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STAKEHOLDER NEEDS ANALYSIS FOR DIGITAL CAREER COUNSELING SYSTEMS IN HIGHER EDUCATION

Abstract. The article considers the urgent problem of modernizing university career support systems in the context of the digital transformation of the labor market. The aim of the study is to identify the deficits of traditional career counseling methods and, on this basis, design a functional architecture of an independent platform for professional development. The principles of requirements engineering and system design of educational information solutions were used as a methodological framework. Empirical data was collected using a combined method, using proprietary questionnaires on a digital forms platform. The total balanced sample of the study consisted of 243 students, 62 university graduates, 45 academic advisors, and 32 representatives of employer companies. Mathematical and statistical analysis of quantitative data was performed in a specialized software environment, calculating frequency distributions and verifying the reliability of scales using Cronbach's Alpha coefficient. Data analysis revealed a deep infrastructural gap: 43.5% of graduates did not use the classic services of career centers, while 83.1% of students are in acute need of automated tools for competency diagnostics and internship selection. The survey of teachers confirmed a critical shortage of time for conducting individual work with students among 62.2% of respondents. From the employers' side, a parity of requirements for the hard and soft skills of graduates was recorded. As a result of the study, the conceptually adapted architecture of an autonomous platform was theoretically justified and designed. The proposed technical solution is designed to automate routine skill assessment processes, compensating for the limitations of closed university learning management systems through user data input, document recognition technologies, and gamification mechanisms.

Keywords: Career counseling, higher education, educational systems design, stakeholder needs, mobile learning, career automation, competency verification, gamification.

Introduction

For most students, successful employment is the dominant goal of higher education, and for more than 80% of students, this factor is decisive when choosing a university (Stolzenberg et al., 2019). In the context of the global educational services market, universities are forced to transform their strategies for supporting the competitiveness of their graduates (Crowne et al., 2020). At the same time, as domestic sociological surveys show, the transition of young specialists from the academic environment to their primary workplace is accompanied by systemic adaptation difficulties, which requires the introduction of new flexible tools for interaction between students, the university, and the industry (Shakirova, 2016). However, classic models of career centers today face barriers of scalability and personalization. The limitations of these classic models are exacerbated by digital transformation. The traditional directive-diagnostic paradigm, which conceptualizes career choice as a static matching process between individual traits and predefined occupational profiles, proves increasingly inadequate in contexts characterized by algorithmic recruitment and recurrent career transitions (Bîrlea et al., 2025). Furthermore, evidence from transitional and post-Soviet higher education systems indicates that only 30-40% of individuals maintain their initial career choice, undermining the predictive validity of one-time assessment models (Bîrlea et al., 2025). This highlights a critical need to transition toward activating, developmental career support frameworks.

The solution to this problem within the paradigm of IT in learning and teaching is seen in the integration of professional development processes directly into Virtual Learning Environments (VLE). The transition from passive information delivery to the development of intelligent e-Learning Tools allows for automating the professional development of students. Nevertheless, designing the architecture of such systems requires a deep analysis of the needs of a wide range of stakeholders – from students to employers – which will make it possible to create an adaptive digital environment that meets the dynamic demands of the modern digital economy.

The choice of a professional path is a critical descriptor of life success, requiring a systematic approach to decision-making. However, in the context of the technological transformation of the labor market, students regularly face the phenomenon of career uncertainty. The key barriers here are a low level of anticipatory awareness of industry requirements and a lack of tools for matching personal abilities with dynamic professional standards.

Within the framework of the projected career counseling system, these problems are viewed as a request for an intelligent Decision Support System. The use of autonomous digital platform minimizes the risk of erroneous choices by algorithmizing competency assessments and providing real-time data on the state of the industry.

The process of career planning requires a comprehensive analysis of multiple factors: from academic achievements and soft skills to prognostic models of career growth. Independent navigation in this multidimensional data space is extremely difficult for students, which actualizes the need for expert support (Natividad et al., 2019). Traditional career centers are not always able to provide widespread coverage due to limited human and material resources (Qamhie et al., 2020).

In the context of Educational Systems Design, this institutional gap can be bridged by implementing automated systems capable of integrating counseling functions into the university's digital environment. The development of autonomous digital platform for career counseling makes it possible not only to compensate for the shortage of human resources but also to ensure high accuracy of assessment and evaluation based on objective data.

Current academic discussions confirm that a simple statement of the competency deficit among graduates is not enough for an effective transformation of career centers. Designing systems with a high level of user engagement becomes critically important. In the conditions of the "attention economy", digital career support tools must compete for user priority, which requires the introduction of gamification elements, adaptive content, and an intuitive interface.

Thus, the success of an autonomous digital platform depends on the depth of the preliminary assessment of the preferences of all interested parties. The synergy of student expectations, university strategic goals, and employer demands forms the foundation for developing a service capable of actively involving students in the process of continuous development. In this regard, this study is focused on identifying and classifying these needs as a starting point for the systematic design of a new digital environment.

Despite the growing body of literature on digital career guidance, a significant research gap remains. Most existing studies focus on the isolated expectations of either students or employers, or they evaluate generic platforms that are easily integrated into open university IT infrastructures. However, there is a lack of comprehensive empirical research that simultaneously confronts and integrates the multidimensional, often competing needs of four distinct stakeholder groups: current students, recent graduates, academic advisors, and employers. Moreover, a specific challenge for the study is that many regional universities use closed learning management systems (such as LMS Platonus), which significantly limits the potential for direct technical integration of modern career development tools. Therefore, the scientific problem addressed in this study is how to conceptualize and design the architecture of an independent, highly engaging digital career ecosystem that effectively bypasses these institutional infrastructural barriers while satisfying the complex requirements of all key educational stakeholders.

For an international audience, Kazakhstan serves as a prime example of a country with a transitional economy that is rapidly integrating into the global educational landscape-specifically, the Bologna Process. The Republic of Kazakhstan's state education policy sets a clear direction for the

digital transformation of higher education and its close alignment with the real economy. During the Government Hour in the Mazhilis of the Parliament of the Republic of Kazakhstan, it was noted that the Law "On Professional Qualifications" is being actively implemented in the country, aimed at bridging the gap between academic training and employer requirements (Official Information Resource of the Prime Minister of the Republic of Kazakhstan, 2026). The most important elements of this ecosystem are the introduction of digital certification of skills, the updating of professional standards taking into account the development of hybrid professions, and the large-scale integration of artificial intelligence tools into the educational process. The autonomous digital platform designed within the framework of our study fully meets these national priorities, acting as a practical tool for monitoring skills and flexibly building students' career trajectories.

Literature review

In modern scientific literature, the digitalization of career guidance is examined through the lens of the concept of Computer-Assisted Career Guidance (CACG). Researchers note that the evolution of these systems has gone from simple information repositories to complex intelligent modules integrated into Virtual Learning Environments (VLE). According to the work of Dziuban et al. (2018), modern educational environments have ceased to be mere content repositories, transforming into adaptive ecosystems where professional development is an integral part of the educational process.

A key advantage of integrating career tools into VLE is the ability to continuously collect data on student progress. As Sampson et al. (2015) note, the use of automated guidance systems allows individualizing the process of career design, taking into account not only academic grades but also the student's digital footprint. However, despite technological progress, many existing e-Learning solutions are still criticized for insufficient integration with actual labor market demands, creating the need for the development of more flexible architectural models.

The technological basis of modern autonomous digital platform in the field of careers increasingly relies on decision support systems and artificial intelligence algorithms. The study by Natividad et al. (2019) demonstrates the effectiveness of using fuzzy logic to match students' personal characteristics with the requirements of various professional tracks. This approach minimizes the subjectivity of the assessment and increases the accuracy of recommendations.

In parallel, Qamhie et al. (2020) propose models of personalized recommendation systems that analyze the competency profiles of graduates and offer trajectories for closing knowledge gaps in real time. Within the paradigm of IT in learning and teaching, such algorithms are seen not just as auxiliary utilities, but as active learning agents capable of forming reflection and strategic planning skills in students within a digital environment.

The scientific design of educational systems postulates that the effectiveness of any IT product is determined by the participation of all interested parties at the requirements gathering stage. If, when forming virtual learning environments (VLE), the authors of autonomous digital platform ignore the requests of teachers or the expectations of the labor market, the viability of such systems drops sharply – this is directly pointed out by stakeholder theory. Today, digital learning tools are forced to compete for the user in the conditions of a fierce "attention economy". To retain student motivation, developers need to implement gamification elements and interactive interaction formats. That is why a detailed study of the needs of all interested parties becomes the main step in the preliminary design stage. This approach helps directly link the academic goals of the university with the practical requirements of the modern industry. Recent qualitative studies emphasize that aligning higher education curricula with rapid industry changes requires "value co-creation". Engaging diverse stakeholders-including students, educators, and career practitioners-transforms the student from a passive receiver of predefined content into an active, resource-integrating partner within the career learning ecosystem (Le et al., 2026).

This is supported by recent systematic reviews, which demonstrate that integrating gamification into career guidance not only significantly increases students' intrinsic motivation and

engagement but also effectively bridges the gap between academic preparation and dynamic industry demands by developing both hard and soft skills (Fazria et al., 2026).

While global platforms (e.g., LinkedIn) successfully connect educational and corporate sectors, they heavily rely on direct API integrations with open university databases or function entirely outside the academic framework. In contexts where universities utilize closed, proprietary Learning Management Systems (such as LMS Platonus) and where direct integration with national employment databases or commercial job boards is restricted, these global architectures cannot be directly replicated. Therefore, the scientific novelty of our proposed architecture lies not in the invention of isolated features like gamification or document recognition, but in their unique configuration as a compensatory mechanism. The proposed model acts as an "API-less verification bridge." It adapts these standard digital tools to function as core engines for verifying academic credentials and stimulating continuous manual user data input, thereby circumventing local infrastructural barriers.

Methods and organization of research

The methodology of the work is based on a systematic approach to modeling educational IT products (Banathy, 1991). Experience in developing digital services for universities shows that a platform will become truly convenient and practically applicable only if the authors study in detail the expectations of future users (Pohl & Rupp, 2015). Data collection was carried out within the framework of the scientific project IRN AP26194889 based on a mixed research method (combined approach), which allowed combining a quantitative survey to identify general trends and a qualitative analysis of responses for a deeper understanding of the participants' requests (Gorshkov & Sheregi, 2016).

The study was conducted in strict accordance with the ethical principles of academic research. Prior to participation, all respondents provided digital informed consent on the first page of the online questionnaire, acknowledging the voluntary and completely anonymous nature of their participation. No personally identifiable information was collected, and participants were informed that they could withdraw from the survey at any time. Participant recruitment was conducted through official university mailing lists, student communication channels (e.g., academic messenger groups), and the professional networks of the partner universities in Kazakhstan using convenience and snowball sampling techniques.

To obtain a comprehensive assessment, four key groups related to the educational process took part in the study:

- students ($n = 243$), who are considered the main users of the projected autonomous digital platform;
- graduates of higher educational institutions ($n = 62$), specialists who graduated from the university within the last three years and have practical experience in transitioning from studies to job hunting;
- academic consultants / advisors ($n = 45$), university teachers and curators acting as mentors and career counselors;
- employers ($n = 32$), company representatives and HR specialists who directly hire graduates and assess their skills.

The student sample consisted primarily of upper-year undergraduates preparing for the labor market, with a relatively balanced gender distribution representative of the participating faculties. The primary data collection tool was a set of specialized, group-specific questionnaires distributed via the Google Forms platform. The questionnaire structure for each stakeholder group consisted of three main sections: 1) non-identifying demographic and academic/professional background information; 2) quantitative closed-ended items assessing the current state of career support and expectations, measured on a standard 5-point Likert scale (ranging from 1 = "Strongly Disagree" to 5 = "Strongly Agree"); and 3) qualitative open-ended questions designed to capture specific architectural and functional wishes for the projected digital ecosystem.

Quantitative data were processed using mathematical statistics methods with the calculation of the frequency distribution of answers in the SPSS 26.0 program.

To check the reliability and internal consistency of the Likert-scale items, Cronbach's Alpha coefficients were calculated separately for each stakeholder instrument, demonstrating high reliability across all groups: students ($\alpha = 0.84$, 12 items), graduates ($\alpha = 0.82$, 10 items), academic advisors ($\alpha = 0.86$, 8 items), and employers ($\alpha = 0.81$, 9 items) (Sidorenko, 2003). The quantitative coding scheme utilized a standard 5-point Likert scale ranging from 1 ("Strongly Disagree" or "Not Important") to 5 ("Strongly Agree" or "Critically Important"). Due to manuscript length constraints, the full questionnaires are summarized by their core thematic constructs and sample item wording. The student and graduate instruments measured the "Career Support Deficit" construct (sample item: "The university provides adequate personalized tools to match my skills with market demands"). The advisors' instrument measured "Resource Constraints" (sample item: "I have sufficient time and administrative resources to provide individualized career tracking for my assigned students"). The employers' questionnaire assessed "Competency Expectations" (sample item: "Current graduates possess the necessary balance of hard and soft skills for successful integration into the workplace"). Qualitative open-ended responses were coded categorically into specific functional requirements (e.g., "automated CV generation," "gamified progress tracking").

To address the qualitative component of the mixed-methods design, responses to open-ended questions were analyzed using thematic content analysis. Textual data provided by the respondents were systematically read and manually coded to identify recurring themes and specific user requirements (e.g., the need for built-in chats or transparent skill verification). These categorized themes were then directly translated into the functional and architectural specifications of the proposed IT platform, ensuring that the final system design is empirically grounded in the stakeholders' articulated needs.

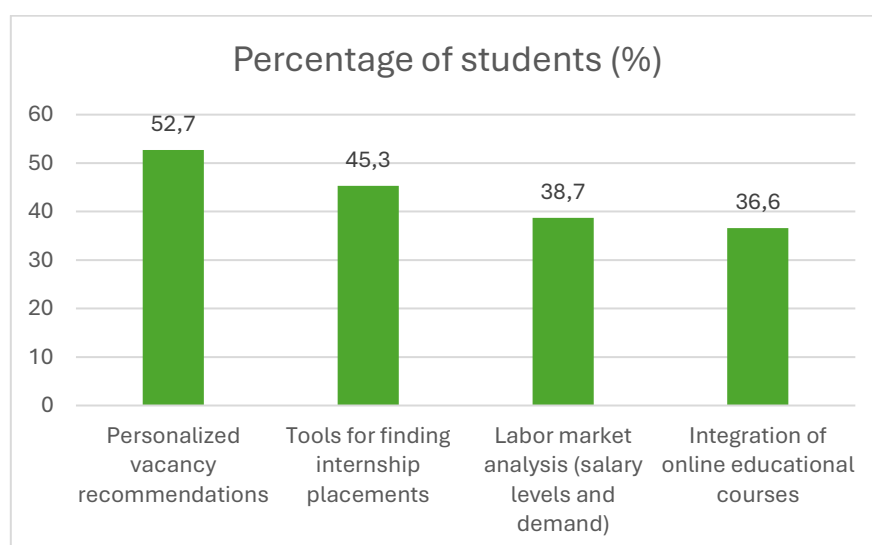
The results of the study and their analysis

Empirical analysis of the students' responses ($n=243$) showed that the majority, when planning their future, are primarily guided by internal motives; 59.7% choose a career trajectory based on personal interests and hobbies. At the same time, external factors, such as the situation on the labor market (12.3%) or the specifics of the chosen educational program (9.1%), have a significantly smaller impact on them. As the main element that would help to better understand the practical side of the profession, 51.0% of students named taking part in internships.

This emphasis on personal interests and practice indicates the need to introduce individual support tools in universities. However, existing career centers often do not fully cope with this task; 28.4% of students found it difficult to name specific formats of support from their university, choosing the answer "difficult to answer".

83.1% of students confirmed that having a platform capable of analyzing their skills and automatically suggesting suitable vacancies would be beneficial to them. As shown in Figure 1, students highlighted personalized vacancy recommendations and tools for finding internship placements as the most anticipated features of the autonomous digital platform. Labor market analysis and the integration of online educational courses were also identified as significant needs.

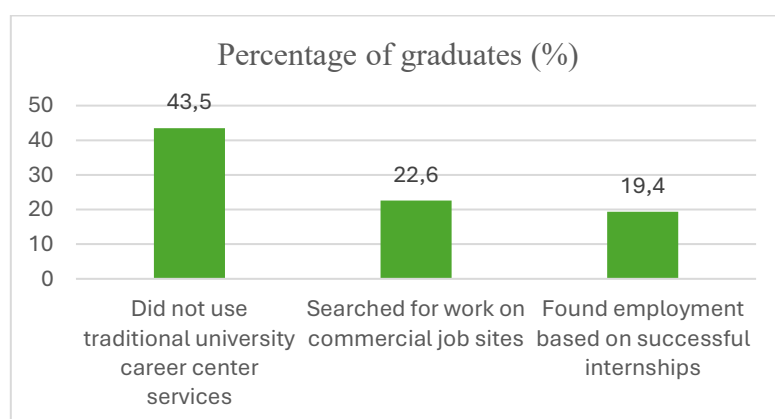
Figure 1
Student Expectations for the IT Platform Features



Note. The data represents the percentage of student respondents (n = 243) prioritizing each specific feature of the projected application.

An analysis of the responses of young professionals (n=62) showed that 46.8% were able to find a job even before graduating from the university. At the same time, 29.0% (18 people) remained unemployed at the time of the study, indicating persistent difficulties in adapting to the market. As illustrated in Figure 2, classic formats of university career centers' work have largely lost their relevance. A significant portion of former students bypassed university employment assistance structures entirely, preferring to look for vacancies on their own in the open labor market through commercial web resources or relying on the results of successfully completed internships.

Figure 2
Job Search Strategies Among Graduates



Note. The data represents the percentage of surveyed young professionals (n = 62) indicating their primary job search experiences and interaction with university career services.

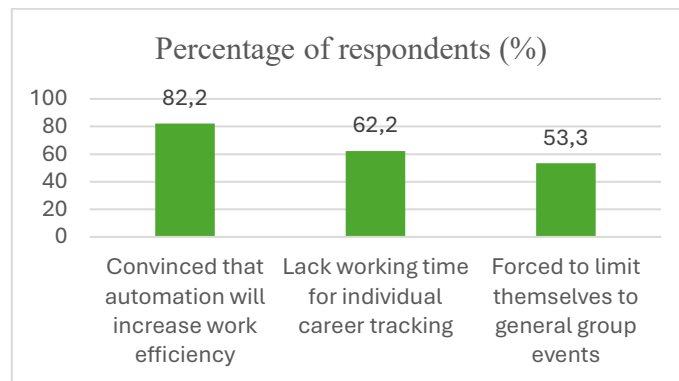
Young professionals, just like today's students, expect a modern IT platform to provide the ability to quickly select specialized training programs (45.2%) and directly contact company representatives through built-in chats (41.9%).

At the same time, a survey of curators and academic advisors (n = 45) revealed the internal side of this problem. As highlighted in Figure 3, the primary barrier is of a resource nature. Teachers noted a significant lack of working time for high-quality career tracking of each individual student, forcing them to limit themselves to conducting general group events and seminars that do not take

into account the unique characteristics of a particular student. Despite these challenges, educators highly value the potential of digitalization, expressing conviction that a special autonomous digital platform or platform with an automatic skills diagnostic function will significantly increase the efficiency of their consulting work and save time.

Figure 3

Teachers' and Advisors' Assessment of Career Support Barriers and IT Potential



Note. The data represents the percentage of surveyed academic advisors and curators (n = 45) evaluating current resource constraints and the potential impact of digitalization on their work.

During a survey of representatives of companies and employer organizations (n=32) acting as university partners and practice bases, a demand for a transparent assessment of candidates' qualities was recorded. Experts note that the main reasons for difficulties in hiring young professionals are their lack of a long-term career plan and low motivation for development (50.0%).

When evaluating potential employees, employers demonstrate parity between fundamental training and cross-professional skills. The demand for applied professional knowledge (hard skills) amounted to 50.0%. At the same time, the employer expects graduates to have developed flexible skills (Soft skills), among which teamwork, initiative, and sociability are named as key ones. Companies see the regular holding of industrial practices and joint dual educational programs as the most effective form of interaction with the university (50.0%).

Comparing the opinions of all four groups of stakeholders allows us to draw an important conclusion for system design. Traditional career centers are physically unable to provide individual attention to every student due to staffing and time constraints, as confirmed by research (Dziuban et al., 2018).

The platform designed within the project solves this problem by replacing routine work with automatic algorithms.

Instead of personal conversations with an advisor, the student takes interactive tests in the application that determine their interests (a request of 41.7% of students).

The problem of time deficit among teachers (revealed in 62.2%) is solved through the curator's personal account, where they see an automatic rating of students' resume readiness and can selectively help those who need it.

This systemic solution aligns with current trends in digital career support, where the role of the career counselor is fundamentally evolving. Digital transformation shifts the advisor's responsibilities from traditional, individualized face-to-face consultations toward active platform management and the provision of data-driven, proactive advice (Sudjani & Putra, 2025).

To distinguish the proposed architecture from standard commercial job boards or traditional VLE modules, it is designed as a completely autonomous, multi-sided ecosystem connecting exactly four actors: students, academic advisors, employers, and graduates. Because the system cannot integrate directly with commercial job boards or state employment services due to technical and administrative barriers, it implements the principle of an independent digital space. The student independently uploads their academic transcript, and the system utilizes document recognition

technologies not merely as a convenience, but as the primary architectural workaround to convert static grades into a verified digital competency profile without requiring backend access to the university's closed database. Furthermore, gamification elements (e.g., profile completion progress bars and skill mastery levels) are structurally applied here not just for entertainment, but as vital drivers to stimulate continuous manual data input by users, ensuring the ecosystem remains dynamic despite the lack of automated data synchronization.

The use of basic game elements (gamification), such as profile completion progress bars and skill mastery levels, helps retain students' interest and encourages them to regularly update their resumes, which directly solves the problem of the "attention economy" in a digital environment (Sailer & Homner, 2020).

Conclusions

The conducted study allowed us to comprehensively study and systematize the expectations of key stakeholders in the educational environment, which became the basis for designing the architecture of a new autonomous digital platform for career support.

Based on the obtained empirical data, the following conclusions can be drawn.

A high infrastructural gap in traditional methods of career building has been identified. A significant portion of students and graduates do not interact with university career centers, preferring to use external digital commercial resources. At the same time, the dominant request of students is associated with individual planning tools based on their personal interests and hobbies, as well as with finding places for industrial practice and internships.

A critical shortage of time and human resources among academic advisors and curators has been recorded. This limits the possibilities of conducting high-quality individual work with students and forces teachers to use exclusively mass, group event formats that reduce the accuracy of career counseling.

A parity of employer requirements regarding the quality of training of young professionals has been determined. For modern business, deep professional knowledge of job seekers (Hard skills) and their behavioral, communicative qualities (Soft skills), supported by long-term career planning, are equally important.

The feasibility of developing an autonomous platform has been justified. In the context of the closed server architecture of commercial learning management systems (LMS Platonus) typical for universities in Kazakhstan, creating an independent digital space is the most flexible solution. It compensates for the lack of direct integration through user data input, document recognition technologies (transcripts), and gamification mechanisms.

The practical significance of this work lies in the fact that the designed IT platform automates routine processes of skills assessment and job search, ensuring a continuous connection between students' academic performance, mentoring from advisors, and current labor market demands. The developed platform transforms passive information dissemination into a proactive professional development management system.

Furthermore, while this study is empirically grounded in the Kazakhstani national context, its findings and the proposed architectural framework demonstrate high transferability to other international higher education systems. The core infrastructural challenge identified here—the inability to seamlessly integrate modern career tools into closed or legacy university databases—is a global issue, particularly prevalent in developing economies and institutions with limited IT budgets. The proposed architectural workaround, which utilizes document recognition and gamified self-reporting to bypass closed institutional IT environments, offers a scalable and adaptable blueprint for universities globally seeking to modernize student career support without requiring expensive, deep-level API integrations.

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Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

Ethics Statement

The study was conducted in accordance with generally accepted ethical principles for academic research. All respondents provided digital informed consent prior to participation. Participation was voluntary and anonymous, no personally identifiable information was collected, and respondents could withdraw at any time.

Author Contributions

Yerbol Sarmurzin: Conceptualization, Supervision, Writing – review & editing. Yelena Chsherbakova: Conceptualization, Methodology, Investigation, Project administration, Writing – original draft preparation. Talgat Zhussipbek: Validation, Writing – review & editing. Yuliya Idiyatova: Formal analysis, Data curation, Software, Visualization. All authors have read and agreed to the published version of the manuscript

Declaration of Use of Generative AI and AI-Assisted Technologies

The authors declare that no generative AI or AI-assisted technologies were used in the preparation of this manuscript.

Data Availability Statement

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions (protection of personal information of the surveyed students, graduates, and employers).

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