

Received: December 2023 Accepted: January 2024

DOI: <https://doi.org/10.58262/ks.v12i2.127>

Impact of New Technologies on Student Competencies in Higher Education

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Summary

A systematic review was carried out on the production and publication of research papers related to the study of ICT, Student Competencies, Higher Education and Vocational Training under the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) approach. The purpose of the analysis proposed in this document was to know the main characteristics of the publications registered in the Scopus and WoS databases during the study and their scope in the study of the proposed variables, achieving the identification of 28 publications in total. Thanks to this first identification, it was possible to refine the results through the keywords entered in the search button of both platforms, which were ICT, STUDENT SKILLS, HIGHER EDUCATION, VOCATIONAL reaching a total of 16 documents, excluding duplicates and those that did not meet the analysis criteria. The identified scientific publications were analyzed in the hope of knowing the main characteristics within the execution of research projects related to the study of education based on the implementation of technological tools and the development of students' competencies in terms of their training through the use of ICT in vocational training. In this way, it is expected to know the impact generated by the research and publication of research papers focused on the measurement of academic performance and the strengthening of digital skills in higher education students.

Key words: ICT, Student Competencies, Higher Education, Vocational Training.

1. Introduction

The panorama of education which has been the focus of attention due to its constant evolution, this transformation in university models has reflected great changes due to the arrival of the digital era, which has had numerous benefits due to the incorporation of new technologies. These technologies have brought to the education sector a growth scale in order to improve their academic performance, which seeks to encourage the development of students' skills by redefining the traditional paradigms of learning and ushering in innovative approaches that transcend the limits of education.

One of the most prominent effects of the incorporation of these new technologies in higher education lies in the field of accessibility. This is evidenced by the advent of online platforms, virtual training classrooms and limited educational resources provided by the network, these benefits have made it possible to close educational gaps, allowing students globally to have

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access to these resources and interaction with other students around the world. These democratized effects of information not only expand the scope of education, but also foster a more inclusive and dynamic environment, where presenters can interact with a multitude of perspectives and experiences.

In addition, this incorporation not only reflects the importance of addressing the present needs of each student, it reflects the need to exploit their individual abilities, promote in them the importance of autonomous education and, hand in hand with technological resources, adapt the content and the different learning styles. Consequently, accessibility and adaptability directs students not only to improve the specific skills studied by each individual student, but also to plant in them other crucial skills for the future such as self-directed learning, time management, teamwork and problem solving, skills necessary in an education that is constantly changing.

This collaboration of this great revolutionary force breaks the stereotypes and limitations of face-to-face classrooms and opens up the possibility of transformative education and collaborative platforms that allow for the improvement of student skills essential for success in the interconnected world. The ability to navigate and contribute meaningfully to collaborative digital spaces has become a hallmark of students' skills. However, as in any paradigm shift, these new technologies in education are not exempt from presenting complications and challenges for their implementation. The complications related to digital literacy, constant training by teachers, equitable access and the potential for data overload are data to be considered and must be executed with extreme care, allowing a balance between the parties that can address these challenges is of vital importance to successfully guarantee the benefits of these technologies in student competencies which are diverse.

2. General Objective

To analyze, from a bibliometric and bibliographic perspective, the production of research papers on the variables ICT, Student Competencies, Higher Education and Vocational Training, published in high-impact journals indexed in the Scopus and Wos databases during the period 2017-2021.

3. Methodology

The present research is qualitative, according to Hernández, et al., qualitative approaches correspond to the investigations that carry out the procedure of obtaining information to review and interpret the results obtained in these studies; To do this, it searched for information in the Scopus and Wos databases using the words ICT, STUDENT SKILLS, HIGHER EDUCATION, VOCATIONAL. (2015)

3.1 Research Design

The research design proposed for the present research was the Systematic Review that involves a set of guidelines to carry out the analysis of the collected data, which are framed in a process that began with the coding to the visualization of theories On the other hand, it is stated that the text corresponds to a descriptive narrative since it is intended to find out how the levels of the variable affect; and systematic, because after reviewing the academic material obtained from scientific journals, theories on knowledge management were analyzed and interpreted. (Strauss & Corbin, 2016) (Hernandez, Baptista, & Fernandez, 2015)

The results of this search are processed as shown in Figure 1, through which the PRISMA technique for the identification of documentary analysis material is expressed. It was taken into account that the publication was published during the period between 2017 and 2021 without distinction of country of origin of the publication, without distinction of area of knowledge, as well as any type of publication, namely: Journal Articles, Reviews, Book Chapters, Book, among others.

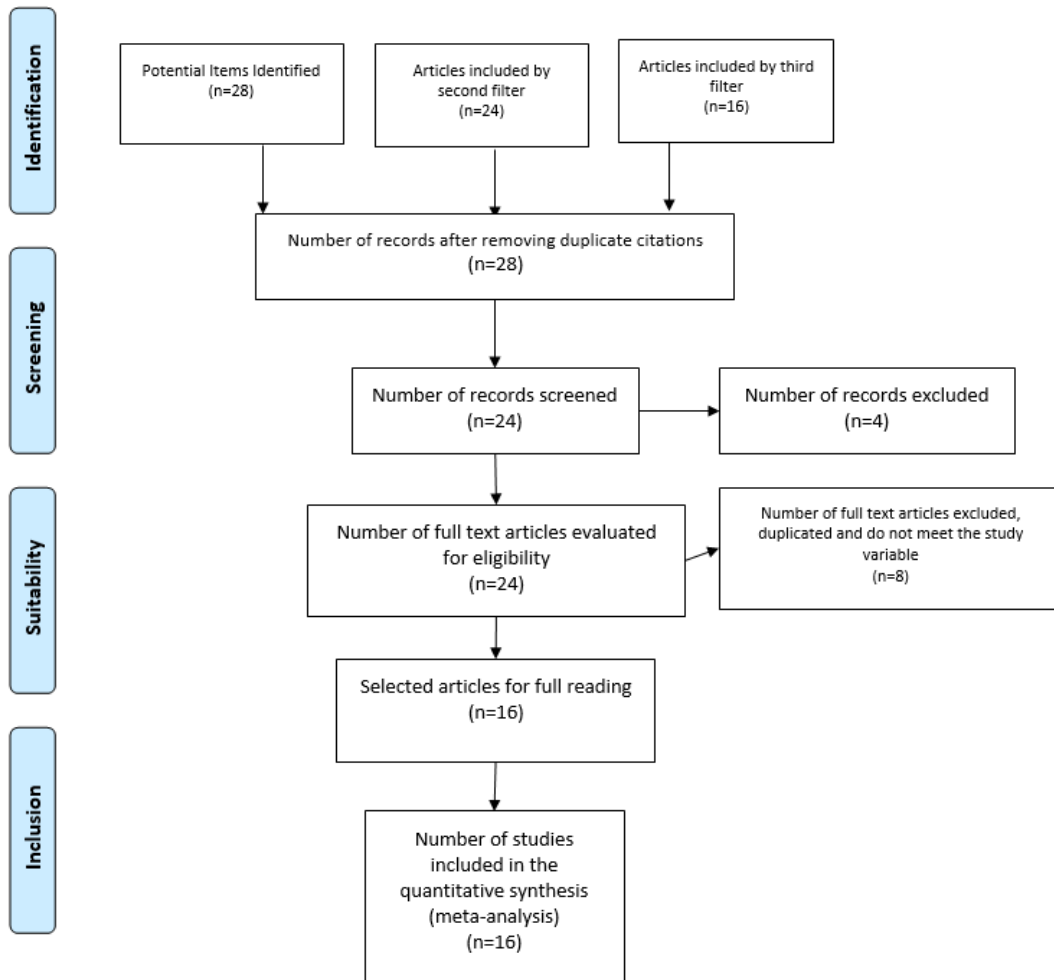


Figure 1: Flowchart of a Systematic Review Carried Out Under the Prisma Technique (Moher, Liberati, Tetzlaff, Altman, & Group, 2009).

Source: Authors' Own Creation; Based on the Proposal of the Prisma Group (Moher, Liberati, Tetzlaff, Altman, & Group, 2009).

4. Results

Table 1: Shows the Results After Applying the Search Filters Related to the Methodology Proposed for This Research, After Recognizing the Relevance of Each of the Referenced Works.

Table 1: List of Articles Analysed.

No.	RESEARCH TITLE	AUTHOR/YEAR	COUNTRY	TYPE OF STUDY	INDEXING
1	Factors with influence on the adoption of the flipped classroom model in technical and vocational education	Villalba, M. T., Castilla, G., & Redondo, S. (2018).	SPAIN	QUALITATIVE	SCOPUS
2	The potential of implementing augmented reality into vocational higher education through mobile learning	Radosavljevic, S., Radosavljevic, V., & Grgurovic, B. (2020).	SERBIA	QUALITATIVE	SCOPUS
3	The use of information and communications technology in vocational education and training- premise of sustainability	Deaconu, A., Dedu, E.M., Igrעי, R.S, Radu, C. (2018)	ROMANIA	QUALITATIVE	SCOPUS
4	Technological resources in modern higher education	Astashova, N. A., Melnikov, S. L., Tonkikh, A. P., & Kamynin, V. L. (2020).		QUALITATIVE	SCOPUS
5	PAOK - ICT network for upper secondary education	Vanninen, R., Laakso, M., & Helynen, M. (2013, October).	FINLAND	QUANTITATIVE	SCOPUS
6	Aligning HE Pedagogical Innovation with VET, Industry, and Research Partnerships: Insights on the Demola Portugal Initiative	Amante, S., & Fernandes, R. (2023).	PORTUGAL	QUALITATIVE	SCOPUS
7	Design principles for the online continuous professional development of teachers	Riviou, K., Barrera, C. F., & Domingo, M. G. (2014, July).	GRACIA, SPAIN	QUALITATIVE	SCOPUS
8	Skills assessment and an innovative curriculum modules: The case of the bachelor of design and development of educational facilities ICT university of Costa Rica	Fallas, J.G, Aguilar, A.G, Sancho, G.M.	COSTA RICA	QUANTITATIVE/QUALITATIVE	SCOPUS
9	Exploring the potential of artificial intelligence tools in educational measurement and assessment	Wild, S., & Schulze Heuling, L. (2020)	GERMANY, NORWAY	QUALITATIVE	WOS
10	MODERN METHODS AND INFORMATION AND COMMUNICATION TECHNOLOGIES IN THE SYSTEM OF TEACHERS' TRAINING FOR VOCATIONAL EDUCATION INSTITUTIONS	Kravchynska, T; Kovalevska, T; Kovalevska, A; Hirna, N; Lysenko, T (2021)	UKRAINE	QUALITATIVE	WOS
11	DIGITAL LITERACY SKILLS OF VOCATIONAL SCHOOL TEACHERS	Saripudin, S., Budiyanto, I. B., Listiana, R. E. N. I., & Ana, A. (2021).	INDONESIA	QUALITATIVE	WOS
12	Importance of computer in learning of person with disabilities in skill training	Bansal, N., Tandon, M., & Das, H. (2023).	INDIA	QUALITATIVE	WOS
13	Preparation of Future Teachers for Use of ICT in Primary School	Lavrenova, M., Lalak, N. V., & Molnar, T. I. (2020).	UKRAINE	QUALITATIVE	WOS
14	Development and validation of EDU-COV-NEE-NEAE questionnaire to measure educational response, ICT usage and impact of COVID-19 pandemic on students with special educational needs	Rodríguez-Jiménez, M. C., Jorge, D. P., González-Contreras, A. I., & Zabala, E. L. (2023).	SPAIN	QUALITATIVE	WOS
15	Extending Technology Acceptance Model in Learning-Management- Systems in TVET Institutions: The Impact of Vocational Educators' Gender, Experience and Perception	Edeh, NI; Ugwoke, EO; Abanyam, FE; Madu, MA; Augustine, NO; Pulife, MC (2021)	NIGERIA	QUALITATIVE/QUANTITATIVE	WOS
16	The Information and Information Literacy Area of the Digital Teaching Competence	Moreno-Guerrero, A. J., Miaja-Chippiraz, N., Bueno-Pedrero, A., & Borrego-Otero, L. (2020).	SPAIN	QUALITATIVE	WOS

Source: Authors' Own Creation

4.1 Co-Occurrence of Words

Figure 2 shows the relationship between the keywords used to search for the study material for the systematic analysis proposed for this research.

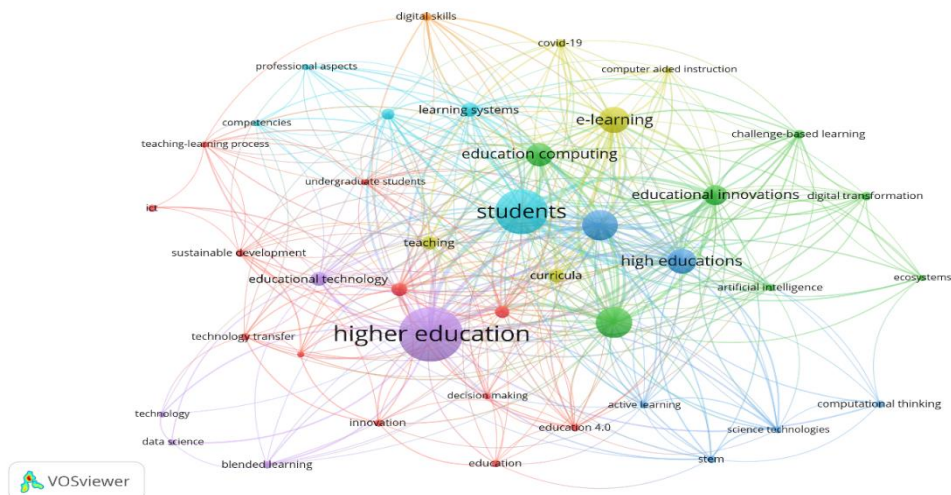


Figure 2: Co-Occurrence of Keywords.

Source: Authors' Own Creation

Figure 2 shows the most frequently used keywords and their correlation with research on topics associated with problems in the use of ICT, Student Competencies, Higher Education and Vocational Training. In this way, it is possible to affirm that Higher Education constitutes the central axis of the research identified for the analysis developed in this article, directly related to research in Computational Education, Learning Analysis, Higher Education, Sustainable Development, Students, Virtual Learning Environments, Learning Systems, among others, which allow confirming the relevance of the data analyzed in compliance with the objective. The emergence of immersive technologies, such as virtual and augmented reality, has brought a tangible dimension to theoretical concepts. Students can now participate in realistic simulations, virtual labs, and experiential learning modules that transcend the limitations of traditional classroom environments. Not only does this enrich their understanding of complex topics, but it also hones their practical skills, forming a generation of graduates adept at applying theoretical knowledge in real-world scenarios. As we navigate this digital frontier, it is imperative that educators, institutions, and policymakers proactively address challenges, ensuring that the promise of technology-enhanced education is realized for all students, regardless of their background or circumstances.

4.2 Discussion

The purpose of this article was to analyze from a systematic perspective, the contribution of the authors through their publications, to the study of the usability problems of ICT, Student Competencies, Higher Education and Vocational Training, carried out in high-impact journals indexed in Scopus and Wos databases by authors affiliated with Latin American institutions. In this way, it is possible to affirm that the publications indicated in the body of this document, have carried out research at different levels whose findings contribute to the generation of new knowledge regarding the variables proposed for this study, this is how great contributions are identified as contemplated in the article entitled "The potential of implementing augmented reality in vocational higher education through mobile learning" The present article aims to compare the outcomes of traditional learning and learning using augmented reality in the part of the curriculum important to vocational skills. The model described was implemented in the

course entitled Postal Services Practice in the final year of vocational studies at the Faculty of ICT Vocational Studies in Belgrade. Participants in the model were students studying a curriculum in the field of postal service delivery. The goal of implementing the model is to show that augmented reality shortens the time to accomplish a task, as opposed to performing it using printed materials, as well as the fact that the efficiency of solving a task is higher compared to the traditional method. Therefore, it is absolutely necessary to know first-hand the real needs of them in order to line strategies that pursue success within their training. Supporting the above idea, the contribution made by the development of the article entitled "Exploring the potential of artificial intelligence tools in educational measurement and evaluation" is evidenced. This article explores the various applications of AI tools in educational measurement and evaluation. Specifically, it discusses the integration of large language AI models into classroom assessment, in specific areas such as determining and specifying the purpose of the test, development, test model, test item generation/development, test instruction preparation, item assembly/selection, test administration, test scoring, interpretation of test results, analysis/evaluation of tests, and reports. It discusses the role of teachers in AI-based assessment and the challenges posed by the use of AI-powered tools in educational assessment. Finally, the article presents strategies to address these challenges and improve the effectiveness of AI in educational assessment. However, as any methodology, it is not exempt from presenting problems through its use, as shown in the article entitled "Preparing future teachers for the use of ICT in primary school" The article addresses the problem of preparing future teachers for the use of ICT in primary school classes. The authors characterize the functionality of information and communication technologies, focus on modern computer resources that can be used in the education and training of younger students, and highlight some aspects of preparing future teachers for the use of ICT in primary education. It is established that ICT in primary school lessons is today a powerful didactic tool that engages children in active work, develops their cognitive interest, promotes better learning and improves the effectiveness of learning. Learning should be multisensory and varied to meet students' information needs. In this context, the informative training of future primary school teachers is of great importance, which activates their cognitive and creative potential, generates the knowledge and skills necessary for future professional activity. In fact, it is about improving the effectiveness of teacher training through the introduction of information and communication technologies, as they change the way scientific information is presented, provide individualization of learning, creating new forms of interaction between teacher and student in the resolution process. various cognitive problems.(Slavica Radosavljevic, 2018)(Valentine Joseph Owan, 2023)(Lavrenova, 2020)

5. Conclusions

This review article concludes by highlighting the importance of knowing the updated status of the bibliography published in databases such as Scopus or Wos, referring to the study of the usability problems of ICT, Student Competencies, Higher Education and Vocational Training during the period between 2017 and 2021, and how the implementation of digital tools within academic training processes has had a positive impact. However, it has also been important to highlight those problems within their use, identified by the authors cited here, as recorded in the body of this article. Although we know that these resources enhance and benefit the parties involved, it is important to recognize how they have revolutionized the education sector and even more so higher education, which has been plagued by countless changes and fluctuations. This resource enhances student competencies within the academic schedule by offering students

unlimited resources that offer them to improve their academic performance. It is important to recognize how new technologies in the modern world change the effects of these new technologies, which range from the integration of online platforms, international forums, access to educational materials and other innovative resources that favor students. In addition, the incorporation of these technologies addresses the didactic needs of each student focuses on supporting these challenges and being able to address adaptability in each learning style. These advantages in higher education are in improving academic quality since this resource would improve the internal processes of teachers, improve the workloads of teachers and focus on being able to exploit new methodologies, with this, virtual tutorials and personalized education are in favor of academic improvement. Virtual tutoring offers students the opportunity to learn in which part of the world, access to the educational network and at the same time have academic flexibility which seeks to leave aside face-to-face classrooms and forge a more digitized horizon and greater connectivity. But it should be noted that this incorporation needs to be executed carefully since institutions must establish solid policies when over storing data and information, ensuring that the data uploaded to the students' network is protected and used ethically. While technology has expanded access to education, concerns about equity remain. Disparities in access to high-speed internet, digital devices, and technological literacy can exacerbate existing educational inequities. Efforts must be made to close these gaps and ensure that all students can benefit from technological advancements. In conclusion, it is important to address all these shortcomings so that these resources are beneficial to the parties and with this seek to improve student competencies within the higher sector.

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