The Role of Digital Technology in Developing Transferable Skills for Higher Education Students: A PRISMA Meta-Analysis

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Abstract

This study examines the pivotal role of digital technology in cultivating transferable skills among higher education students. Utilizing the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology, a comprehensive meta-analysis was conducted to evaluate existing literature on this subject. The findings indicate that integrating digital tools and platforms into educational settings significantly enhances students' competencies in areas such as critical thinking, communication, collaboration, and digital literacy. The study also presents a keyword co-occurrence map derived from the PRISMA analysis using the Scopus database, highlighting prevalent trends and interconnections in research topics related to digital technology's impact on transferable skills development. These insights underscore the necessity for educational institutions to adopt and integrate digital technologies within their curricula, thereby equipping students with essential skills for the evolving demands of the 21st-century workforce.

Keywords: Transferable Skills, Digital Technology, Higher Education, PRISMA Meta-Analysis, Educational Technology

1. Introduction

In today's rapidly evolving digital landscape, the integration of digital technology into higher education has become pivotal in equipping students with transferable skills essential for the 21st-century workforce. Transferable skills, often referred to as "21st-century skills," encompass competencies such as critical thinking, communication, collaboration, and digital literacy, which are applicable across various professional contexts. The infusion of digital tools and platforms in educational settings not only enhances learning experiences but also fosters the development of these crucial skills. Research indicates that the incorporation of digital technologies in higher education significantly contributes to the cultivation of students' technological competencies (Sathiya, Prachyanun, & Jarumon, 2021). A study analyzing technological skills development among higher education students in Portugal found that balanced development of technological skills is crucial for students' personal, social, and professional futures. The integration of digital technologies was deemed relevant in changing academic work organization and relationships (Cardoso & Almeida, 2021).

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Furthermore, the COVID-19 pandemic has accelerated the adoption of digital tools in education, underscoring the necessity for students to acquire digital competencies. A study examining 21st-century digital skills of higher education students during the pandemic highlighted factors affecting students' digital skills acquisition, including instructor involvement, e-course quality, e-learning system usability, and e-course interactivity. The study also explored the relationship between increased educational ICT usage and improved digital skills (Khan et al., 2023). The integration of digital technology in higher education not only enhances students' learning experiences but also prepares them for the demands of the modern workforce. By engaging with digital platforms, students develop critical transferable skills that are essential in today's digital-first world. As noted by Professor Steven Spier, vice-chancellor of Kingston University, focusing on 'human future-proofing' by developing human skills such as creativity and lateral thinking, which are hard to replicate with AI, is vital for career success in a digital-first world (Spier, 2024).

The integration of digital technology in higher education plays a crucial role in developing transferable skills among students. As the educational landscape evolves, digital competence becomes essential for students to navigate their academic and professional futures effectively. This response will explore the significance of digital skills, the impact of digital tools on learning, and the necessity of adapting educational methodologies to foster these competencies. Digital competence encompasses critical thinking, information literacy, and the ability to use digital tools creatively(Zakharevych & Hryhorenko, 2024). It is essential for students to master operational skills, evaluate information, and process data effectively, which are vital in a rapidly changing job market(Zakharevych & Hryhorenko, 2024). Digital technologies enhance engagement and motivation through immersive and dynamic learning experiences, catering to the expectations of modern students(Piersiala, 2024)(Langat, 2024). Blended learning models, which combine online and face-to-face instruction, promote active learning and collaboration, essential for developing transferable skills(Langat, 2024).

In conclusion, the role of digital technology in developing transferable skills among higher education students is both significant and multifaceted. As educational institutions continue to integrate digital tools into their curricula, it is imperative to recognize and harness the potential of these technologies to cultivate a workforce equipped with the essential skills for the future.

2. Research Objectives

The primary objectives of this study are:

1. To systematically evaluate the role of digital technology in developing transferable skills among higher education students, adhering to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines.

2. To create a visual representation of the relationships between keywords extracted from the PRISMA analysis using the Scopus database, identifying trends and connections in research topics related to the role of digital technology in enhancing transferable skills.

3. Literature Review

Transferable skills

Transferable skills are competencies that can be applied across various roles and industries, making them essential for adaptability in the evolving job market. In higher education,

fostering these skills is crucial for enhancing graduate employability and ensuring students are well-prepared for diverse professional environments. The integration of transferable skills into higher education curricula has been extensively discussed. Assiter (1995) emphasizes the importance of embedding life skills across various subject areas to facilitate holistic student development. This approach suggests that curriculum modifications can effectively promote the acquisition of transferable skills. The incorporation of digital technologies in education has further facilitated the development of transferable skills. Fallows and Steven (2000) discuss strategies for integrating key skills into higher education, highlighting the role of technology in enhancing learning outcomes. Their work underscores the necessity of aligning educational practices with the demands of the digital age.

However, challenges persist in effectively embedding transferable skills into curricula. Novakovic (2014) explores the contribution of extracurricular activities to the development of transferable skills, indicating that while academic programs recognize their importance, there is often a gap between theoretical knowledge and practical application. To address this gap, innovative teaching approaches have been proposed. For instance, the integration of technology into curriculum design has been shown to enhance educational outcomes. Chanda (2024) explores effective strategies for incorporating technology into curriculum design, emphasizing the need for a balanced approach that combines traditional teaching methodologies with modern digital tools.

Furthermore, the implementation of blended learning models has been associated with the acquisition of transferable skills. A recent study delves into the intricate landscape of integrating technology, particularly blended learning, in higher education, analyzing its impact and the challenges it presents within a specific educational setting. In conclusion, while the significance of transferable skills in higher education is well-recognized, ongoing efforts are needed to effectively integrate these competencies into educational programs. This includes adopting innovative teaching methods and ensuring alignment between academic training and the skills demanded in the workforce.

4. Methodology

In the initial phase of our research, we sought to identify studies examining the role of digital technology in developing transferable skills among higher education students. Direct searches combining terms like "digital technology" and "transferable skills" yielded limited results. Consequently, we adopted an indirect search strategy, focusing on the term "transferable skills" within the context of higher education. This approach allowed us to review a broader spectrum of literature, from which we identified studies that met our inclusion criteria—specifically, those discussing the impact of digital technology on the development of transferable skills in higher education students. For instance, Cardoso and Almeida (2021) analyzed the relevance of technology integration and the development of technological skills among higher education students in Portugal. Their study highlighted the importance of balanced technological skill development for students' personal, social, and professional futures. Additionally, Khan et al. (2023) examined factors affecting students' digital skills acquisition during the COVID-19 pandemic, including instructor involvement, e-course quality, e-learning system usability, and e-course interactivity. Their findings underscored the relationship between increased educational ICT usage and improved digital skills. By employing this indirect search methodology, we were able to compile a comprehensive collection of relevant studies, thereby

enriching the foundation for our PRISMA meta-analysis on the role of digital technology in developing transferable skills among higher education students.

5. Result

To conduct this systematic review, we performed an advanced search in the SCOPUS database using the following query:

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TITLE-ABS-KEY ( "transferable skills" ) AND PUBYEAR > 2018 AND PUBYEAR < 2025 AND ( LIMIT-TO ( LANGUAGE , "English" ) ) AND ( LIMIT-TO ( SRCTYPE , "j" ) OR LIMIT-TO ( SRCTYPE , "p" ) ) AND ( LIMIT-TO ( EXACTKEYWORD , "Transferable Skills" ) ) AND ( LIMIT-TO ( OA , "all" ) )
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In our systematic review, we conducted an advanced search in the SCOPUS database to identify studies on transferable skills. Using query terms like "transferable skills" in titles, abstracts, and keywords, we targeted English-language publications from 2019 to 2024, focusing on journals and conference papers, including open-access studies. The selection process followed PRISMA guidelines, as shown in Figure 1, detailing identification, screening, eligibility, and inclusion stages to ensure transparency and reliability in our review.

Figure 1: PRISMA diagram illustrates the process of selecting studies in "Transferable Skills"

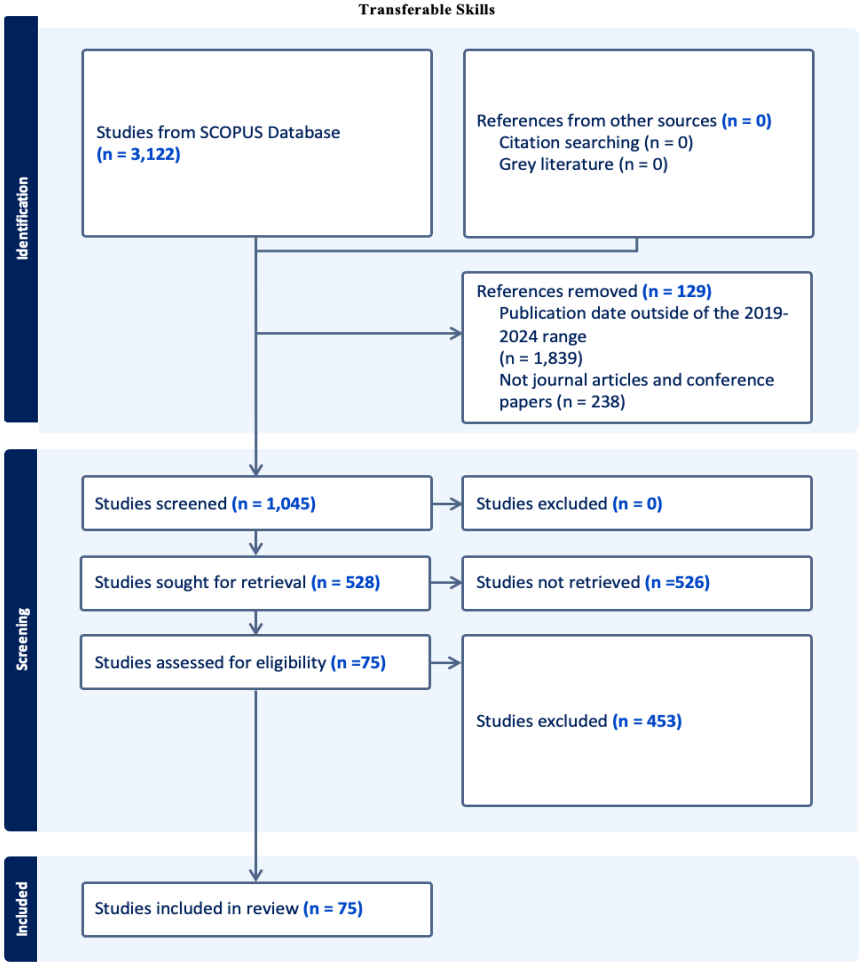


Figure 2: The number of research documents on "Transferable Skill" each year

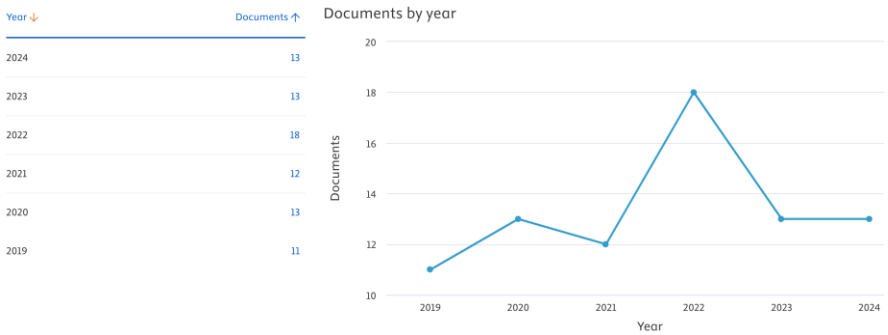


Figure 3: The number of research documents on "Transferable Skill" each country

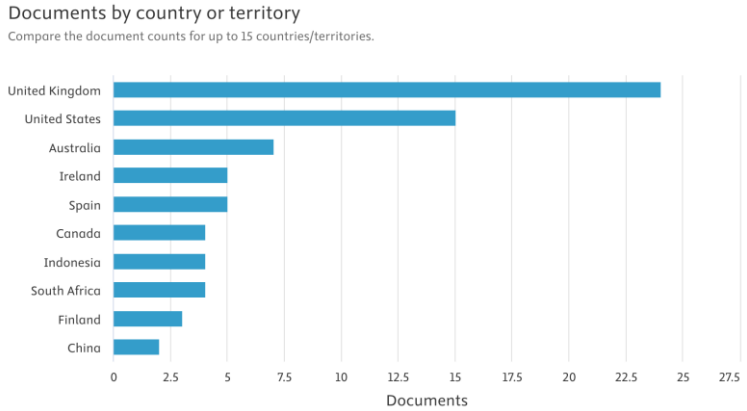
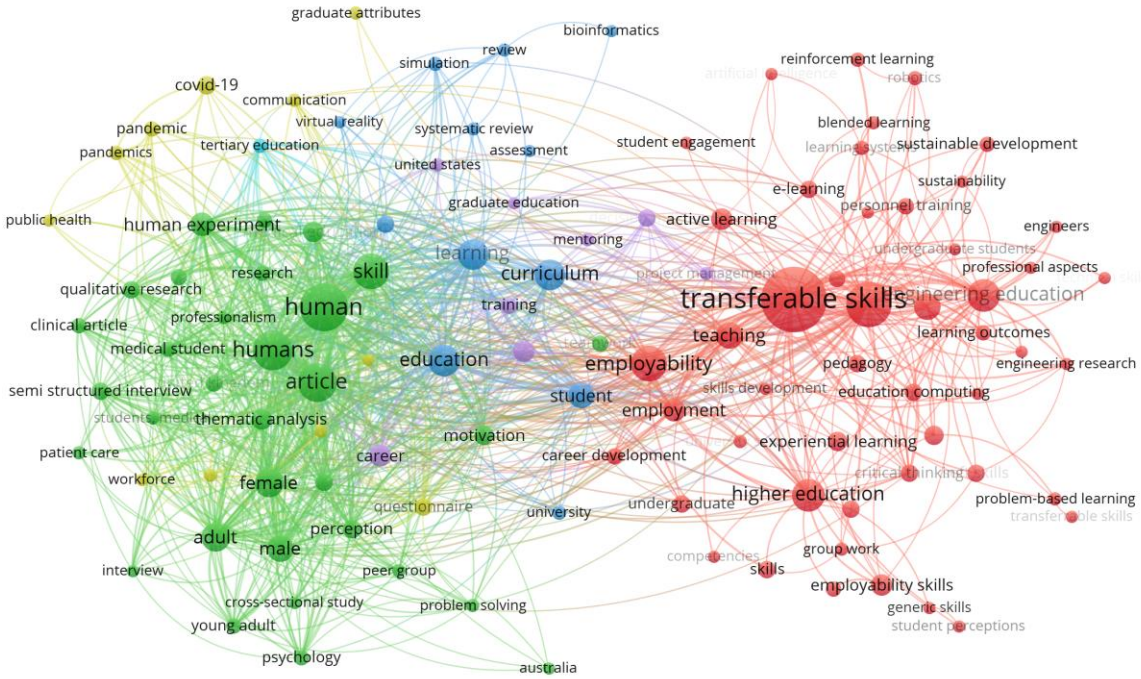


Figure 4: Keyword Co-Occurrence Map of "Transferable Skill" in the Systematic Review Using PRISMA Framework



In this systematic review, an advanced search was conducted in the SCOPUS database to identify studies focusing on digital and transferable skills. The search query used was:

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TITLE-ABS-KEY ( digital AND transferable AND skills ) AND PUBYEAR > 2018 AND PUBYEAR < 2025 AND ( LIMIT-TO ( LANGUAGE , "English" ) ) AND ( LIMIT-TO ( SRCTYPE , "j" ) OR LIMIT-TO ( SRCTYPE , "p" ) ) AND ( LIMIT-TO ( OA , "all" ) )
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This query was designed to retrieve publications from 2019 to 2024 that include the terms "digital," "transferable," and "skills" in their titles, abstracts, or keywords. The search was limited to English-language articles and conference papers, encompassing all open access statuses.

This targeted search strategy enabled the compilation of a comprehensive collection of relevant literature, ensuring that the review encompasses the most pertinent and up-to-date studies at the intersection of digital technology and transferable skills. The selection process is depicted in Figure 5, the PRISMA flow diagram, which illustrates the stages of study selection, including identification, screening, eligibility, and inclusion. The PRISMA flow diagram is a standardized tool that enhances transparency in systematic reviews by detailing the flow of information through the different phases of the review. It maps out the number of records identified, included, and excluded, along with the reasons for exclusions, thereby providing a clear overview of the study selection process.

By adhering to the PRISMA guidelines, a systematic and replicable approach to literature search and selection was ensured, enhancing the reliability and validity of the review findings.

Figure 1: PRISMA diagram illustrates the process of selecting studies in "Digital and Transferable Skills"

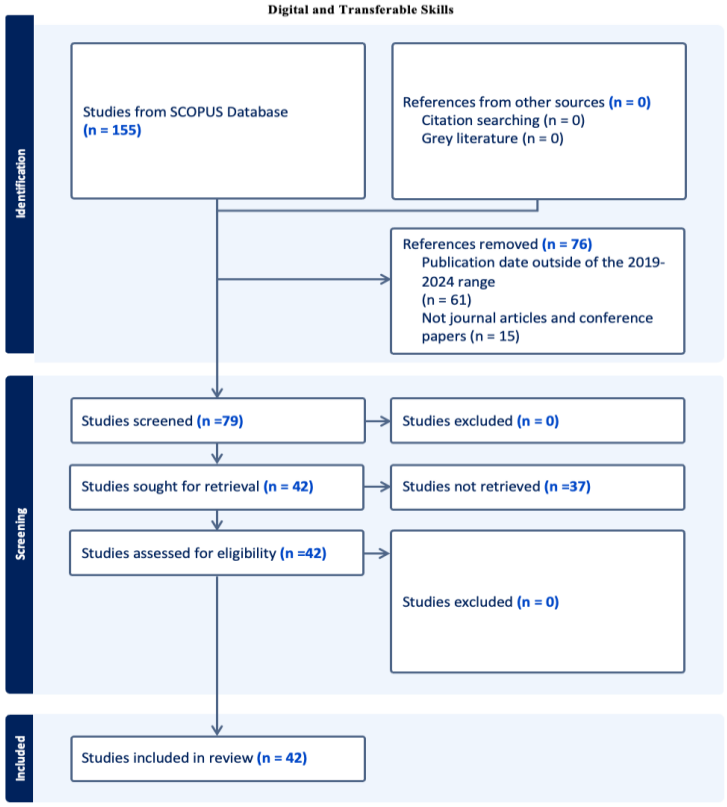
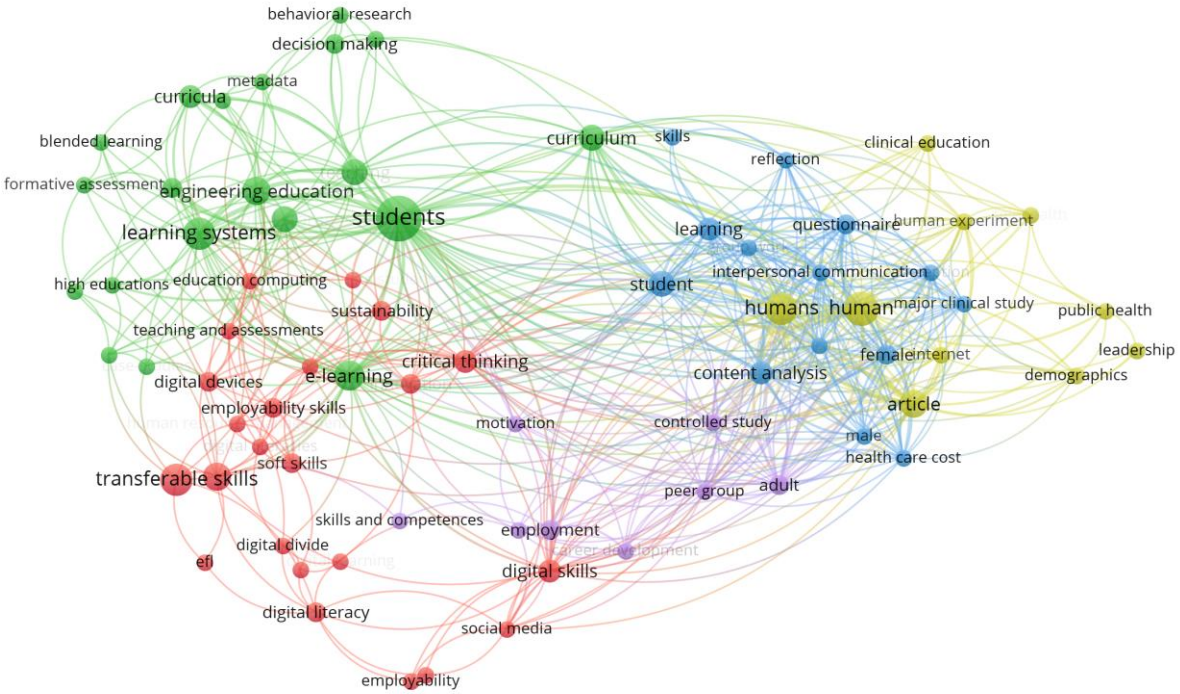


Figure 4: Keyword Co-Occurrence Map of "Digital and Transferable Skills" in the Systematic Review Using PRISMA Framework



6. Conclusion

The comparative analysis of the co-occurrence maps for "Transferable Skills" and "Digital and Transferable Skills" reveals distinct patterns that underscore the integral role of digital technology in cultivating transferable skills among higher education students. The co-occurrence map for "Transferable Skills" illustrates a broad spectrum of competencies, including critical thinking, communication, and collaboration, frequently associated with traditional educational methodologies. In contrast, the map for "Digital and Transferable Skills" highlights a convergence of digital literacy, technological proficiency, and adaptability, indicating a significant interplay between digital technologies and the development of these essential skills. This observation aligns with existing literature emphasizing the necessity of integrating digital technologies into higher education to enhance transferable skills. For instance, Cardoso and Almeida (2021) analyzed the relevance of technology integration and the development of technological skills among higher education students in Portugal. Their study highlighted the importance of balanced technological skill development for students' personal, social, and professional futures. Furthermore, the COVID-19 pandemic has accelerated the adoption of digital tools in education, underscoring the necessity for students to acquire digital competencies. Khan et al. (2023) examined factors affecting students' digital skills acquisition during the pandemic, including instructor involvement, e-course quality, e-learning system usability, and e-course interactivity. Their findings underscored the relationship between increased educational ICT usage and improved digital skills. The integration of digital technology in higher education not only enhances students' learning experiences but also prepares them for the demands of the modern workforce. By engaging with digital platforms, students develop critical transferable skills that are essential in today's digital-first world. As noted by Professor Steven Spier, vice-chancellor of Kingston University,

focusing on ‘human future-proofing’ by developing human skills such as creativity and lateral thinking, which are hard to replicate with AI, is vital for career success in a digital-first world.

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Acknowledgments

The authors express their gratitude to Suan Sunandha Rajabhat University, Bangkok, Thailand, for providing funding support for the dissemination of this research. We also extend our heartfelt thanks to our families, friends, and colleagues for their unwavering support and encouragement throughout this study.

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