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Diagnosis and Improvement of Digital Skills: Strategies for Educational Transformation in Monterrey

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ABSTRACT

This study done at the Instituto Tecnologico de Nuevo Leon assessed the digital skills of Business Management Engineering students using the External Factor Evaluation (EFE) and Internal Factor Evaluation (IFE) matrices. The students scored 2.57 in EFE and 2.44 in IFE, indicating that their digital competencies align reasonably well with market expectations and technological advancements. However, there is significant room for improvement in critical areas such as cybersecurity and programming to enhance their employability. The analysis involved collecting evaluations from 20 significant employers, providing a comprehensive view of the program strengths and weaknesses. EFE matrix highlighted opportunities such as trends in technological innovation and industry collaborations, while identifying threats like government education policies and academic competition. IFE matrix pointed out internal strengths like the institution's location in a technological innovation zone and academic agreements with the industry, as well as weaknesses such as insufficient technological infrastructure and resistance to change. The study underscores the importance of a strategic focus on continuous improvement and adaptation to emerging technologies and market demands. It calls for an educational transformation that prioritizes constant updates in digital competencies to ensure that graduates remain competitive and employable in a rapidly changing labor market.

1. INTRODUCTION

Digitalization has significantly transformed the business landscape, reshaping how organizations operate and compete in the global market. The rapid evolution of technology has led to an increasing demand for digital skills in fields such as cybersecurity, data analysis, and process automation. However, a substantial gap persists between the digital competencies acquired by university students and those required by the labor market [1, 2]. This disparity represents a critical challenge for graduate employability, particularly in programs such as Business Management Engineering (IGE), where digital transformation is a key factor in professional competitiveness.

1.1 Research problem

Despite efforts to integrate digital competencies into higher education curricula, many graduates still lack the specific skills required by employers. Research indicates that the pace of technological advancement surpasses the ability of academic programs to update accordingly, leading to a misalignment between educational outcomes and workforce demands [3]. This study aims to analyze the extent of this gap and assess how well IGE students at ITNL are prepared for digital workforce demands.

Business digitalization initially emerged as an internal optimization strategy but has evolved into the development of new business models and the restructuring of consumer interactions. According to Schroeck et al. [4], "companies that adopt digital practices can experience up to a 45% improvement in their business processes". Task automation has helped reduce errors, lower costs, and enhance operational efficiency across various sectors, such as manufacturing and e-commerce [5]. A notable example is Amazon, which evolved from an online bookstore into a global e-commerce giant, reshaping the retail distribution model worldwide [6].

From an educational perspective, digitalization has not only impacted the business sector but has also transformed the skills that future professionals must develop. According to the World Economic Forum [7], "54% of employees across all industries will require significant reskilling by 2025." This underscores the need for educational institutions to adapt their curricula to the demands of the digital economy.

To systematically assess the gap between acquired and required digital skills, this study employs the EFE and IFE matrices. These tools facilitate a structured analysis of both external labor market demands and internal institutional capabilities, providing insights into areas for improvement in digital education.

1.2 Benefits of business digitalization

1. **Enhanced Operational Efficiency:** Automation reduces operational times and costs, enabling companies to be more agile and competitive [8].
2. **Data-Driven Decision-Making:** Access to large volumes of information facilitates more precise and informed decision-making [9].
3. **Access to New Markets:** Digital platforms remove physical barriers, allowing small and medium-sized enterprises to expand globally [6].
4. **Improved Customer Experience:** Digitalization enables businesses to better understand consumer needs and offer personalized services [10].
5. **Innovation in Products and Services:** The adoption of digital technologies fosters the development of innovative business models [11].
6. **Improved Internal Collaboration:** Digital tools strengthen communication and coordination among teams, even in remote work environments [12].
7. **Sustainability and Environmental Responsibility:** Digital optimization contributes to reducing resource consumption and waste production [13].

Despite its advantages, digital transformation presents significant challenges that must be addressed to ensure effective adoption in companies and academic training:

1. **Digital Skills Gap:** There is a disparity between the digital competencies available in the workforce and those demanded by the market [14].
2. **Cybersecurity:** The increase in data security risks necessitates stricter protection measures [15].
3. **Organizational and Cultural Change:** Resistance to change within companies is a significant barrier to digital transformation [8].
4. **Integration of Digital Technologies:** Effectively incorporating new technologies into existing processes poses technical and operational challenges [16].
5. **Data Management and Analysis:** Handling large volumes of information remains a challenge for many companies [17].

These challenges highlight the importance of educational institutions adapting their programs to equip students with the necessary digital competencies. UNESCO [18] emphasizes that "education must evolve alongside the labor market, ensuring that graduates possess applicable digital skills." The integration of advanced technologies, programming, and data analysis in higher education has become essential to preparing future professionals for a digitalized business environment [19].

In this context, the connection between business digitalization and digital transformation in educational institutions is fundamental to developing critical skills in human capital. Initiatives such as digital internships and collaborative projects with companies allow students to gain practical experience in real-world digitalization environments [20]. Additionally, the Association to Advance Collegiate Schools of Business [21] emphasizes that "integrating digital skills into curricula is essential to training business leaders for the digital era".

This document is structured as follows: Section 2 presents the theoretical framework, contextualizing the main approaches to digitalization in education and employability. Section 3 describes the methodology used, justifying the application of the EFE and IFE evaluation instruments. Subsequently, Section 4 presents the results obtained and their interpretation considering academic literature. Finally, Section 5 outlines the conclusions and recommendations for future research and improvements in teaching digital competencies in higher education.

2. THEORETICAL AND CONCEPTUAL FRAMEWORK

Digital transformation represents a structural reconfiguration in higher education that goes beyond merely introducing new technologies into the classroom. It involves a redefinition of processes and pedagogical strategies to develop digital skills aligned with labor market demands [22]. Within this framework, the ITNL positions itself as an educational entity that must address these challenges to maintain the employability of its graduates in the field of business management.

2.1 The DIGCOMP 2.0 framework and its importance

The DIGCOMP 2.0 framework, developed by the European Commission, provides a comprehensive model for assessing digital competencies among students and professionals. It categorizes digital skills into five main areas: Information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving [2]. This framework serves as a benchmark for understanding the digital preparedness of students and allows educational institutions to align their curricula with the evolving demands of the labor market.

DIGCOMP 2.0 is widely adopted across Europe and other regions to standardize digital skills assessment and certification [23]. Studies show that institutions that integrate this framework into their curriculum design produce graduates with higher employability rates, as they are better prepared to handle digital tools and technologies effectively [24]. Given this, ITNL can benefit from applying DIGCOMP 2.0 to evaluate and enhance its students' digital competencies, ensuring their successful transition into the workforce.

2.2 Strategic tools for digital skills assessment

The strategic analysis tools EFE-EFI are fundamental in identifying the gap between the digital skills acquired by students and those required by employers. These strategic models provide an accurate diagnosis, allowing federal institutions like ITNL to develop a pertinent and effective action plan [25]. The application of these tools allows a structured assessment of institutional strengths and weaknesses in digital education, guiding improvements that align with industry expectations.

The assessment of digital skills, measured through internationally recognized parameters such as the DIGCOMP 2.0 framework, offers a detailed evaluation of the capabilities that students must master to be competitive in the digital economy [2]. The employability of graduates is intrinsically linked to their ability to adeptly handle current digital tools and platforms, highlighting the urgency of this assessment [26].

Previous studies have explored the impact of digital competencies on employability, highlighting that skill gaps persist despite efforts to integrate digital learning into higher

education curricula [24, 27, 28]. Research suggests that students often lack practical experience in digital problem-solving and industry-specific technology use, which affects their adaptability in professional environments [29]. These findings support the use of strategic analysis tools, such as the EFE and IFE matrices, to assess institutional readiness and develop targeted interventions.

In addition, research has demonstrated that organizations increasingly rely on digital competency frameworks like DIGCOMP 2.0 to evaluate potential employees, emphasizing the importance of structured, formalized digital education within academic institutions [14]. Universities that have adopted these frameworks have reported improved student outcomes in critical thinking, digital literacy, and cybersecurity awareness [19].

National statistics underscore a concerning trend towards the obsolescence of certain traditional skills, echoing the need to incorporate digital competencies into educational curricula to meet the needs of the modern business environment [18]. Federal policies increasingly advocate for digital education, positioning institutions like ITNL as key actors in driving innovative educational strategies that bridge the competency gap [18].

Given the alignment of these theoretical perspectives, ITNL has an opportunity to lead digital competency development within its business management programs. By integrating DIGCOMP 2.0 into its assessment and curriculum planning, ITNL can systematically address competency deficiencies and enhance the employability of its graduates. Additionally, the use of strategic evaluation tools like MEFE-MEFI and the IE matrix can provide data-driven insights to adjust curriculum offerings, implement digital skill certification programs, and foster stronger industry-academia collaboration.

3. METHODOLOGY

For the execution of the project "Diagnosis and Improvement of Digital Skills: Strategies for Educational Transformation in Monterrey," a mixed research methodology was adopted, integrating qualitative and quantitative approaches to evaluate employers' perceptions of the digital skills of Business Management Engineering students.

The EFE Matrix and the IFE Matrix are strategic tools used to evaluate the external and internal environments of an organization, respectively. These matrices allow for the identification and assessment of key factors affecting organizational performance, providing a solid foundation for strategic planning.

The methodological decisions were based on a Delphi method consultation with experts in the field of digital education and labor market transformation [30]. The panel included a Ph.D. in Education and Digital Transformation, a Ph.D. in Education, and employers from the ICT sector. This expert consultation ensured that the research design was aligned with industry needs and academic best practices.

3.1 EFE matrix

The EFE Matrix analyzes external factors, classifying them as opportunities or threats. Each factor is weighted according to its relative importance and assigned a rating that reflects the organization's effectiveness in responding to that factor. The total score is obtained by summing the products of the weights and ratings. The EFE Matrix allows strategists to summarize and evaluate economic, social, cultural, demographic, environmental, political, governmental, legal, technological, and competitive information" [31].

3.2 IFE matrix

The IFE Matrix, on the other hand, focuses on internal factors, classifying them as strengths or weaknesses. Like the EFE, each factor is weighted and rated to reflect its impact and the organization's ability to manage it. The total score of the IFE Matrix is the sum of the products of the weights and ratings. "The IFE Matrix allows managers to identify key strengths and weaknesses within the organization, providing a basis for developing strategies that capitalize on strengths and improve weaknesses" [31]. The scores from the matrices provide a quantitative measure of the internal and external environments, enabling strategists to identify areas needing attention and develop action plans to improve organizational performance.

3.3 Weight generation in EFE and IFE

Weight generation in the EFE and IFE matrices is a crucial process that involves assigning relative weights to each identified factor. This process was refined through the Delphi method, ensuring a rigorous and evidence-based approach:

1. **Identification of Factors:** Key factors affecting the organization were first identified, which can be external (opportunities and threats) or internal (strengths and weaknesses). These factors were selected based on their relevance to the digital competency development of students [31].
2. **Assignment of Weights:** The panel of experts, composed of a Ph.D. in Education and Digital Transformation, a Ph.D. in Education, and ICT employers, assigned weights to each factor based on its impact on digital readiness and labor market expectations. Weights ranged from 0.0 (not important) to 1.0 (very important) and summed to 1.0 to ensure a balanced distribution.
3. **Assignment of Ratings:** Each factor was assigned a rating ranging from 1 to 4 in both the EFE and IFE matrices. In the EFE, a rating of 4 indicated a superior response by the institution to opportunities/threats, while 1 indicated a poor response. In the IFE, 4 indicated a major strength and 1 a major weakness [31].
4. **Calculation of Scores:** The total scores for the EFE and IFE matrices were computed by multiplying the weight of each factor by its corresponding rating and summing the resulting products. "The final result offers a quantitative measure of the external and internal environments, helping strategists make informed decisions" [31]. This structured process ensured that strategic decisions were grounded in empirical evidence and expert insights.

3.4 Data analysis

Data collected from the digital questionnaires were analyzed using descriptive statistics and correlation analysis in SPSS. Frequencies and cross-tabulations were employed to identify trends in employer perceptions, while chi-square tests were used to assess the significance of associations between digital competency ratings and industry expectations. This

analytical approach provided robust insights into the alignment between student competencies and market demands, ensuring the validity of the study's findings.

4. RESULTS

The research developed within the framework of the project "Diagnosis and Improvement of Digital Skills: Strategies for Educational Transformation in Monterrey" focused on analyzing employers' perceptions of the digital competencies of graduates from the Business Management Engineering program at the Instituto Tecnologico de Nuevo Leon. Through the implementation of EFE and IFE diagnostic tools in a digital questionnaire, evaluations from 20 significant employers were collected, culminating in scores of 2.57 e.g., Table 1 and 2.44 e.g., Table 2 respectively, on a scale of 1 to 4 where 1 is very poor and 4 is excellent.

4.1 EFE matrix results

Table 1 summarizes the key opportunities and threats identified in the EFE matrix, highlighting technological trends and academic collaborations as strengths, while identifying government education policies and funding limitations as major threats. The highest-rated opportunities include technological innovation trends, the strong business ecosystem in Monterrey, and advancements in online and distance education. These findings emphasize the importance of maintaining strong industry-academic collaboration to enhance student digital preparedness.

Table 1. EFE matrix

Factor	Value	Rating	Weighted Result
OPPORTUNITIES			
O1. Trends in Technological Innovation	0.08	4	0.32
O2. Business Ecosystem in Monterrey	0.07	4	0.28
O3. Developments in Online and Distance Education	0.07	4	0.28
O4. Emerging Technologies in the Business Sector	0.06	4	0.24
O5. Changes in Student Demand	0.06	3	0.18
O6. Industry Collaborations	0.06	3	0.18
O7. Developments in Innovative Teaching Methodologies |	0.05	3	0.15
O8. Influence of International Educational Organizations	0.05	3	0.15
SUBTOTAL	0.5		1.78
THREATS			
A1. Government Education Policies	0.09	1	0.09
A2. Federal Funding for Education	0.07	1	0.07
A3. Academic Competition	0.07	2	0.14
A4. Accreditation and Educational Quality Standards	0.06	2	0.12
A5. Impact of the COVID-19 Pandemic	0.06	2	0.12
A6. Social and Cultural Pressures	0.05	2	0.1
A7. Ethical and Legal Aspects of Digitalization	0.05	2	0.1
A8. Dynamics of the Local and Global Labor Market	0.05	1	0.05
SUBTOTAL	**0.5**		**0.79**
TOTAL EFE	**1**		**2.57**

These results align with the DIGCOMP 2.0 framework [2], which highlights the necessity of equipping students with digital competencies that align with emerging industry needs [24]. The increasing integration of artificial intelligence, cloud computing, and data analytics in business environments underscores the importance of aligning educational programs with technological advancements [26]. Institutions that successfully integrate these elements into their curricula see higher employability rates among graduates [29].

Table 1 presents the EFE matrix results

Table 1 presents the EFE matrix results, where technological trends and the local business ecosystem were the highest-rated opportunities. These findings emphasize the importance of maintaining strong industry-academic collaboration to enhance student digital preparedness.

The following is the description of the 16 internal factors identified for the EFE analysis, consisting of 8 Opportunities and 8 Threats:

4.2 Opportunities

O1. Trends in Technological Innovation: Trends in technological innovation represent a significant opportunity for the institution. The constant evolution of technology offers new tools and methods that can be integrated into the educational curriculum, enhancing the quality of teaching, and better preparing students for the future. Staying up to date with these trends can position the institution as a leader in technological education, attracting more students and strengthening its reputation.

O2. Business Ecosystem in Monterrey: Monterrey has a robust business ecosystem that the institution can leverage. Local companies can offer collaboration opportunities, internships, and jobs for students. These relationships can facilitate the transfer of knowledge and technology, allowing students to apply what they have learned in the classroom to real-world work environments, improving their preparation and employability.

O3. Developments in Online and Distance Education: Advances in online and distance education present a great opportunity to expand the institution’s reach. Implementing online programs can attract students who cannot physically attend campus, increasing enrollment and diversifying the student base. Additionally, these developments allow flexibility in learning, accommodating different lifestyles and schedules, and making education more accessible.

O4. Emerging Technologies in the Business Sector: Emerging technologies in the business sector, such as artificial

intelligence and the Internet of Things, can be incorporated into the institution's curriculum. Teaching these technologies can better prepare students for future jobs and make them more attractive to employers. Adopting these technologies can also improve the efficiency and effectiveness of educational processes.

O5. Changes in Student Demand: Changes in student demand reflect the needs and expectations of modern students. Adapting to these changes can help the institution develop programs and services that are more attractive and relevant to current students. Listening to and responding to student demands can improve student satisfaction and retention.

O6. Industry Collaborations: Collaborations with industry are crucial for maintaining the relevance of the educational curriculum. These partnerships can provide students with access to current technology and practices, as well as employment opportunities. Collaborations can also facilitate joint research and the development of innovative projects, benefiting both the institution and its industry partners.

O7. Developments in Innovative Teaching Methodologies: Implementing new teaching methodologies can significantly improve the quality of learning. Innovative methodologies, such as project-based learning and collaborative learning, can make the educational process more dynamic and effective. Adopting these methodologies can increase student engagement and motivation and improve academic outcomes.

O8. Influence of International Educational Organizations: The influence of international educational organizations can guide the institution in adopting best practices and global standards. These organizations offer resources, research, and collaboration networks that can be leveraged to improve educational quality. Aligning with international standards can also increase the institution's credibility and prestige globally.

4.3 Threats

A1. Government Education Policies: Government education policies can impose restrictions or changes that negatively impact the institution. New regulations may require costly adaptations or changes to the curriculum, which can be challenging. Additionally, uncertainty in education policies can make long-term planning difficult.

A2. Federal Funding for Education: Decreases in federal funding for education can limit the resources available to the institution. This can affect the quality of teaching, infrastructure, and the ability to implement new programs and technologies. Dependence on government funding makes the institution vulnerable to changes in funding policies.

A3. Academic Competition: Academic competition with other institutions can be a significant threat. Universities compete for the same students, funds, and resources. To remain competitive, the institution must differentiate itself by offering unique and high-quality programs and demonstrating superior results in education and research.

A4. Accreditation and Educational Quality Standards: Accreditation and educational quality standards can impose strict requirements that the institution must meet. Maintaining accreditation is crucial for the institution's credibility and recognition but meeting these standards can be challenging and require significant resources.

A5. Impact of the COVID-19 Pandemic: The COVID-19 pandemic has had a profound impact on the education sector, forcing institutions to rapidly adapt to online teaching and face financial and logistical challenges.

A6. Social and Cultural Pressures: Social and cultural pressures can influence the expectations and demands of students and their families. These pressures can affect enrollment, retention, and student satisfaction. The institution must be sensitive to these factors and adapt to meet the needs and expectations of its community.

A7. Ethical and Legal Aspects of Digitalization: Digitalization brings with it ethical and legal challenges, such as data privacy and cybersecurity. The institution must ensure compliance with regulations and protect the information of students and employees. Ethical issues can also impact the institution's reputation and trustworthiness.

A8. Dynamics of the Local and Global Labor Market: Changing dynamics of the labor market can affect the relevance of educational programs. The institution must adapt to market needs to ensure that its graduates are prepared for employment opportunities. Keeping up with market trends is essential for student employability.

The results obtained from the EFE matrix indicate that although students possess an acceptable foundation in digital skills, there are significant opportunities for improvement in their preparation to meet the technological demands of the current labor market. Specifically, there is a need to strengthen areas such as programming, data analysis, and cybersecurity, which are increasingly demanded by the market. These findings are consistent with the DIGCOMP 2.0 framework [2], which emphasizes the importance of strengthening digital competencies in cybersecurity, programming, and data analysis. This aligns with studies indicating that institutions that integrate industry-driven digital training modules achieve higher employability rates for their graduates [24, 26].

4.4 Internal Factor Evaluation (IFE) matrix results

Table 2 presents the IFE Matrix results, highlighting key strengths and weaknesses identified in the institution's digital education framework. The main strengths include the institution's strategic location in a technological innovation zone (F1) and the high qualification level of professional service professors (F2). These factors significantly contribute to students' digital skills development. Additionally, the specialization offered in the last semester (F3) and academic agreements with industry (F6) were identified as critical assets that enhance employability.

However, technological infrastructure limitations (D2) and lack of specialized software (D1) emerged as the most pressing weaknesses. These deficiencies hinder students' ability to acquire hands-on experience with industry-standard digital tools, which could negatively impact their transition into the workforce. Moreover, faculty technological training limitations (D4) and resistance to change (D3) were also identified as areas requiring urgent intervention to modernize digital education methodologies.

These findings reinforce the conclusions of previous studies [1, 22, 24] that indicate digital competency gaps in higher education are often caused by outdated technological infrastructure and a lack of continuous faculty training. The DIGCOMP 2.0 framework [2] suggests that continuous professional development for educators and investment in up-to-date technological tools are essential to maintaining competitiveness in digital education.

On the other hand, the IFE matrix reveals that students demonstrate intermediate digital competencies that do not significantly differ from business expectations e.g., Table 2.

However, the study suggests the integration of practical modules that reinforce the application of digital knowledge in real work contexts [31].

The following is the description of the 16 internal factors identified for the IFE analysis, consisting of 8 strengths and 8 weaknesses:

Table 2. Internal Factor Evaluation (EFI) matrix

Factor	Value	Rating	Weighted Result
STRENGTHS			
F1. Location in Technological Innovation Zone	0.08	4	0.32
F2. Highly trained adjunct professors	0.07	4	0.28
F3. Specialization in the last semester	0.08	4	0.32
F4. Federal Funding	0.06	3	0.18
F5. Increasing Student Demand for the program	0.06	3	0.18
F6. Academic agreements with Industry	0.06	3	0.18
F7. Dual educational model in the last semester	0.05	3	0.15
F8. Unionized full-time professors	0.05	3	0.15
SUBTOTAL	0.51		1.76
WEAKNESSES			
D1. Lack of specialized software	0.07	1	0.07
D2. Insufficient technological infrastructure for student demand	0.06	1	0.06
D3. Resistance to change	0.04	1	0.04
D4. Limitations in teacher technological training	0.06	1	0.06
D5. Technological lag in classrooms	0.06	2	0.12
D6. Funding limitations for updates	0.07	2	0.14
D7. Centralized Curriculum Design Process	0.06	2	0.12
D8. Lower Training of Unionized Professors	0.07	1	0.07
SUBTOTAL	0.49		0.68
TOTAL IFE	1		2.44

4.5 Strengths

F1. Location in a Technological Innovation Zone: The strategic location of the institution in a technological innovation zone is highly advantageous. This proximity to cutting-edge technological developments provides students and faculty with direct access to the latest innovations, fostering a culture of continuous learning and adaptation. It also facilitates collaborations with tech companies and startups, offering students opportunities for internships and practical experiences that are crucial for their professional growth.

F2. Highly Trained Professional Service Professors: The presence of professors who are highly trained and engaged through professional services ensures that students receive quality education from experts in their respective fields. These professors bring real-world experience and contemporary knowledge into the classroom, enhancing the learning experience and keeping the curriculum relevant to current industry standards.

F3. Specialization in the Last Semester: Offering specialization in the last semester allows students to focus on their areas of interest and gain in-depth knowledge in specific fields. This targeted learning approach not only prepares students for specialized roles in the job market but also makes them more competitive candidates for employment.

F4. Federal Funding: Federal funding is a significant strength as it provides financial stability and resources necessary for maintaining and improving the quality of education. This funding can be utilized for infrastructure development, research projects, and scholarships, thereby enhancing the institution's capability to support its students and faculty.

F5. Increasing Student Demand for the Program: A growing demand for the program indicates its popularity and relevance in the current job market. This trend suggests that the program is meeting the educational and career aspirations of students, and it reflects positively on the institution's reputation and the perceived value of its degree.

F6. Academic Agreements with Industry: Academic agreements with industry partners are crucial for bridging the gap between theoretical knowledge and practical application. These partnerships provide students with internship opportunities, exposure to industry practices, and potential job placements. They also allow for curriculum updates based on industry feedback, ensuring that the education provided is aligned with market needs.

F7. Dual Educational Model in the Last Semester: Implementing a dual educational model, which combines classroom learning with practical work experience in the last semester, prepares students for the real-world challenges they will face in their careers. This model enhances their employability by providing them with hands-on experience and making them more adaptable to the professional environment.

F8. Unionized Base Professors: Having unionized base professors can contribute to job stability and consistency in the quality of teaching. Unionization often ensures that professors receive fair treatment and professional development opportunities, which can translate into better teaching and support for students.

4.6 Weaknesses

D1. Shortage of Specialized Software: The scarcity of specialized software is a significant drawback as it limits students' ability to gain practical experience with the tools commonly used in their industry. Access to up-to-date software is essential for students to develop relevant skills and be prepared for the technological demands of the workforce.

D2. Insufficient Technological Infrastructure for Student Demand: Inadequate technological infrastructure can hinder the learning process and negatively impact the student experience. Modern education relies heavily on technology, and without sufficient resources, students may struggle to

complete assignments, participate in online learning, or conduct research effectively.

D3. Resistance to Change: Resistance to change among faculty or administration can stifle innovation and prevent the institution from adapting to new educational methodologies or technologies. Embracing change is crucial for keeping the curriculum relevant and for implementing improvements that can enhance the educational experience.

D4. Limitations in Technological Training for Faculty: The lack of technological training for faculty members can impede their ability to integrate new technologies into their teaching methods. Continuous professional development is essential for educators to stay current with technological advancements and to effectively teach their students using the latest tools.

D5. Technological Lag in Classrooms: A technological lag in classrooms means that students are not being exposed to the most current tools and technologies. This gap can result in graduates who are not fully prepared for the demands of the modern workplace, making it harder for them to compete for jobs.

D6. Funding Limitations for Updates: Insufficient funding for updates and improvements can prevent the institution from maintaining modern facilities and equipment. Regular updates are necessary to keep pace with technological advancements and to provide students with an environment conducive to learning.

D7. Centralized Curriculum Design Process: A centralized process for curriculum design can limit the flexibility and responsiveness of the institution to industry needs and technological changes. Decentralizing this process can allow for more innovative and relevant curricular updates that better prepare students for their careers.

D8. Lower Training of Unionized Professors: Lower levels of training among unionized professors can affect the quality of education. Continuous professional development is vital to ensure that all faculty members are equipped with the latest knowledge and teaching techniques, which in turn enhances the learning experience for students.

The findings reinforce the need for curriculum updates that integrate digital training in programming and cybersecurity, aligning with the DIGCOMP 2.0 framework [2]. This aligns with previous studies that emphasize the increasing demand for these skills in modern labor markets [29]. These results suggest that academic institutions should prioritize industry-aligned digital education to enhance graduate employability. Additionally, it underscores the relevance of the institution's continued adaptation to the rapid transformations of the digital landscape to ensure the competitiveness and employability of its graduates in a constantly changing labor market [18].

4.7 Implications and strategic recommendations

The joint interpretation of the EFE and IFE matrices suggests that while the institution has a solid foundation for fostering digital competencies, there are significant gaps that must be addressed to ensure that graduates are well-prepared for technological advancements in the labor market.

1. Strengthening Practical Digital Training: The study suggests integrating practical modules that reinforce the application of digital knowledge in real work environments [22]. This aligns with industry expectations and reduces the competency gap.
2. Investing in Technological Infrastructure: Addressing weaknesses such as limited access to specialized software (D1) and insufficient infrastructure (D2) is crucial for improving students' ability to develop industry-relevant skills.
3. Updating the Curriculum in Line with Market Trends: The results highlight the necessity of aligning academic training with the demands of modern industries by incorporating advanced programming, data analytics, and cybersecurity training.
4. Enhancing Faculty Training in Digital Tools: To improve educational delivery and maintain competitiveness, faculty members must receive continuous training in emerging digital tools.

The findings of this study confirm previous research indicating that the gap in digital competencies is mainly concentrated in areas such as programming and cybersecurity [1]. These results suggest that curricular updates incorporating practical, industry-aligned training modules could help close this gap and better align student skills with labor market demands.

5. CONCLUSIONS

This study highlights that while graduates generally meet market expectations for digital competencies, there remains a critical need to strengthen key skills such as cybersecurity and programming to enhance their competitiveness and employability. The institution should prioritize digital educational transformation by implementing continuous curriculum updates and investing in resources to address external opportunities and threats effectively (European Commission, 2022).

5.1 Implications for educational strategy

The significance of this study lies in its practical implications for curriculum development and continuing education. Aligning students' digital skills and academic program content with labor market demands is crucial for increasing graduate employability and social mobility. Addressing these gaps will ensure that the institution's educational offerings remain relevant and effective in preparing students for the evolving digital workforce.

Understanding employers' perceptions plays a vital role in the continuous improvement of academic programs. Employers provide direct insights into the competencies most valued in the industry, allowing educational institutions to tailor their curricula accordingly. This alignment benefits not only the students but also enhances the institution's reputation and impact within the labor market.

5.2 Strategic planning and EFE-IFE matrices

The application of EFE-IFE evaluations in this study underscores their value as strategic tools for academic decision-making. These matrices offer a structured approach to assessing both external opportunities and threats, as well as internal strengths and weaknesses. By leveraging these insights, institutions can prioritize key initiatives that will have the most significant impact on enhancing educational outcomes and ensuring alignment with market needs.

The study suggests several potential avenues for future research:

1. Teacher Training in Digital Competencies: Future studies could explore the development of specialized training programs for faculty members, ensuring they are equipped to teach advanced digital skills effectively.
2. Long-Term Impact of Digital Training: Research could examine how integrated digital skills education influences graduates' career progression and long-term employability.
3. Effectiveness of Instructional Methods: Investigating different teaching approaches and emerging technologies to determine their effectiveness in improving students' digital competencies would provide valuable data for refining curricula.

This research reinforces the need for curriculum updates that integrate digital training in programming, cybersecurity, and data analytics, aligning with the DIGCOMP 2.0 framework (European Commission, 2022). Academic institutions must prioritize industry-aligned digital education to enhance graduate employability. Additionally, the study highlights the necessity for higher education institutions to continually adapt to technological transformations to ensure the competitiveness and professional success of graduates [24].

By bridging the gap between digital education and labor market demands, institutions can equip their graduates with the necessary competencies to thrive in the digital economy. This proactive approach will not only increase employment rates but also strengthen collaborations between academia and industry, ensuring that educational programs remain future-proof and market-relevant.

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