LEX LOCALIS-JOURNAL OF LOCAL SELF-GOVERNMENT

ISSN:1581-5374 E-ISSN:1855-363X
VOL. 23, NO. 8(2025)

THE IMPACT OF IMPLEMENTING EDUCATIONAL SKILL TRANSFER STRATEGIES ON ENHANCING PROFESSIONAL COMPETENCIES IN INFORMATION AND COMMUNICATION TECHNOLOGY AMONG ALGERIAN UNIVERSITY STUDENTS

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Received: 19/02/2024 Accepted: 14/04/2025

Abstract

This study aimed to measure the impact of implementing educational skill transfer strategies on the development of professional skills in the field of Information and Communication Technology (ICT) among Algerian university students. The research problem stems from the widening gap between academic outputs and the requirements of the digital labor market, which increasingly demands practical and applied competencies. To achieve the intended objectives, the study employed a descriptive-analytical approach. Data were collected from a sample of 324 students from various technical and engineering specializations using an online questionnaire, and analyzed through the Statistical Package for the Social Sciences (SPSS). The findings revealed a contradiction between the students' strong theoretical background and their weak actual practical application. Moreover, the results confirmed a strong positive and statistically significant correlation between the two variables, with a Spearman correlation coefficient of 0.702. These results indicate that educational skill transfer strategies such as project-based learning and partnerships with the industrial sector are an essential necessity for preparing graduates. The study recommends intensifying efforts to integrate applied curricula and strengthen collaboration between universities and the business sector to bridge this critical gap.

Keywords: Skill transfer strategies, professional skills, Information and Communication Technology (ICT), higher education, labor market.

INTRODUCTION

The global economic landscape is undergoing a profound transformation driven by technological and knowledge-based shifts. This has imposed on higher education systems the necessity of keeping pace with these changes by preparing graduates equipped with practical and professional skills that meet the demands of the labor market particularly in the field of Information and Communication Technology (ICT), which forms the backbone of the digital economy. Scientific and technical

ISSN:1581-5374 E-ISSN:1855-363X
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disciplines emerge as a cornerstone in building these skills, as they provide the human capital specialized in innovation and technological solutions.

However, a significant gap persists between the theoretical knowledge acquired by students in these disciplines and their ability to transform it into practical, applicable skills in real work environments. Many graduates from science, technology, engineering, and mathematics (STEM) fields face challenges in transitioning into ICT-related jobs due to the mismatch between the skills they acquired in their studies and those required by employers, especially in terms of practical, applied, and digital competencies (OECD Science, 2019). This disparity between theory and practice represents a major challenge.

Many STEM programs still focus heavily on abstract theoretical knowledge, thereby weakening graduates' readiness to tackle problem-solving, project management, and collaboration in ICT roles (Cabrera & Maldonado, 2020). Employers consistently highlight that, despite the strong academic foundations of ICT graduates, they often lack the practical experience and interpersonal skills necessary to become immediately productive in dynamic work environments (Ahmed & Alamin, 2021). This situation underscores the urgent need for effective strategies to transform educational skills into professional competencies in ICT, thereby aligning educational outcomes with the actual needs of the industrial and technological sectors.

From this context arises the central research question:

To what extent can educational skill transfer strategies in modern technological disciplines contribute to the development of the professional competencies required by the ICT labor market among Algerian university students?

Research Hypotheses

1. The application of educational skill transfer strategies to the development of professional skills in ICT is at a low level among Algerian university students.

2. There is a statistically significant positive correlation between the application of educational skill transfer strategies and the development of professional skills in ICT among Algerian university students.

Research Objectives

- To explore how educational skills can be transformed into effective professional tools, with a focus on university students as the main sample, in order to bridge the gap between education and employment.

- To measure the extent of a statistically significant positive correlation between the acquisition of educational skills in modern technological fields and students' ability to develop professional competencies in ICT.

Significance of the Study

- **Theoretical Significance:** This study contributes to enriching theoretical knowledge on models and approaches for transforming academic learning into professional competencies, particularly in the ICT field.

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- **Practical Significance:** The study provides a practical framework that universities can adopt in designing their curricula and courses to bridge the gap between academic skills and labor market requirements.
- **Stakeholder Significance:** The study benefits policymakers, faculty members, university students, and ICT companies seeking to recruit qualified personnel.

Furthermore, the importance of this study lies in its contribution to narrowing the gap between higher education and professional ICT requirements, thus improving graduates' employability and strengthening the digital economy. Its findings also offer practical recommendations for universities to reform curricula, enhance innovation, and increase competitiveness in the labor market, while supporting the achievement of sustainable development goals related to quality education and decent work. In addition, it helps guide educational policies to confront global digital challenges.

Previous Studies

1. **Study (Tytler, R., Murcia, K., & Williams, J., 2021):**

The study aimed to explore the effectiveness of *innovation pedagogy* in linking STEM education with workplace competence requirements. It employed a qualitative case study approach supported by quantitative analysis, with a sample of 120 university students enrolled in an engineering program. Data were collected through participant observations, focus group interviews, and analysis of student portfolios. Descriptive statistics (frequencies and percentages) were used for quantitative data analysis. The study's main findings indicated that project-based and real-world challenge approaches significantly contributed to the development of problem-solving, teamwork, and critical thinking skills competencies essential for the technical labor market.

2. **Study (ElSayary, A., 2023):**

This study sought to measure the impact of a professional development program on STEM teachers' competence in teaching 21st-century skills. A quasi-experimental design was adopted (experimental and control groups) with a sample of 85 STEM teachers. Data were collected using a pre/post self-efficacy questionnaire. Statistical analysis methods included Analysis of Covariance (ANCOVA) and *t*-tests. The results revealed that the experimental group demonstrated a statistically significant improvement in their competence to teach practical skills compared to the control group, positively reflecting on their students' future ability to transfer knowledge into professional contexts.

3. **Study (Al-Gharaibeh, M., & Al-Abadi, A., 2020):**

The purpose of this study was to examine the effectiveness of a STEM-based program in developing technical skills and critical thinking. An experimental method was applied with a sample of 60 male and female students from the Department of Educational Technology. A pre/post-test was used to measure technical skills and critical thinking. For statistical analysis, ANCOVA and the Mann-Whitney test were employed. The findings revealed statistically significant differences between the experimental and control groups in the post-test results of both technical skills and critical thinking, in favor of the experimental group.

4. **Study (Al-Saadi, A., & Al-Hajri, F., 2022):**

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This study aimed to identify the requirements for employing STEM strategies in developing professional skills for ICT students. It used a descriptive-analytical approach with a sample of 75 faculty members in colleges of computer and information technology. Data were collected through an online questionnaire, and statistical tools included means, standard deviations, and analysis of variance. The findings emphasized the need for computing and ICT programs to integrate project-based STEM strategies and interdisciplinary approaches, while highlighting the importance of partnerships with the industrial sector to align academic outputs with labor market demands.

5. **Study (Pérez-Marín, D., & Paredes-Velasco, M., 2025):**

Entitled *"Fostering STEM Skills,"* this study underscored the critical importance of STEM education in preparing students to face contemporary technological challenges. It analyzed how curriculum content can be structured to develop essential 21st-century skills within the teaching–learning process. The study adopted a descriptive-historical method to conduct a literature review, assessing scientific articles indexed in *Web of Science (WOS)* and *Scopus* from 2020 to 2024. Subsequently, surveys were administered to eighth-grade students and teachers in Girona's educational unit to evaluate satisfaction levels. These surveys addressed various aspects of teaching programming and robotics from a STEM perspective. The synthetic analytical approach revealed that teaching programming and robotics enhances cognitive skills from adolescence, laying solid foundations in STEM concepts. The study further demonstrated positive effects on students' and teachers' motivation for change by facilitating interaction with technologies and applying knowledge through practical projects in the educational process.

I- THEORETICAL AND CONCEPTUAL FRAMEWORK OF THE STUDY VARIABLES

I-1 The Concept of Educational Skills

Educational skills are defined in the educational literature from multiple perspectives, but they are generally associated with the cognitive and performance abilities acquired by learners throughout their academic journey. Their definitions vary depending on the researchers' orientations and contexts.

According to the Organisation for Economic Co-operation and Development (OECD), educational skills are those that encompass cognitive and behavioral abilities enabling individuals to access information more effectively, live and work with dignity, participate in development, and improve their quality of life, with an emphasis on continuous knowledge upgrading. These include basic skills such as reading, numeracy, problem-solving, and technological skills used in daily life, while recognizing that traditional skills (such as reading and numeracy) are no longer sufficient today and must be integrated with digital skills (calliteracy technologie) (OECD, 2000).

Other scholars view educational skills as teaching skills, i.e., the set of abilities and competencies that teachers require to effectively transfer complex knowledge and understanding to students. These include managing educational technologies, questioning skills, and other techniques for achieving learning objectives (John Biggs & Catherine Tang, 2011).

Focusing on students in higher education, their educational skills encompass academic skills (such as research and writing) as well as transferable skills, including problem-solving, decision-

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making, and project management, which are developed to facilitate graduates' integration into the labor market. Scholars stress the importance of these skills in university programs to enhance students' ability to engage creatively with their environment (Martínez-Clares & González-Morga, 2022).

Across definitions, consensus exists that educational skills are not merely theoretical; rather, they are applied abilities that require practice and mastery. There is a significant overlap between educational skills and professional skills, as competencies such as critical thinking, analysis, problem-solving, and teamwork are considered fundamental both for academic learning and for professional success, often classified as essential soft skills in the labor market. This overlap highlights that the gap between education and employment does not lie in the nature of the skills themselves but in the degree of mastery and the students' ability to apply them effectively in diverse contexts.

According to the literature, skills are acquired through a systematic process that begins with theoretical understanding, followed by practice and training, then automated performance, ultimately culminating in creativity. This progression explains why students need structured strategies to move from the stage of academic reception to professional application.

In light of the above, educational skills in higher education can be defined as the cognitive and scientific competencies that include critical thinking, academic research and writing, problem-solving, communication, teamwork, time management, and digital literacy. Their goal is to enable students to engage in independent learning, adapt to labor market demands, interact creatively with their environment, and support lifelong learning.

I-2 Educational Skill Transfer Strategies

Researchers define educational skill transfer strategies as a set of methods and approaches used to bridge basic educational skills with practical and professional requirements in a specific field, such as Information and Communication Technology (ICT). These strategies aim to help students apply what they have learned theoretically in practical and real-life contexts, thereby facilitating their transition from the academic environment to the labor market (Thomas & Brown, 2006).

Other scholars consider them as a process that involves setting objectives, assessing current skills, formulating an action plan, and implementing it through various means such as training courses, workshops, mentoring programs, and learning by observation (Bakkah for Education, 2025; DocSuite, 2024).

"Transfer strategies" can be understood as a composite concept that integrates *teaching strategies* guided by the instructor and *skill development strategies* led by the learner. This indicates that transfer is not a process of rote delivery, but rather a systematic process intended to move the learner from the stage of knowledge reception to that of guided and independent application, using specific teaching methods such as project-based learning. This justifies the causal relationship assumed in the study variables, as the use of such modern strategies directly leads to the development of students' practical and professional skills, making them more prepared for the labor market.

Accordingly, in this study, **educational skill transfer strategies** are operationally defined as a set of planned teaching methods and activities aimed at enabling university students to utilize their cognitive and academic skills in applied and professional contexts, thereby enhancing their professional competencies in alignment with labor market requirements.

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I-3 Professional Skills

Professional skills represent the point of interaction between educational outcomes and the needs of the professional sector, comprising two main dimensions: technical skills and soft skills. Some researchers view professional skills as a set of specialized abilities and knowledge required by individuals to successfully perform specific job tasks. These can be divided into *technical skills* (e.g., programming) and *soft skills* (e.g., communication and teamwork) (Goleman, 1998).

The development of professional skills is a structured and continuous process aimed at improving individuals' competencies to keep pace with changes in the labor market. This process involves training, mentoring, and hands-on practice, ensuring that individuals remain qualified and competitive in their fields of specialization (Knowles et al., 2015). Others emphasize that professional skills are measurable abilities that can be applied in real work contexts to achieve specific objectives. These include competencies such as communication, time management, problem-solving, technology use, and teamwork (World Institute of Education, 2024).

In this study, professional skills are defined as a set of technical skills specific to the ICT field (such as programming and network management), in addition to soft skills (such as communication, problem-solving, and teamwork), which together enable university students to integrate into the labor market.

Therefore, professional development is no longer an option but a *vital and urgent necessity*. This conclusion stems from the accelerating social, economic, and scientific transformations that perpetually widen the gap between the knowledge provided by universities and the actual needs of society and the labor market. Moreover, professional development goes beyond mere training; it represents a comprehensive growth process that aims to transform concepts, behaviors, and attitudes, while equipping individuals with new technical skills. This understanding underscores that professional development is a continuous process that does not stop at graduation but extends throughout one's professional career.

I-4 Information and Communication Technology (ICT)

Information and Communication Technology (ICT) is defined as a set of tools and techniques used to collect, store, process, transmit, and exchange digital information. It encompasses hardware, software, and communication networks, and is considered a fundamental pillar of the modern era (World Bank, 2018). According to UNESCO, ICT represents a scientific, technical, and engineering discipline as well as a management technology applied to the handling of information and its interaction with social, economic, and cultural affairs (UNESCO, 2023).

Sources agree that ICT is an integrated system that goes beyond hardware and software to also include data, processes, and communications. From UNESCO's perspective, ICT has deeper dimensions, being directly linked to social, economic, and cultural development. This comprehensive understanding explains why ICT is not merely an educational tool but also a structural component of society and the digital economy. Consequently, universities are required to prepare graduates capable of engaging with ICT effectively, both as citizens and as productive contributors.

Operationally, in this study, ICT is defined as an integrated technological system that includes hardware, software, communication technologies, and networks, used to collect, process, store,

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transmit, and retrieve information. It is considered an essential tool for facilitating teaching and learning processes in the digital age.

An analysis of the literature confirms that the use of ICT in higher education extends beyond being a superficial addition; rather, it serves as a fundamental driver for professional skill development. The literature emphasizes that ICT use has a profound impact on the educational process, helping students accomplish learning tasks such as data collection and analysis, and creating presentations—activities that are inherently professional skills. This demonstrates that technology is not simply a medium for delivering knowledge, but a comprehensive environment through which academic knowledge is applied in scientific contexts, directly contributing to the transformation of theoretical skills into professional competencies via project-based learning and practical tasks.

II- METHODOLOGY AND TOOLS

II-1 Research Method

The study relied on the descriptive-analytical method for the theoretical framework, drawing on available studies and literature across various platforms. In addition, a field study approach was employed to examine the impact of applying educational skill transfer strategies on the development of professional skills in ICT among students of the Faculty of Modern Information Technologies across different universities and national institutes. Data were collected from students specializing in computer science, networks, artificial intelligence, cybersecurity, electronics, mathematics, and other technical and engineering disciplines through the design of an online questionnaire as the primary data collection tool.

II-2 Study Sample

A total sample of 324 students was obtained by distributing the online questionnaire across various social media groups linked to Algerian universities and institutes. The participants were exclusively selected from advanced academic cohorts (third-year Bachelor's, first-year Master's, second-year Master's, and postgraduate studies) in all technical and engineering disciplines to ensure diversity. All responses were valid for analysis, representing a 100% response rate.

II-3 Online Questionnaire

The questionnaire consisted of four sections:

- **Section One:** Personal information about the respondent.
- **Section Two:** Dimensions of the independent variable—application of educational skill transfer strategies:
  - Dimension One: Items measuring the quality of educational skills among university students, reflecting their understanding of fundamental scientific principles and theories in their field rather than merely memorizing formulas and equations for examinations.
  - Dimension Two: Items measuring skill transfer strategies, indicating the students' ability to apply acquired knowledge to solve real-world problems, bridging the gap between being learners of theories and practitioners of those theories.

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- Dimension Three: Items measuring the supportive learning environment, which enables the verification of the extent to which theoretical knowledge is transformed into practical skills.

- **Section Three:** Items of the dependent variable—development of professional skills in ICT, measuring students' professional abilities in the field to assess their capacity to achieve practical outcomes using their theoretical knowledge.

A three-point Likert scale was used in the questionnaire. For the independent variable, the options were (Agree, Neutral, Disagree), while for the dependent variable, the options were (Agree, To a Moderate Extent, Disagree).

II-4 Reliability of the Instrument and Normality Test

The reliability analysis showed a Cronbach's Alpha value of 81%, indicating good reliability of the questionnaire. The statistical analysis further demonstrated that the assumption of normal data distribution was not met. Results of the Kolmogorov–Smirnov test indicated that the data were not normally distributed, with an asymptotic significance (two-tailed) of 0%, which is below the standard significance threshold of 5%. Accordingly, non-parametric tests were adopted for the analysis.

II-5 Statistical Data Analysis

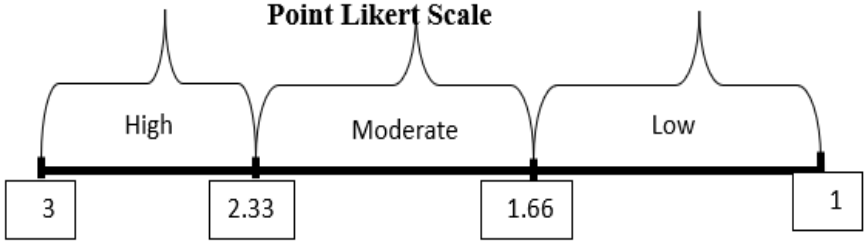
The Statistical Package for the Social Sciences (SPSS 25) was used to conduct the statistical analysis. Percentages and Spearman's Rho correlation coefficient were applied to measure the relationship between two variables in data that do not follow a normal distribution.

- The level of significance for measurement units on the three-point Likert scale was determined according to the following formula:

$$\frac{\text{Number of scale levels}}{\text{Upper limit of the alternative} - \text{Lower limit of the alternative}} = \text{Significance Level}$$

$$0.66 = \frac{3}{1-3} =$$

Figure (1): Measurement Levels of the Questionnaire Items According to the Three-Point Likert Scale



Source: Prepared by the researcher based on theoretical literature

III- Results and Discussion

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III-1 Presentation and Discussion of the First Hypothesis:

The first hypothesis states that: "The application of educational skill transfer strategies to the development of professional skills in the field of Information and Communication Technology (ICT) is characterized by a low level among university students in Algeria."

This hypothesis is discussed through the analysis of the arithmetic means of each dimension separately, as presented in the following table:

Table 01: Responses of the Study Sample to the Dimensions of Applying Educational Skill Transfer Strategies for the Development of Professional Skills in ICT

Dimensions	No	Statements	Arithmetic Mean	Standard Deviation	Level of Importance
Quality of Educational Skills	1	The courses in my specialization focus on a solid understanding of scientific theories and principles.	2.73	0.538	High
	2	Sufficient laboratory experiments are provided in which theoretical knowledge is applied.	2.19	0.646	Moderate
	3	The courses encourage me to use a scientific methodology (observation, hypothesis, testing, analysis) to solve problems.	2.55	0.739	High
	4	I feel that I have a strong foundation in the mathematical skills required for my specialization.	2.81	0.486	High
Skill Transfer Strategies	5	Examples and applications from the real field of ICT are used to explain theoretical content.	2.59	0.713	High
	6	I participate in applied projects that require the use of my specialization skills to solve problems similar to those in the labor market.	1.86	0.916	Moderate
	7	The university provides me with opportunities for practical training in ICT companies.	2.81	0.484	High
	8	Faculty members encourage us to participate in competitions inside or outside the university, or in innovative technical projects in my field of specialization.	2.68	0.546	High
Supportive Learning Environment	9	The university provides modern technological centers and tools (such as programming labs and local networks with internet access) that support the implementation of my ideas.	2.58	0.656	High
	10	I communicate with professionals in the ICT field to receive guidance on developing my career path.	1.91	0.841	Moderate
	11	I feel that the learning environment encourages experimentation and innovation and accepts mistakes as part of the learning process.	2.63	0.567	High

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Development of Professional Skills in	12	I am able to use the programming languages I have learned to develop usable applications or software.	1.91	0.837	Moderate
	13	I feel qualified to join a development team working on real software or technical projects.	2.32	0.546	Moderate
	14	I can analyze the requirements of a technical system and design practical solutions using the knowledge I have acquired in my specialization.	2.67	0.555	High
	15	I am confident in my ability to quickly adapt to new tools and technologies in the future work environment.	2.63	0.561	High

Source: Prepared by the researchers based on SPSS outputs

Table 01 presents the responses of the study sample regarding the items of the independent variable dimensions application of educational skill transfer strategies. The analysis of the arithmetic means by dimension shows that for the dimension of the quality of educational skills, the mean scores are very high. For instance, the mean of item 1 (M = 2.73) indicates that students strongly agree that their courses emphasize theoretical understanding, while the mean of item 4 (M = 2.81) confirms that they have a solid foundation in mathematical skills. This demonstrates that their theoretical and academic competencies are very strong.

For the dimension of skill transfer strategies, the results revealed variability in the application of such strategies. Students reported being encouraged to use the scientific method in problem-solving (M = 2.55, high) and that real-world examples were often used in teaching (M = 2.59, high). However, their participation in actual applied projects simulating labor market conditions was weak (M = 1.86, low). This highlights a gap between theoretical educational practices and practical application.

Regarding the dimension of the supportive learning environment, results showed that the university context was highly supportive in fostering skills development. For instance, the item on universities providing opportunities for practical training scored very high (M = 2.81), participation in competitions was also rated high (M = 2.68), and the availability of modern technological centers and tools was high as well (M = 2.58). This confirms that the infrastructure and general learning environment encourage innovation and application.

As for the dependent variable development of professional skills in ICT, results indicated significant variation. While students expressed high confidence in their ability to adapt to new technologies (M = 2.63, high) and demonstrated a strong ability to analyze and design technical solutions (M = 2.67, high), their ability to use programming languages to develop real applications was only moderate (M = 1.91), as was their actual participation in software development teams (M = 2.32). Furthermore, interaction with professionals in the field was weak (M = 1.91, low). This confirms the existence of a gap between students' confidence in their theoretical abilities and their actual capacity to apply them in real work environments, which may negatively affect the development of their professional skills.

Overall, the results of this hypothesis point to a contradiction: strong academic efforts in the theoretical dimension (reflected in the quality of educational skills) contrasted with weak practical implementation (evidenced by limited application of skill transfer strategies and insufficient interaction with professionals). Although the university environment is highly supportive in terms

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of infrastructure and encouragement, this has not fully translated into strong professional skills in ICT. This underscores the importance of bridging the gap between theory and practice through greater participation in applied projects and field training.

The findings of this study are in close alignment with those of Tytler et al. (2021), which confirmed that project-based and real-world challenge approaches are key to developing skills demanded in the labor market. Similarly, the current results showing students' weak participation in real-world projects (M = 1.86) support this conclusion, highlighting the importance of project-based learning in fostering problem-solving and critical thinking.

The results are also consistent with Al-Gharaibeh & Al-Abadi (2020), who demonstrated that STEM programs based on experimental approaches produce statistically significant improvements in technical skills and critical thinking. Given that the current study found only moderate means for technical skill items (M = 1.91), there is an urgent need to incorporate such programs into curricula to overcome the gap between theoretical knowledge and applied skills.

Furthermore, the study of Al-Saadi & Al-Hajri (2022) directly supports our findings, emphasizing the need to integrate project-based STEM strategies and strengthen partnerships with industry. This corresponds with our descriptive analysis, which revealed students' limited participation in applied projects and weak professional interaction, indicating that the issue is structural rather than individual.

Although the study of Pérez-Marín & Paredes-Velasco (2025) focused on secondary education, its results remain highly relevant to the current research. Both highlight that applying knowledge through practical projects (such as programming and robotics) enhances cognitive skills and student motivation. By contrast, our findings of weak student capacity to develop real applications underscore how the lack of practical implementation negatively impacts professional skill development. This reaffirms the importance of the strategies highlighted in their study.

III-2 Presentation and Discussion of the Second Hypothesis

The second hypothesis states that: "There is a statistically significant positive correlation between the application of educational skill transfer strategies and the development of professional skills in the field of Information and Communication Technology (ICT) among university students in Algeria."

To examine this hypothesis, Spearman's Rho correlation coefficient was employed to measure the relationship between the independent and dependent variables, given that the data in the present study do not follow a normal distribution. The results obtained are presented in the following table:

Table 02: Correlation between the Application of Educational Skill Transfer Strategies and the Development of Professional Skills in ICT

Sample Size	Spearman's Rho Correlation Coefficient	Test Significance Level (SIG)	Standard Significance Level	Result
324	0.702	0.000	0.001	Statistically Significant

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Source: Prepared by the researchers based on SPSS outputs

The results presented in Table 02 show that the significance level of the SIG test is 0%, which is lower than 1%. This indicates that the correlation is not due to chance and is highly statistically significant at the 0.01 level, thereby reinforcing the strength and reliability of the result. Furthermore, the Spearman correlation coefficient of 0.702 indicates a strong positive relationship between the two variables (application of educational skill transfer strategies and the development of professional skills in ICT). This confirms the validity of the hypothesis, which stated that there is a statistically significant positive correlation between the application of educational skill transfer strategies and the development of professional skills in ICT among Algerian university students.

The inferential analysis results (Spearman's correlation) complement the descriptive analysis results (arithmetic means) discussed earlier in relation to the first hypothesis. While the descriptive analysis revealed gaps in students' practical application, the inferential analysis confirms that any effort exerted in applying these strategies—even with the shortcomings observed produces a tangible and positive impact on the development of professional skills. In other words, the correlation is very strong, which implies that focusing on the development of these practical strategies is vital and decisive for preparing students for the labor market. The positive correlation also means that the more skill transfer strategies are applied, the higher students' levels of professional skills.

Accordingly, the inferential results of this second hypothesis are strongly aligned with the literature and previous studies reviewed in the theoretical framework, adding a decisive quantitative dimension. They complement Tytler et al. (2021), who demonstrated that project-based approaches enhance professional skills. Our current results confirm this on a broader scale, showing that the relationship between the application of strategies in general and professional skills is extremely strong, thereby reinforcing the study's recommendation on the importance of project-based learning.

These findings are also supported by ElSayary (2023), who emphasized the role of teachers in bridging the gap between theory and practice. In line with our study, his findings confirm that there is a positive relationship between teaching strategies and students' skills, which necessitates greater focus on developing faculty competencies to ensure the full implementation of these strategies.

Similarly, the results are consistent with Al-Gharaibeh & Al-Abadi (2020), who demonstrated the effectiveness of STEM programs in developing technical skills and critical thinking. Our findings add further evidence that such programs considered as part of skill transfer strategies are essential for fostering professional skills.

Moreover, Al-Saadi & Al-Hajri (2022) reinforced the need to integrate STEM strategies and establish partnerships with industry. The strong correlation observed in our study demonstrates that these requirements are not merely theoretical recommendations but decisive factors that directly impact graduates' readiness for the labor market.

Finally, the findings of Pérez-Marín & Paredes-Velasco (2025), which highlighted the importance of practical application of programming and robotics in strengthening skills, are also consistent with our results. While their study showed the positive impact of such activities, our study provides evidence that the absence of practical application weakens students' skills, whereas its presence yields strong positive effects confirming the importance of incorporating such activities into curricula.

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In conclusion, the results of the second hypothesis indicate that the application of educational skill transfer strategies is a decisive factor in the development of professional skills in ICT among university students. This strong relationship confirms that efforts to integrate applied skills, critical thinking, and practical projects into the educational process do not merely improve students' performance but are essential for effectively preparing them for the labor market. These findings call for intensifying such efforts and closing the gap between academic knowledge and actual professional practice.

IV- Conclusion:

This research paper presents results and an in-depth analysis of the impact of applying skill transfer strategies in education on the development of professional skills in the field of Information and Communication Technology (ICT) among Algerian university students.

The study concluded that there is a contradiction between the strong academic efforts in the theoretical dimension, which are reflected in the quality of educational skills, and the weak actual practical implementation on the ground (as evident in skill transfer strategies and limited interaction with professionals). Although the university environment is highly supportive in terms of infrastructure and encouragement, this has not been fully translated into strong professional skills in ICT. The study further revealed a strong positive and statistically significant relationship, confirmed by a Spearman correlation coefficient of **0.702** between the two variables (application of skill transfer strategies and the development of professional skills in ICT).

These findings are fully consistent with the theoretical literature and previous studies, all of which emphasized that project-based approaches, partnerships with industry, and professional development programs for students are essential factors in enhancing technical skills and critical thinking. Thus, this study provides quantitative evidence that these strategies are not merely optional, but an imperative necessity for producing graduates qualified for the digital labor market.

Based on the above, the study recommends intensifying efforts in the following areas:

- **At the institutional level:** Universities should restructure curricula to more extensively integrate project-based learning and real-world challenges that simulate the workplace environment.
- **At the partnership level:** Collaboration between universities and the industrial sector should be strengthened to provide regular and effective practical training opportunities, facilitating students' interaction with professionals and aligning their learning with the actual needs of the labor market.
- **At the academic level:** Professional development programs should be provided for faculty members to enable them to adopt modern teaching strategies focused on practical application and the development of soft skills.

Bridging the gap between theory and practice is no longer a luxury in the digital age; rather, it is an investment in the future of human capital. This study aims to underscore this point and serves as a starting point for future research that may focus on examining the effect of each strategy individually, or on comparing skill levels across different universities to provide a deeper understanding of this phenomenon.

ISSN:1581-5374 E-ISSN:1855-363X
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