literacy and the integration of ICT in learning. The National Qualifications Framework aligns with the EU Key Competences Framework, supporting lifelong learning, civic engagement, and the capacity to apply knowledge creatively in professional contexts.

(RQ3): Which skill gaps or mismatches are consistently reported, and where are higher education curricula misaligned with employer needs?

In 2015, research (source W23) shows that accounting students did not have enough training and knowledge on information security issues and that universities had the duty to implement such courses in order to mitigate the negative effects of security breaches in such an important domain (Stanciu & Tinca, 2016). A consistent gap was observed in paper S12 between university training and market expectations: curricula were overly theoretical, practical courses and internships were insufficiently integrated, and teachers were detached from business realities. Employers reported that graduates lacked project management, communication, and leadership competences, as well as professional attitudes such as ethics, adaptability and initiative (Anastasiu *et al.* 2017).

A major perception gap was identified in article S11: students incorrectly and negatively associated competencies such as risk-taking and decision-making with entrepreneurial intentions. This indicated a curricular misalignment, as the study program failed to convey an accurate understanding of entrepreneurial skills (Bordean & Sonea, 2018). Universities taught theoretical knowledge, but practical application, team coordination, and transversal skills were insufficient; some employer-demanded competencies were underrepresented, as discussed in paper S10 (Vîlcu *et al.* 2019). Article S9 illustrated that gaps existed between student-acquired competencies and labor-market requirements, particularly in applied and transversal skills. Technical infrastructure and practical activities, if not integrated into teaching, failed to enhance employability, reflecting misalignment between university resources and employer needs. Curricula had to be continuously adapted to reduce these gaps and develop relevant competencies (Gora *et al.* 2019). Source S8 showed that a clear gap existed between higher education training and labor-market needs: curricula often failed to develop practical skills and personality traits, leaving qualified workers underutilized or emigrating (Pricina, 2020). Traditional teaching methods relying on manual problem-solving created a gap with industry needs and students recognized that practical experience with software remained insufficient, as per source S7 (Roman *et al.* 2020).

Article S6 identified a fundamental double gap. First, there was a skills and attitudes gap: employers reported a lack of "human quality" and soft skills in graduates, while students argued that their education was too theoretical and disconnected from the labor market. Second, there was an expectations gap: students held conservative career expectations, desiring stability and predictability, whereas employers operated in a dynamic market and sought proactive employees with clear goals and initiative, often perceiving a "lack of ideals" in young candidates (Gavriluță, 2020). There was a significant gap between university-acquired skills and labor-market needs, as per S5. Students lacked sufficient motivation to develop entrepreneurial abilities and often relied on family support or personal resources. Theoretical entrepreneurial education was neither well-integrated nor compelling, resulting in a mismatch between academic training and real-world requirements (Roșu, 2022).

Article S4 implied a significant skills gap. The misalignment stemmed from academic curricula that often failed to adequately develop the non-cognitive skills (communication, decision-making, teamwork) that employers particularly valued. Even if graduates possessed strong cognitive skills (analytical, IT), a lack of these soft skills created a clear mismatch between the educational supply and the actual expectations of the labor market (Maer Matei *et al.* 2023). Paper S3 identified a persistent gap in the development of Critical Thinking, a transversal skill highly valued by employers but insufficiently fostered by traditional university curricula. This misalignment stemmed from strategic and methodological shortcomings: curricula were often designed in isolation without employer input, and traditional teaching methods (*e.g.*, lectures) failed to develop practical, real-world competencies. A fundamental barrier was the lack of a shared understanding between academia and business on what constituted Critical Thinking (Rebelo *et al.* 2023).

The findings in S2 revealed a clear mismatch between graduates' self-perception and employers' evaluations. Graduates excelled in sport-related competencies (conscientiousness, teamwork, respect for hierarchy) but reported major gaps in transversal skills (public speaking, management, foreign-language communication, project management). This indicated a curricular misalignment, as programs focused on sports techniques and values but neglected the development of business and communication skills necessary for successful careers (Lovin & Savu, 2025).

The main gap, as shown in source S1, lay in the insufficient formal development of transversal competences within universities, with a significant perception gap between employers and students regarding training opportunities and labor-market preparedness (Grama & Todericiu, 2025). The primary mismatch identified in paper W1 is a qualification mismatch: graduates are overqualified for the jobs they obtain. The article argues this is a symptom of a deeper, systemic misalignment caused by the lack of a graduate monitoring system. Without feedback on graduates' career paths, universities cannot align their curricula with the actual needs of the labor

market (Caragea *et al.* 2025). Article W2 identified a new type of gap: an "AI literacy" and critical-thinking gap. A particularly concerning finding was that graduate-level students (master's and doctoral) were no better at identifying errors and accuracy issues in ChatGPT than undergraduate students. This indicated misalignment, as advanced students were expected to possess superior critical skills, but these did not apply in the context of AI usage. Additionally, students perceived a limited impact of AI on developing analytical skills (Constantin & Iacob, 2025).

Both sources W3 (Pantea, 2025) and W4 (Botezat *et al.* 2024) highlighted the fact that overqualification is widespread among Romanian graduates, especially in call centers and business services which often employ graduates from non-STEM fields like Political Sciences, Communication or Letters. Many graduates in the studies did not perceive themselves as overqualified, since work in their degree specialization was seen as unrealistic or outdated. It is mentioned that employers prefer candidates with internship experience, as universities usually provide limited practical training and mostly theoretical knowledge, and those students who are mismatched in their first job tend to remain so later in their careers. Internships and Master's programs significantly reduce skill mismatches and improve employability.

(RQ4): What interventions are associated with better employment outcomes?

Even ten years ago, a quantitative study on students enrolled in business programs, represented by source W21, highlighted the importance of having access to on-the-job training and development opportunities, in the sense that those students who had benefitted from internships and part-time jobs before their actual first serious job had better results in the recruitment process. Besides that, perhaps having "excellent mentors and trainers" or simply working with "excellent professionals in projects of high importance" was considered to be more impactful by respondents, as mismatches between skills and job requirements can be minimized this way. However, when it came to career counselling in university's specialized offices, the majority of respondents were not aware whether they existed or not (Echevarria-Cruz *et al.* 2015). A paper review from 2016 (source W20) illustrated that increasing tertiary education attainment meant helping students through all educational levels first, and improving the quality of higher education programs meant to develop transversal competences among students, to update curricula based on technological advance, to promote the teaching profession in any area of study, and to diversify the educational offer according to the requirements of the labor market, strategies which ultimately needed financing (Fleacă *et al.* 2016). The transition from university to professional life could be enriched by qualitative internship programs, as source W16 suggests, an aspect that is still true for the present, too (Goia Agoston *et al.* 2017). Internships, apprenticeships and similar education programs which can equip students with the know-how, knowledge, skills and capabilities required in a particular industry, may improve the process of finding a job (Eurostat, 2025). An empirical research study by Monteiro *et al.* (2021) identified a strong need for "practical experiences" during HE studies (Monteiro *et al.* 2021). The importance of internships during higher education studies is sustained by Albert *et al.* (2023), as well, in the sense that they can reduce job mismatches at the first work experiences. Looking back at year 2017, paper W16 outlines the fields in which students from several faculties from the Bucharest University of Economic Studies could perform internships, as follows: business administration and management students were able to choose from very diverse fields, such as "banking, tourism, consultancy, advertising, quality management, event management", due to the general character of the study program, while accounting and finance and banking students could have internships in narrower fields, such as accounting, audit or banking (Goia Agoston *et al.* 2017). Good mentoring is mentioned here again, as well as a better involvement from the academic supervisors in how the internship programs are chosen and delivered to students. Another interesting finding from paper W16 is that companies should budget the internship programs, because interns sometimes deliver valuable work and they could be considered "a real workforce inside the company" (Goia Agoston *et al.* 2017).

The most effective interventions mentioned in paper S12 were modular interdisciplinary courses and practice-oriented training co-designed by universities and companies. Voluntary or optional modules taught jointly by academic staff and industry experts, combined with company-based internships and apprenticeships, significantly improved employability. These partnerships allowed students to gain relevant applied knowledge and helped firms reduce recruitment costs (Anastasiu *et al.* 2017). As a strategy to foster practical activities in the educational program, IPA SA, the Bucharest University of Polytechnics and the Romanian – American University developed the "CONPROF" project in 2015 which related to a simulated enterprise as a learning method. Basically, students learned in an interactive way through simulated enterprises, connecting university education with real business practices. In this way, students could gain professional and managerial experience in a virtual company environment, they could improve teamwork, entrepreneurship, and decision-making skills in realistic and risk-free conditions, and they could practice "working as" managers, accountants, marketers, or HR personnel (Pavaloiu *et*

al. 2015). This is an excellent learning method which is still being applied nowadays at the Faculty of Business Administration in foreign languages, as part of the Bucharest University of Economic Studies, and it is called "TOPSIM" – a business simulation which provides students with "hands-on, strategic management experience" at various subjects and years of study (FABIZ, 2025). Virtual companies teach students how real businesses work by combining academic theory, practical simulation, and digital tools, hence preparing them for the current labor market.

A study carried out in 2017 (source W15), which collected data from 2013 to 2015, mentioned that a successful indicator for future employability was international experience and that curricular models were supposed to insert international competences so as to check the global labor market qualifications. 71% Romanian respondents of the study thought that "responsibility, flexibility, social competences, and ability to work under pressure" were mandatory for getting a job. Also, there was a high demand for professional and practical skills, as well as international work experience gained from social and volunteering activities. The international experience was believed to be useful in careers in multinational companies, and the general internationalization process of the university meant opportunities for exchange programs and foreign university partnerships. Besides, students appreciated their university's involvement in social events, jobs and career fairs (Butum, 2017). A similar concept was sustained by paper W18 which mentioned that universities could increase quality in education by internationalizing, because an international academic environment does not relate only to collaboration among universities and people, but it refers to "competitiveness among institutions", as well (Nicolau & Lache, 2017). Participants with majors in engineering and sciences in this questionnaire stated that there were insufficient laboratories and equipment in their universities. Another insight of this study referred to the teaching quality and how interviewees believed that newly employed teaching staff needed to shadow more experience professors during courses in order to be better skilled at teaching methodology and student psychology (Nicolau & Lache, 2017). In 2020, paper W8 outlined the need for international competences for Economics students, too, together with personal, practical, relational and professional skills, and participants in the study said that they were trained by their university to master general economic theoretical knowledge and an economic way of thinking, enabling them to understand international business, economic, and political contexts. Another set of students in the same study's sample presented Social Sciences students' perceptions on their university in preparing them with "communication skills, teamwork, adaptability, organization and integrity, planning and problem solving" (Butum *et al.* 2020).

Article S11 recommended that universities play a more active role in shaping graduates' careers by improving the learning process to instill a correct understanding of essential competencies and strengthening ties with the business environment through effective internship programs (Bordean & Sonea, 2018). The hierarchical PCA model in paper S10 guided curriculum adjustment and practical training, allowing universities to optimize programs to develop professional, technical, and transversal skills valued by employers (Vîlcu *et al.* 2019). Paper W14, a 2018 qualitative case study on the automotive industry, resumed the importance of advanced transversal competences for successful labor market integration, alongside "digital, numerical, autonomy, critical thinking, and problem solving" competences, and gave the example of the Faculty of Mechanics from "Gh. Asachi" Technical University of Iasi where permanent contact with the main employers in the field was maintained and encouraged and where this cooperation consisted of introducing an e-learning support material for simulating processes in real time and by employing technologies in the field (Cojan *et al.* 2018).

In paper S9, effective interventions included improving the quality of the educational process (curriculum content, teaching staff, and methods), strategically integrating practical and research activities, and actively using infrastructure and equipment to support learning. Flexible curricula aligned with labor-market needs, emphasizing transversal and international competencies, further enhanced outcomes (Gora *et al.* 2019). Paper S8 mentioned measures such as higher salaries, attractive work environments, practical training, and leveraging social networks improved retention, but company-level interventions alone were insufficient and systemic, national-level actions were required (Pricina, 2020).

In source S7, active integration of specialized software, combined with assignments and practical simulations, increased learning efficiency, motivation, and acquisition of labor-market–relevant competencies (Roman *et al.* 2020). Study S6 identified interventions at two levels. At the university level, existing interventions included career counseling centers, workshops on practical skills such as CV writing, and partnerships with companies for internships. However, the article suggested these measures were insufficient and called for interventions at the public policy level, including more flexible curricula, funding for university-employer partnerships, and economic policies to stimulate promising sectors to increase the attractiveness of the domestic labor market and retain talent (Gavriluță, 2020).

In source S5, practical entrepreneurial education, individual or team mentorship, and participation in extracurricular projects were associated with reduced skill gaps and increased entrepreneurial intentions. However, their impact remained limited if student participation was low or activities stayed overly theoretical (Roșu, 2022). Paper S3 showed that successful interventions included participatory co-design of curricula, joint training for university and industry partners, explicit definition of objectives and roles, integration of real-work problems and case studies, continuous monitoring and evaluation, and dissemination of best practices to create a sustainable community of practice (Rebelo *et al.* 2023).

A study conducted in 2017-2018 on bachelor programs graduates showed that 83% of graduates from the Bucharest University of Economic Studies were employed, while 46% of them were working jobs in their specialization fields and 29% of them perform professionally in related fields (Camelia & Nastase Richiteanu, 2018). Roughly three years later, paper W7 came up with some good practices which include: "practical compulsory stages in curriculum, experts from the business sector involved in teaching activities, job fairs and meetings with employers' representatives, employers' representatives involved in the decision making processes in universities as members of consultative councils, free counselling and career orientation services, and ,finally, practical stages and internships in companies" (Staiculescu *et al.* 2021). Interviews (W3) with students and employers denoted that graduates tended to value workplace learning over academic education, as they considered the university content as too abstract or detached from practice. This study called for higher education to assert its broader value, beyond opening doors to jobs, emphasizing critical thinking, adaptability, and civic engagement. The issue is not poor student choices, but rather a shortage of suitable jobs and the technological and AI substitution (Pantea, 2025).

In a comparative analysis about Austria, Romania and Sweden, paper W10 presented an experimental and innovative tool in the form of a free online platform which tracks how employability skills' acquisition among high school and high education may take place, as follows: 1) selecting the key elements such as job profile, type of competence (transversal and/or specific), name and category of competence; 2) identifying indicators: importance of this competence for the job and the candidate's capacity to perform a competence; 3) recommendations based on the results: the training needs priority matrix (Gabor *et al.* 2019).

Paper W11 discussed entrepreneurial education and how it should be integrated in each degree specialization, as it is in European developed countries like Germany, Austria, Finland and Denmark, for enhancing education and employability effectiveness of students. In 2019, Romanian universities were still infant in this process of transforming traditional learning institutions into entrepreneurial ones (Nastase *et al.* 2019). Employability and university-industry partnerships are also mentioned in papers W5 and W6. University education alone cannot ensure employability, as outcomes depend on job complexity, workplace policies, and experience. Thus, stronger faculty-student consultation, academic counselling, and extracurricular support through activities like business competitions and entrepreneurship programs were recommended. Entrepreneurial education and business incubators ought to be integrated into universities to encourage innovation and maybe self-employment. Thus, collaboration between universities, employers, and policymakers is crucial to align training with real labor market requirements (Brezuleanu *et al.* 2024; Păunescu *et al.* 2024). Paper W6 described socioeconomic and behavioral factors which influence students' employability and proactiveness that can later translate into workplace success, such as family background, politics, and financial situation. The article also stated that students' voices should play a central role in shaping recruitment strategies and education-employment partnerships and that policymakers should create adaptive learning programs with employers to upskill current and future workers, enhancing lifelong employability (Păunescu *et al.* 2024).

In 2025 (paper S1), Work-Based Learning (WBL) and Entrepreneurship Education Programs (EEPs) demonstrated positive impacts on employability when properly implemented; however, their results remained inconsistent because of fragmented institutional coordination and the absence of standardized frameworks (Grama & Todericiu, 2025). The fundamental intervention proposed in paper W1 is systemic: the creation of a detailed graduate tracking system. The article argues that this is the essential first step, as it would provide universities with the necessary data to make informed decisions, such as adjusting curricula, fostering relevant private sector partnerships, and understanding student dropout reasons (Caragea *et al.* 2025). The main proposed intervention in W2 was educational and institutional. The article explicitly recommended introducing mandatory AI literacy courses. The aim was to teach students to use AI tools responsibly, ethically, and critically. It also emphasized the need for universities to develop clear policies and guidelines regarding AI usage to address ethical concerns and ensure academic integrity (Constantin & Iacob, 2025). Article S2 emphasized continuous professional development and lifelong learning as key strategies for sustaining employability in a dynamic labor market. It also highlighted the importance of enhanced university–industry collaboration, internships, and practical training to better align academic outcomes with employer expectations (Lovin & Savu, 2025).

Conclusions and Further Research

Although the worldwide literature on "school-to-work-transition" is vast and growing, there seems to be no consensus about the factors that facilitate a smooth such transition (Pastore & Choudhry, 2022). Barriers of university-to-work transition can derive from a "lack of career agency during graduation and professional experiences" (Monteiro *et al.* 2021). Besides updating and upgrading curricula to match skills with labor market dynamics, universities should also intervene with support for coaching students to improve the learning process and employability competences, as emotional support and trust are key elements in making career decisions (van der Baan *et al.* 2024). Romania's education system has progressed toward addressing the skills gap, but continues to lag in digital literacy, practical training, and innovation capacity. Bridging this gap requires structural curriculum reforms aligned with industry trends, EU digitalization goals, and sustainable development priorities.

This review is limited by the availability of comparable national datasets and exclusion of non-English literature. Future research could combine longitudinal data and employer surveys, explore regional differences within Romania, and perhaps compare skill transitions across CEE countries.

Practical implications of this study refer to the fact that universities and policymakers should jointly redesign study programs to ensure better labor market relevance and digital integration. As strategies, the authors of this study mention: embedding digital and green competences, as recommended by Cedefop (2025) and OECD (2022) across all disciplines through project-based and experiential learning, institutionalizing internships and apprenticeships, as empirical evidence shows these reduce skill mismatches and strengthen employability (Goia Agoston *et al.* 2017; Monteiro *et al.* 2021), promoting entrepreneurship education, strengthening partnerships between universities and industry, and implementing lifelong learning to enable workers to reskill in response to automation and AI transformations (UNESCO, 2025). Collectively, these measures would improve graduate adaptability, close Romania's skills gap, and ensure alignment with the European Skills Agenda and the Green Deal's digital transition. To conclude, this paper represents a valuable contribution to the Romanian academic literature on the issue of employability of graduates and the higher education system due to the overall drawn picture of the current state of knowledge in this field using the PRISMA methodology.

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Credit Authorship Contribution Statement:

Daria Elisa Vuc: Conceptualization, Methodology, Project administration, Formal analysis, Writing – original draft, Supervision;
Viorela-Denisa Stroe: Investigation, Formal analysis, Writing – original draft.

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