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ASSESSMENT OF DIGITAL COMPETENCIES IN YOUNG UNIVERSITY STUDENTS

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Abstract-- This study will address the assessment of digital skills in first-semester university students in the January-June semester of 2025. The need for research stems from the lack of instruments aimed at higher education regarding the mastery of digital tools as a fundamental instrument of current academic performance. A quantitative approach and a non-experimental cross-sectional design were selected with a sample of 24 freshman students. Data was collected using structured questionnaires with 46 questions, which were validated by experts. Each question was documented on international scales that addressed five main areas: information, digital communication and collaboration, creation, online presentation, security, and technical problem solving.The results illustrated the important facets of the digital competence profile of university students at the peak of their academic careers. The sample consisted mainly of women, with a concentration of ages between 21 and 23, which are the very particular demographic characteristics of this cohort. Knowledge and critical areas in different dimensions are evaluated based on the research using SPSS version 25.0 for statistical analysis. In addition, the work develops and contributes to the established body of knowledge on the digital skills of postsecondary education students for the current cohort.

Keywords-- Digital skills, Higher education, Technological literacy, University students, Educational assessment.

Abstract-- This study will address the assessment of digital skills in first-year university students in the January-June semester of 2025. The need for research stems from the lack of tools aimed at higher education in relation to the mastery of information and communication technologies as a fundamental tool for current academic performance. A quantitative approach and a non-experimental cross-sectional design were selected with a sample of 24 first-year students. Data collection was carried out using a structured questionnaire with 46 items, validated by experts and based on international scales that addressed five main dimensions: information literacy, digital communication and collaboration, digital content creation, online presentation, security, and technical problem solving. The results obtained revealed important aspects of the digital competency profile with which university students enter their academic journey.

The sample was predominantly female, with an age concentration in the 21-23 range, specifically, which corresponds to the particular demographic characteristics of this cohort. Using SPSS version 28.0 for statistical analysis, this research identifies strengths and critical areas in the different dimensions evaluated. In addition, empirical evidence is developed on the digital skills of the current cohort of post-secondary students in transition, contributing to the established knowledge in the area.
Keywords-- Digital skills, Higher education, Technological literacy, University students, Educational assessment.

INTRODUCTION

Digital skills have proven to be one of the key requirements for university education in the 21st century. The results of a systematic review conducted by González et al. (2018) on digital skills among university students confirm the importance of this area, as the main skills in which university students excel are data management, conflict resolution, choice of alternatives, analytical reasoning, and digital competence. Furthermore, the analysis of the 159 relevant studies confirms that the issue is relevant to modern educational research.

Complementing the above, the study by Núñez et al. (2024) on digital skills in university students considers the dimensions of student perceptions regarding knowledge, security, importance, and functionality of technological resources. From the perspective of technological conditions in higher education, mainly in classrooms, this study directly demonstrates how these conditions influence the development of digital competencies, showing that the way in which information and communication technologies are integrated into the educational system is essential for students' educational and professional growth.

A key group in higher education is first-semester students, who are undergoing the transition from secondary education to a more competent academic environment. The latter requires adopting a new approach/coping strategy based on autonomous learning that involves the use of digital resources. Therefore, it seems that developing educational strategies aimed at improving their digital competence and education in general is essential.

A systematic assessment of previous skills could enable continuous improvement of educational programs, as key data is used for curriculum development and the expenditure of technological learning resources. Therefore, schoolchildren become experts in strengthening their research skills; however, some limitations must be taken into account in the study:

1. Temporal: The research is limited to the academic period from January to June 2025, thus providing a cross-sectional measurement without being able to observe the progression of digital skills over a continuous period.
2. Sampling: The sample consisted of 24 first-semester students. As this is a small and restricted sample, the results obtained cannot be generalized to other student populations given the distribution of students across different degree programs and semesters.
3. Population: the results obtained will be specific to first-year university students; therefore, they cannot be extrapolated to students in higher semesters or at different educational levels.

Background

In their study, Centeno and Cubo (2013) found several deficiencies with regard to digital competence; however, the authors noted a positive inclination toward ICT. They also discovered a statistically significant relationship between attitude and skills in the technological sphere; in particular, students in the virtual modality had more favorable attitudes.

Neri et al. (2023) proposed a training program based on task-based learning pedagogy, focusing on the five dimensions of digital competence established by the European Commission. In terms of assessment, the questionnaire was implemented based on a pretest-posttest design. As a result, students reported satisfaction with this methodology and showed significant progress in the development of digital competence.

In the study by Cabero et al. (2020), specifically, 369 invitations were sent to specialists and 179 valid responses were obtained. Subsequently, through the application of the Expert Competence Coefficient, a fixed sample of 148 experts was obtained. The results confirm the dominance in this ranking of the European Framework for Digital Competence in Education as the main reference framework.

According to Reyes and Avello (2021), who conducted a comparative study with a non-experimental and descriptive design, 122 teachers from public universities in Mexico and Cuba participated; the age of the participants ranged from 25 to 62 years. The results of the study reveal an intermediate level of digital competence performance in teaching practice in the aforementioned institutions.

Çebi and Reisoğlu (2022), in terms of metaphors used in the description of a teacher who possesses digital competence, divide them into three dimensions: digital competence, pedagogical competence, and personal qualities. According to the results, future teachers see a teacher who possesses digital competence as a professional who can manage information and data, communicate effectively, ensure digital security, solve problems, and maintain productivity.

Fernández and Silva (2022) sought to assess students' digital competence using the COMPDIG-PED framework, guided by the DIGCOMP framework, in relation to the effect of gender on achievement levels. Using a stratified sampling approach and a quantitative methodology on a sample of 817 participants, it was revealed that male students outperformed female students, on average, in collaborative communication and in the subdomain of problem solving in digital content creation and problem solving.

The structural equation model used by Romero and Barrios (2023) is employed to assess the measurement of digital skills in 256 higher education students. The constructs of psychometric properties in digital skills based on information, communication, technology, and organizational capabilities are developed through university transmission processes. The authors consider that the characterization of these skills allows for improving the quality of the results obtained in virtual spaces in relation to processes such as information search, collaborative work, and editing of university documents.

Gaona et al. (2024) conducted a literature review (2018-2023) with the aim of analyzing the level of mastery, perception, and challenges of digital competencies in a university environment. The results show a high level of mastery of both competencies in students and teachers. In addition, a directly proportional relationship with specialization and mastery of technological tools is demonstrated. On the other hand, the perception of both parties is very positive: students use technology a lot, which in turn is a weakness for education, and teachers are largely resistant to improving their teaching methods.

DEVELOPMENT

Type and Design of Research

This study is part of a quantitative approach with descriptive and correlational characteristics. A non-experimental cross-sectional design was adopted, which allows the variables to be examined at a specific moment without manipulating the conditions of the study environment. In accordance with the objectives of the study, the aforementioned methodology is appropriate, as it allows for the description and correlation of dimensions related to the digital skills of university students (León et al., 2022).

The cross-sectional design simplifies data collection for the period from January to June 2025 by providing a snapshot of the present with digital skills among first-semester students without the need for longitudinal tracking of study participants.

Level of research Population and sample

Population

The study population consists of all first-semester students at the university during the January-June 2025 academic period.

Sample

The sample consisted of 24 first-semester students who were selected using a purposive sampling method.

Study Variables

Main variable: Digital Competencies

This is operationally defined as the set of knowledge, skills, and attitudes necessary for the critical and safe use of information and communication technologies in academic contexts. It was evaluated through the following dimensions:

Information literacy: Ability to identify, locate, evaluate, and use digital information Digital communication and collaboration: Skills to communicate and collaborate effectively using digital tools

Digital content creation: Competencies to create, edit, and produce content in digital formats

Digital security: Knowledge of data protection, privacy, and safe use of technologies Technical problem solving: Ability to identify and solve basic technological problems **Data Collection Instrument**

A structured questionnaire based on internationally validated scales was used to assess digital skills. The instrument was based on adaptations of digital skills assessment questionnaires specifically designed for higher education (Revuelta et al., 2023).

Characteristics of the instrument

Format: Self-administered questionnaire

Number of items: 46 questions distributed across the five dimensions of digital skills

Measurement scale: 5-point Likert scale (1: Never, 2: Rarely, 3: Sometimes, 4: Frequently, 5: Always)

Application time: Approximately 25-30 minutes Modality: Digital

application through institutional platform **Validation of the**

instrument

The questionnaire underwent content validation through expert judgment, with the participation of three specialists in educational technology and digital skills. The content validity coefficient (CVC) was calculated, obtaining values above 0.80 for all items. Hernández (2011) argues that items with values equal to or greater than 0.80 have adequate validity and should be considered in the construction of the questionnaire.

Data Collection Procedure

Data collection was carried out during the month of March 2025, following the protocol below:

Preparation phase:

Obtaining institutional permissions

Coordination with teachers and

administrators

Preparation of digital platform for application of the instrument

Application phase:

Presentation of the study to students Obtaining

informed consent

Application of the questionnaire during regular school hours

Supervision of the completion process to ensure data quality

Verification phase:

Review of instrument completeness

Verification of consistency in responses Coding
and database preparation **Data analysis**

Data analysis was performed using SPSS statistical software version 25.0. According to Chávez and Morell (2024), participants had a positive attitude toward the software and considered it useful for improving their understanding of statistics and performing activities involving large data sets.

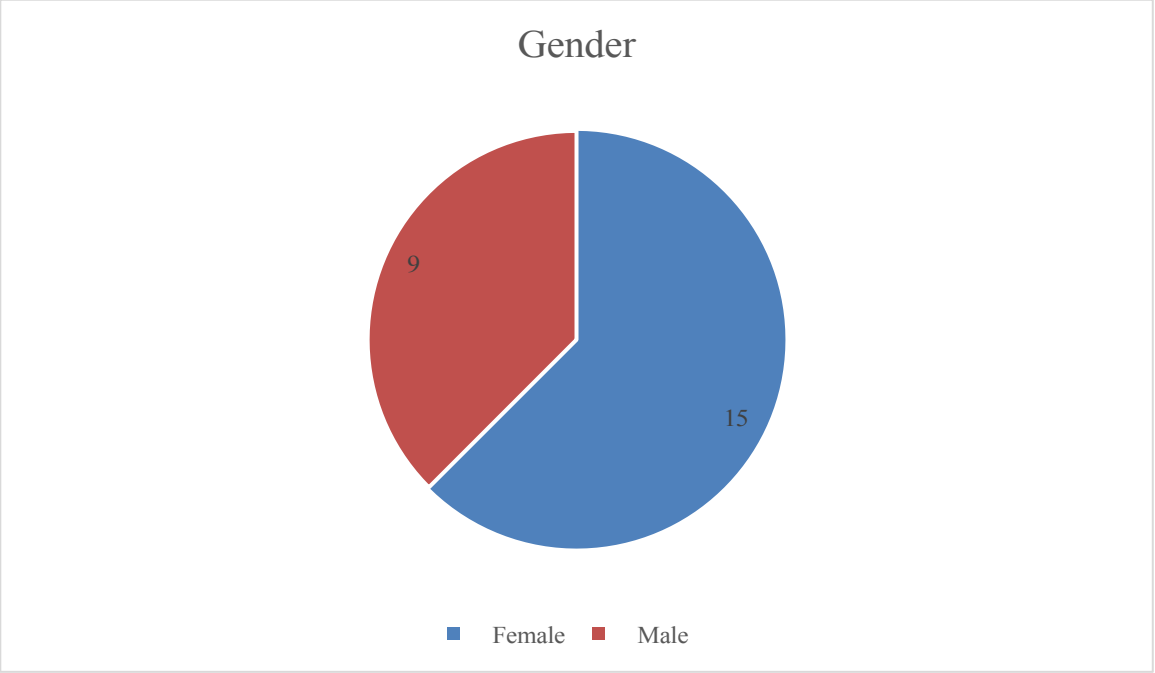
Ethical considerations

The research was conducted in accordance with fundamental ethical
principles: Autonomy: Voluntary participation through informed consent

The confidentiality and anonymity of the data were guaranteed by assigning numerical codes to each participant. The information collected was used exclusively for academic and research purposes.

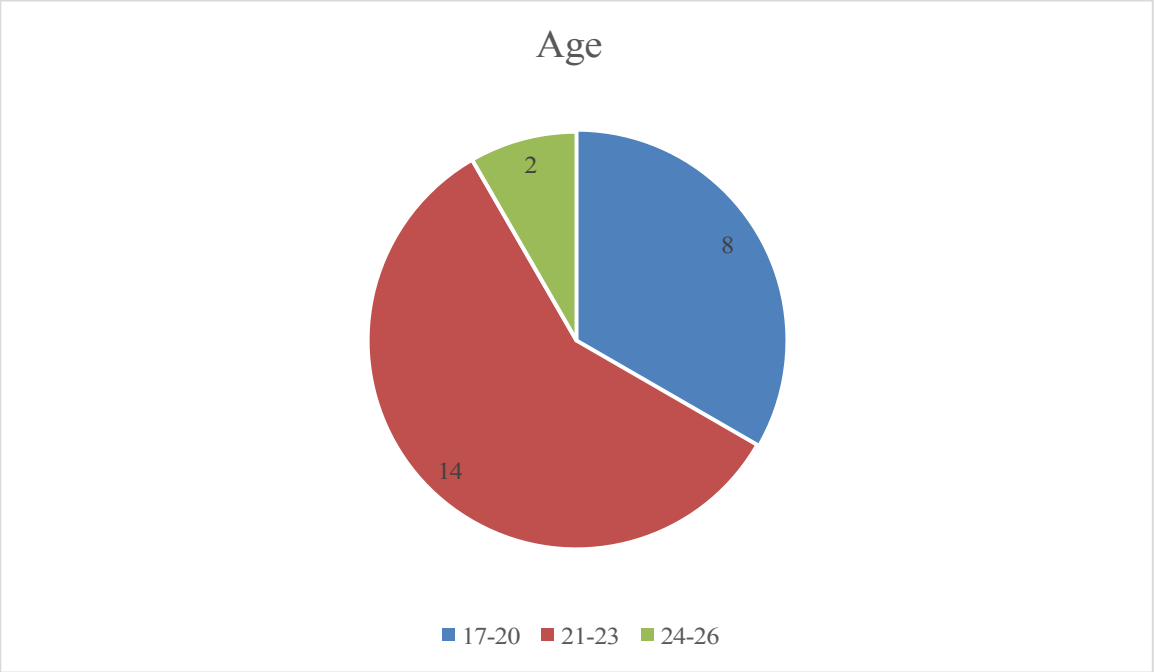
DISCUSSION AND ANALYSIS OF RESULTS

Figure 1 shows the gender distribution of the participants.



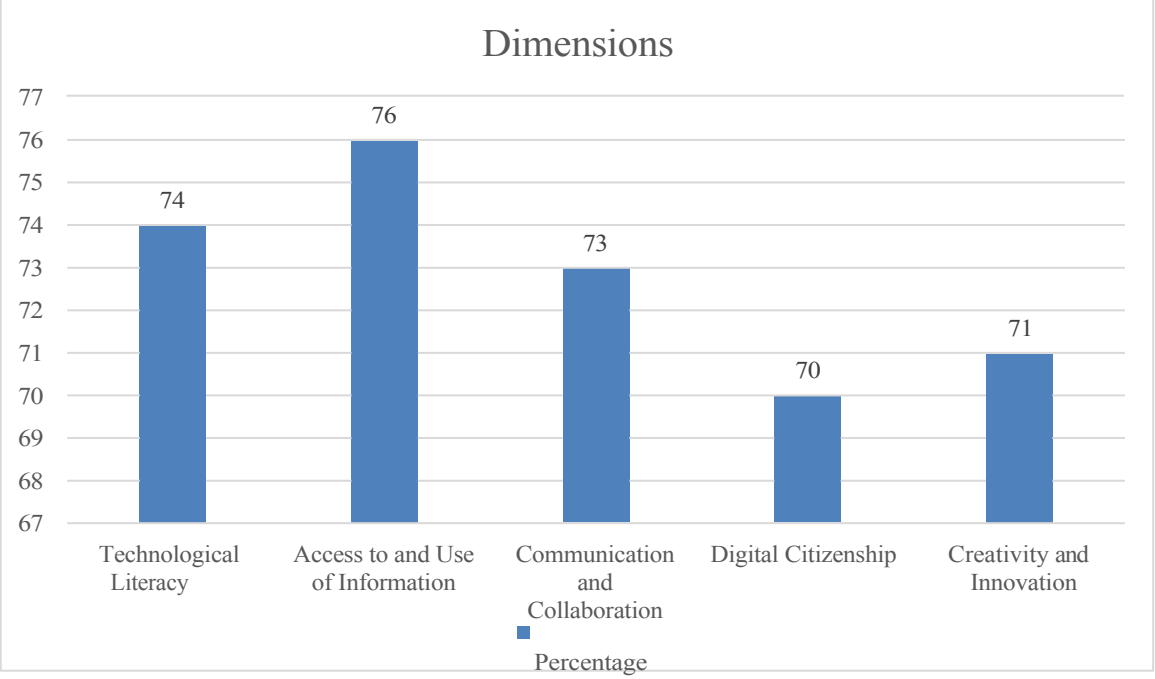
The figure above shows that females were more represented, with 64%, while males were represented by 36%.

Figure 2 shows the age distribution of the participants.



The figure above shows that the 21-23 age range was the most representative, with 58%; while the 17-20 age range had a percentage of 36%; finally, the 24-26 age range had a percentage of 9%.

Figure 3 shows the results of the five dimensions of the instrument.



CONCLUSIONS

This study evaluated the digital skills of first-semester university students, providing valuable information on the current state of these fundamental skills in the contemporary academic context.

The results of the structured questionnaire administered to 24 first-semester students shed light on the importance of understanding the level of digital skills among this population. Evaluating the five dimensions, the lack of digital content creation, digital communication and collaboration, digital security, and digital problem solving is more complex, and information literacy correlates with the problem. All of these issues are relevant and impactful enough to warrant institutional action.

Among the initial findings, one immediately stood out: female participation far exceeded male participation. Men, on the other hand, accounted for only about one-third of the total. In addition, it turns out that a good proportion of them are young, around twenty, twenty-one, twenty-two, or twenty-three years old. DISCUSSION

These results are consistent with the conclusions of González et al. (2018), whose systematic findings conclude that some of the skills most mastered by university students are knowing how to interpret and manage information, solve problems, and make sound decisions.

That said, first-semester students, who are the focus of the current study, are at a different stage of development than the populations in the studies analyzed above, and this may shed some light on the differences in competency levels observed. As discussed by Núñez et al. (2024), the technological conditions of higher education correlate with the maturation of certain skills, which, in particular, need more attention for students coming from the secondary education system.

The students' perceptions, as presented in the conclusions, are related to the findings of Centeno and Cubo (2013), who found that university students appreciated the use of ICT, even when their levels of digital competence were low. This paradox, which is recognizable in the context of these authors, is relevant today, since in the current context, a favorable attitude does not imply mastery in the academic uses of technology.

Students and teachers reported having a positive attitude toward digital skills, which is also evident in the conclusions of Gaona et al. (2024). This stability in the attitude toward

technology over time suggests a latent predisposition that can be optimized by reinforcing pedagogical skills in technology-driven systems.

Fernández and Silva (2022) found Communication and Collaboration, Content Creation, and Problem Solving to be educational areas that had significant advantages for men. These, and those already mentioned, become relevant because the sample is overwhelmingly female—64%.

From this perspective, it becomes relevant to implement gender-oriented approaches, especially with regard to aspects of inclusive pedagogical interventions, taking into account possible differences in patterns of digital competence development.

The validation of the instrument used through the content validation index with CVC > 0.80 confirms the best practices advocated in the literature. Cabero et al. (2020) used similar expert judgment validation methodologies in their research on digital teaching competency frameworks.

The methodological approach adopted in this study brings methodological rigor and comparability to similar research in the field through adaptations of internationally validated questionnaires, as indicated by Revuelta et al. (2023).

The findings regarding the five areas assessed (information literacy, digital communication and collaboration, digital content creation, pedagogy related to student digital safety, and technical problem solving, and teaching practice) coincide with the profile developed by Çebi and Reisoğlu (2022), who articulated a set of digital competencies that include data and information literacy, communication, digital safety, problem solving, and productivity within the framework of advanced competencies.

Romero and Barrios (2023) constructed and modeled structural equations that serve as another theoretical framework for understanding how communication, organization, and information and digital technology skills are determined as described in this model. The multidimensional approach strengthens the conceptual framework that this research has adopted.

George and Avello (2021) reported an average development of digital skills for digital competence in higher education teaching, indicating the need for parallel training processes for both students and educators.

In the work of Neri et al. (2023), the European Commission's Competence 21 proposes a training method based on 'learning by tasks', 'learning by doing' and 'learning by teaching' with a proposal within the five dimensions of digital skills. The author structures new methodologies for teaching, with the aim of alleviating the worrying phenomena in the acquisition of digital skills by first-semester students.

The results of this research confirm the obstacles described by Gaona et al. (2024), in particular the reluctance of teachers to change established pedagogies, which can stifle the development of students' digital skills. However, the widespread use of technology in higher education presents an unprecedented opportunity for the formulation of effective interventions.

FUTURE WORK

We propose the design of a longitudinal study that addresses, over a longer time frame, the evolution of digital skills in university students from admission to graduation. The proposal involves following different cohorts over several academic years in order to analyze how the dynamics of academic training, interaction with digital sources, and methodological approach favor increasingly broader learning in the five dimensions of skills. In this way, it will also be possible to identify, over the entire time frame, critical situations or nodes in which there is progress or stagnation, which contributes to the development of fundamental insights for thinking about pedagogical intervention.

The second line of research proposes a multi-center comparative study on digital competencies among university students in Latin American countries. The analysis would include the application of standardized instruments in Mexico, Colombia, Peru, and Chile, as well as in other contexts in the region, and seeks to document similarities and differences related to socioeconomic, infrastructural, and institutional realities. The report will also discuss varying levels of access to electronic surveys, electronic survey infrastructure, barriers to training modules, barriers to the digitization of education and teaching traditions, as well as pedagogy and other policies and practices, with the aim of developing a theoretical framework that seeks to clarify these discrepancies and possibilities within the context of a national report.

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