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A Systematic Review (2019-2023) on The Impact of Advanced Technologies in Higher Education Learning

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ABSTRACT

The integration of high technology has brought unprecedented convenience and possibilities to higher education, but it has also brought various challenges. With the continuous innovation of technology, these advantages and challenges are constantly changing. However, the previous studies lack a systematic review and summary of these advantages and challenges of changes. Therefore, the purpose of this review is to integrate and analyze the relevant research results of higher education learning in the high-tech environment, to keep an eye on these changes, better grasp the impact of technology on the field of higher education, and insight into the future development trend of higher education. This systematic review uses 20 journal articles from (WoS) and Scopus from 2019 to 2023. The results of the survey show that students' learning ability is gradually enhanced, the academic atmosphere of colleges and universities is increasingly strong, and the learning opportunities provided by higher education are more and more diverse, which are the positive effects of high-tech progress on higher education. However, in the context of the rapid development of high technology, we should also pay attention to the adaptability of the teaching individual and the challenges faced by the inadequate preparation of society in terms of technical training and technical equipment at the macro level.

Keywords:

Advanced technologies, learning, higher education

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1. Introduction

1.1 Explanation of High Technology

Our lives revolve around technology in today's knowledge- and information-based society. Technology can be understood as more than just a single device. It can also mean a social structure that offers a particular kind of service and a positive mindset that can analyze an issue and come up with a workable solution. Finally, technology can also be considered a culture, and from this perspective, it can explain our identity, desires, and values, encompassing our hopes and dreams [6]. Technology, according to [4], may be divided into at least three categories. The effectiveness and

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functionality of technology as a mediator are referred to as the first level; system complexity, which typically includes irrationality and dysfunction, is referred to as the second level; and the integration of technological systems with human economic activity and cultural life, or "technological lock-in," is covered in the third level. [33] distinguishes between the concepts of "technological operations" and "technological phenomena." While "technological phenomena" show how technology influences our ways of thinking and being, "technological operations" allude to technology as a tool that may be used. Technology is therefore neither divested nor value-neutral. On the contrary, Technology is socially important and may be directly related to other social developments and processes [17].

1.2 Changes at the Higher Education

The rapid development of science and technology is triggering a revolution in the field of higher education [11]. Modern education is no longer limited to the traditional face-to-face teaching mode, but online and distance learning are booming [26,27]. The impact of the COVID-19 epidemic in 2019 has challenged traditional education models but also highlighted the importance of technologically adaptable education systems [3]. In this transformation, the role of teachers has changed from mere knowledge transmitters to learning facilitators and educational innovators. They need to re-examine their teaching behavior, accept new teaching concepts, and take technology as an effective tool to improve teaching effect [29]. This also means that educators must constantly learn and research new technologies to better apply them to educational practice [36]. For students, the Alpha Generation will gradually become the dominant force on college campuses. They have grown up in the digital age and have a natural affinity and keen insight into new technologies [38]. Therefore, the future college education will pay more attention to the deep integration of science and technology and education.

1.3 Research Questions

While embracing new technologies, it is imperative that we clearly recognize the ongoing evolutionary advantages and limitations of these rapidly developing high-tech innovations in higher education, thereby enabling us to delve deeper into exploring the direction of higher education reform under the trend of new technologies. Although numerous studies have explored the impact of technology on higher education, a systematic analysis of the dynamic impact of technology on higher education is still insufficient. In other words, we urgently need a more comprehensive and detailed classification and description of the ongoing evolutionary advantages and challenges that technology brings to higher education. Therefore, the goal of this systematic review is to review the latest trends and research findings on the impact of high-tech innovations on higher education and establish the following research questions:

RQ1. What aspects of high technology benefit higher education learning?

RQ2. In what ways does high technology pose a challenge to higher education learning?

2. Methodology

The technique used for collecting articles about the influence of advanced technologies on learning in higher education is covered in this section. This study uses the systematic analysis approach, which has been utilized to aid in the critical examination, evaluation, and synthesis of complicated concepts as well as to produce original research. [10] Following PRISMA's (Preferred Reporting Items for Systematic Review and Meta-Analyses) guidelines [25], the systematic review

procedure was carried out. The databases Scopus and Web of Science (WoS) were utilized to locate publications about the influence of advanced technologies on learning in higher education for this systematic research project. Then, as Figure 1 illustrates, this methodical procedure proceeded through a few stages of identification, screening, eligibility, and exclusion.

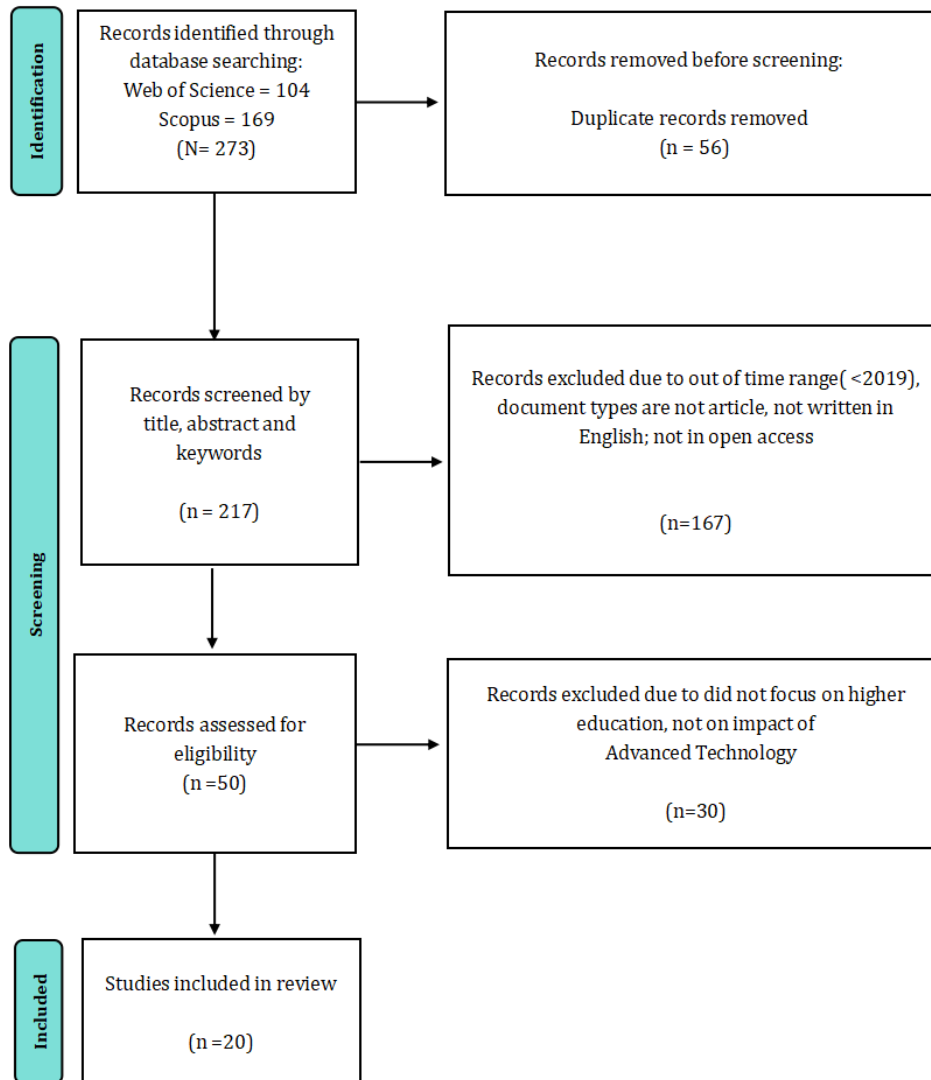


Fig. 1. PRISMA systematic review adapted from Page *et al.*, [22]

2.1 Identification Phase

As stated in the PRISMA standards, the identification procedure is covered in the first phase of the systematic review. Web of Science (WoS) and Scopus were the two databases that were selected as appropriate for the purpose of this study. The constructs that were intended to be studied were carefully reflected in the main phrases that were included in this systematic study. There were terms like "impact," "advanced technology," and "higher education." The search query used in this investigation for each database is shown in Table 1.

Table 1

Search string used in this study

Database	Search String
Web of Science (WoS)	TS= (("impact*" OR "influence*" OR "effects*" OR "benefits*" OR "advantage*") AND ("Advanced Technologies *" OR "ICT" OR "High-tech*" OR "digital technology*") AND ("learning in Higher Education*" OR "higher learning*" OR "learning tertiary education*"))
Scopus	TITLE-ABS-KEY (("impact*" OR "influence*" OR "effects*" OR "benefits*" OR "advantage*") AND ("Advanced Technologies *" OR "ICT" OR "High-tech*" OR "digital technology*") AND ("learning in Higher Education*" OR "higher learning*" OR "learning tertiary education*"))

2.2 Screening Phase

After identifying the articles, the following stage is the screening procedure, where duplicate articles that appear in both databases are initially eliminated. After 56 of the same articles were filtered out, 217 remained suitable for additional screening. The time frame between 2019 and 2023 was selected as one of the inclusion criteria since it was challenging for the writers to read every article. To guarantee their quality, the study only considered open-access research with empirical data written in English and published in journals. Fifty of the 167 articles not selected for further screening were added to the following screening round. Moreover, only articles on high technology, influence, and higher education were chosen for this review. Thirty publications were disqualified during the screening process because they had no bearing on the research goal. Twenty papers were possibly included in this systematic review after rigorous selection based on inclusion and exclusion criteria. Table 2 displays the inclusion and exclusion criteria.

Table 2

Inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
Studies conducted between 2019 and 2023	Studies conducted before 2019
Articles from journals	Book, Review, Book chapter, Conference paper, Retracted
Articles with open-access	Articles without open-access
Articles written in English	Articles were not written in English
Related to to high technology, impact, and higher education	Not Related to to high technology, impact, and higher education

2.3 Included Phase

The influence of advanced technology on higher education learning is the main topic of the articles in this systematic review; Table 3 displays the findings of the included research. Twenty papers from WoS and Scopus were chosen based on the table above. These databases were selected based on data quality factors, particularly in the sector of education.

Table 3
 Summary of articles selected

Author &Year	Database	Aim	Samples	Findings
Suliman et al., 2019	Scopus	To investigate the viewpoints of undergraduate students regarding the application of ICT, perceived ICT competencies, opinions on ICT, and attitudes about ICT while also researching the correlation of the variables.	283 undergraduate students	The respondents' attitudes and impressions concerning utilizing ICT in everyday life were overwhelmingly positive. ICT is mainly used for amusement rather than education, and its use is declining. When examining the correlation between perceived ICT competence and ICT use, there is a positive mediated association between the two.
Fuchs, 2022	Scopus	To investigate undergraduate students' opinions about applying Kahoot	113 undergraduate students	The process of learning is positively impacted by gamification for students and is needed to maintain their motivation during the undertaking. Furthermore, international students thought gamified learning was more beneficial than their Thai counterparts. Compared to their male counterparts, female students reported higher mean values of perceived usefulness; Students in first year of study reported slightly higher mean values of perceived usefulness, while students in second year reported somewhat higher mean values of felt engagement.
Wu & Plakhtii, 2021	WoS & Scopus	To give a theoretical overview of the components in the architecture of the e-learning cloud and the models applied to implement it in educational institutions	100 educators	Knowledge monitoring tools, efficient content processing, efficient teaching-learning process management, and efficient security and confidentiality systems are the primary benefits of arranging and bolstering the educational process with computer-based e-learning software. Integrating cloud computing into the classroom encourages the creation of instructional materials and can significantly enhance student achievement.
Elm et al., 2023	Scopus	To examine academic instructors' experiences with digital tools that encourage students' learning in universities.	36 academic teachers	Instructors' TEL usage has advantages and disadvantages. The paper emphasizes crucial TEL organizational features. Academic instructors' decisions and expressions are not influenced by their personal beliefs or positions in the classroom.
Okoye et al., 2023	WoS & Scopus	To ascertain the degree to which digital technologies have been employed in higher education institutions to enhance the process of teaching and learning, as well as the obstacles and impediments that may have	40 participants	The users maintained that the primary obstacles to the teaching-learning process are more infrastructure and resources, access to the internet, and digital platforms.

		prevented their successful implementation throughout the HEIs		
Dhillon & Murray, 2021	WoS & Scopus	To look at how EAP teachers utilize and perceive e-learning technologies.	55 respondents	The most regularly utilized and accessible technical resources were videos and virtual learning environments (VLEs). The capacity of these technologies to encourage student participation and learner autonomy was the most often mentioned advantage of using them. People's resistance to utilizing the available tools and their practical and technological problems were attributed to a lack of training and trust in using e-learning technology.
Le et al., 2021	Scopus	To investigate how instructors and students at a significant institution focused on pedagogy changed their perspectives, approaches, and orientations toward online learning throughout the three COVID-19 outbreaks in Vietnam.	945 students and 150 lectures	The COVID-19 epidemic has positively influenced the trajectory of online education in Vietnam's tertiary sector. Online learning in Vietnam has accomplished extraordinary achievement via the three epidemics and the efforts of professors and students, despite opposition and unhappiness at the time of the outbreak.
Obeidat et al., 2020	Scopus	To find out how Hashemite University in Jordan's students felt about the efficacy of online learning during the COVID-19 program	399 students	Although students generally gave their online learning experience a good review, they did have some negative experiences, most of which had to do with technological difficulties. The most popular e-learning platform among students was Microsoft Teams, and most accessed instructional materials via cellphones.
Ali et al., 2023	Scopus	To create a solid plan to improve IoT integration at HEIs, especially in developing nations.	384 students	Factors including usability, accessibility, technical support, and individual strengths heavily influence the rate of IoT consolidation. IoT adoption is also significantly impacted by cost obstacles, self-efficacy, interactivity, online monitoring, automatic attendance tracking, training initiatives, network and data security measures, and associated technologies.
Subashini et al., 2022	WoS & Scopus	To describe Sri Lankan undergraduates' attitudes about accepting online learning in higher education amid the COVID-19 pandemic.	657 randomly selected undergraduates	Over two-thirds of the participants knew about digital learning and the various learning management systems that enable it. Most respondents utilize different e-learning platforms, with cell phones being the most often used device for e-learning, followed by laptops and PCs. The kind of neighborhood, family income, academic year and field, ICT proficiency, and prior e-learning training were discovered to be essential factors affecting Sri Lankan undergraduate students' adoption of e-learning practices.

Soegoto et al., 2022	WoS & Scopus	To ascertain how e-learning influences students' satisfaction at private universities and to develop a marketing strategy to keep institutions of higher learning competitive throughout the COVID-19 or similarly disrupting events.	245 students	ICT, e-SQ and e-IQ all have considerable effects on e-learning. In addition, 65.9% of student satisfaction may be explained by ICT, e-IQ, and e-SQ variables, and other factors explain the remaining 34.1%.
Adinda & Mohib, 2020	Scopus	To determine the instructional design and teaching strategies used by instructors in blended learning settings and to evaluate the impact these strategies have on students' independent learning.	18 lecturers and their 294 undergraduate students	Blended learning courses are only sometimes designed as student-centered learning environments by lecturers who use student-centered teaching methodologies. Furthermore, online peer review and online forum discussion activities were offered by the students' instructors, who increased their degree of independent thinking. More investigation is required to ascertain how blended learning settings enhance contact and cooperation and confirm the direct link between these pedagogical activities and self-directed learning.
Shpeizer, 2019	Scopus	This study aims to display and illustrate the integration of project-based learning concepts with current ICTs and provide guidance on implementation for higher education institutions and instructors.	/	While technology makes PBL learning more efficient and encourages autonomous group projects, formative evaluation, feedback-giving and monitoring of student learning processes, and learning authenticity (connection with the natural world), it also presents certain drawbacks : Ideology (awareness of its significance), compensation (more wage), assistance with technological training
Ndayisenga et al., 2022	Scopus	To provide light on the application of BL in HLIs and make suggestions for enhancing BL instruction to raise the standard of pre-service training for nurses and midwives.	33 nursing and midwifery students	The data analysis revealed three key themes: (1) BL considered a novel and successful teaching and learning strategy; (2) Contextual barriers to the BL technique; and (3) Suggestions for enhancing the BL method. Experiences have shown that the advantages encompassed time and money savings and the approach's flexibility. Nonetheless, several difficulties were noted, including technical ones like inadequate internet access and a lack of ICT expertise.
Wekerle et al., 2022	WoS & Scopus	To investigate the relationship between student participation in these activities, the use of technology in the classroom, and the effects of student engagement on learning outcomes.	381 higher education students	Compared to when technology was not utilized in the classroom, pupils were inspired to participate in more productive, active, and passive activities when deployed. Additionally, learning outcomes were favorably correlated with student participation in constructive, interactive, and dynamic learning activities.

Mapundu & Musara, 2019	WoS	To investigate the leading causes of learning facilitation in technology-based contexts.	48 studentes	Having exploratory value in revealing the attitudes, sentiments, and lived experiences of contemporary students about the use of e-portfolios as a tool to improve their educational experience and foster entrepreneurial behavior in the modern workplace
Letchumanan et al., 2023	WoS	To examine factors affecting the development of higher-order thinking skills (HOTS) among mathematics students at HEI in Malaysia who are in technology-enhanced learning environments (TELEs)	250 undergraduate and postgraduate students	The way that students felt about using technology was positively correlated with HOTS. In the meantime, students' attitudes about technology usage were positively correlated with organizational support, which indirectly impacted HOTS promotion.
Looi, 2021	WoS	To find out what obstacles Malaysian business undergraduates have and what they would want in the future for e-learning during the COVID-19 semester	251 undergraduates	ICT infrastructure, training, support, resources, discipline, benefits, drawbacks, and learning objectives are among the challenges facing e-learning.
Scherer et al., 2023	WoS	Examining variations in OTL readiness across genders	731 higher-education teachers	Men reported greater self-efficacy in technical subject knowledge, whereas women reported being more prepared for cognitive activation activities. Additionally, women's construct correlations with perceived institutional support were less.
Martín-García et al., 2019	WoS	To nalyze and determine the phases at which the blended learning approach has been adopted in higher education settings, and evaluate how these stages connect to a variety of personal and professional traits, qualities that are seen as relevant to blended learning, and contextual factors.	980 actives academic staff	The findings demonstrate that, across all models used, the desire to use BL is the most significant predictive variable. Additionally, it was confirmed that greater usage frequency and expertise in digital learning environments with more advanced BL approach implementation phases were related.

3. Results

3.1 The Benefits

The paper was read, examined, and summarized in order to provide a response to the first research question. The advantages of advanced technology on higher education learning, as reported in this systematic study, can be summed up as follows: 1. Enhancing students learning' ability; 2. Enriching learning experience; 3. Emerging diverse development opportunities. The result is shown in Table 4.

Table 4

The benefits of High technology on learning in higher education

Enhancing students learning' ability	[2], [7], [13],[15], [32], [34]
Enriching learning experience	[1], [2], [5], [7], [8], [13], [15], [20], [28],[34]
Emerging diverse development opportunities	[7], [20], [35]

3.1.1 Enhancing Students Learning's Ability

Technological advancements have enhanced the students' learning capabilities. On the one hand, with the continuous progress of high technology, students' ability to obtain information has been significantly improved [32]. The rapid development of high technology enables students to access more diversified information resources [7], for example, the Internet of Things can seamlessly integrate online and offline academic resources [2]; Electronic portfolios make the use of resources in the learning process more flexible [15]. On the other hand, the development of science and technology improves students' ability to grasp knowledge, including thinking skills [13] and language skills [32]. Students see technology as an effective way to improve their learning ability as it can help them develop relevant interdisciplinary competencies and gain access to field-specific information [34]. In addition, the learning experience of e-portfolio can improve students' entrepreneurial ability and enhance their ability to adapt to the modern workplace [15].

3.1.2 Enriching learning experience

Advanced technology enriches the learning experience of higher education. First, technological progress has increased students' experience of more autonomy and participation in the learning process [5]. Compared with traditional classrooms, students are more productive in technology-supported classrooms [34]. A more typical scenario is the introduction of high-tech supported video games into educational Settings, where the fun and demands of games may significantly increase students' willingness to learn [8]. Second, High technology has also brought more interactive learning experiences to teaching subjects. Technology-enabled communication and feedback can promote the authenticity of learning and make the technology-enabled learning model consistent with the real world [28]. At the same time, students can speak and communicate more successfully [18]. Students feel that technology helps them psychologically and emotionally because it is fun to use, promotes rapid interaction with tutors and peers, [13] leads to greater collaboration and more student participation in the classroom. [15] For example, the use of iot in higher education has introduced interactive features that improve understanding and communication between students and faculty [2], where students can share knowledge with more knowledgeable others, such as professors and classmates, and develop knowledge through collaboration and experience [24].

Online peer review activities support peer review and feedback, can identify students' learning needs, provide clarification, and determine learning plans [1]. Third, the development of technology has broken the spatial and temporal limits of teaching [7], enhancing the sense of free learning experience, make it more Flexibility [15]. Technology can satisfy students' needs for on-demand instruction whenever and wherever they choose. They can also give those who are deprived of education due to social, political, political, or economic factors the chance to receive an education [20]. It removes obstacles to learning and creates a positive constructive learning atmosphere [37]. Technology plays a key role in ensuring that everyone has access to high-quality, fair education, particularly when it comes to promoting chances for lifelong learning [23]. The advent of E-learning, for example, has enabled students to learn at any time and from any place [7]. Learning also has lower time and financial expenditures at the same time. For instance, e-portfolios enable for the offline completion of tasks, enhancing learning outcomes and providing greater flexibility in the learning path [28].

3.1.3 Emerging diverse development opportunities

Advances in technology have diversified opportunities for higher education. First, it increases the possibility of tailored learning patterns. High technology brings convenience and possibilities for students in higher education to learn in a more personalized way [7], especially since learning creates suitable educational conditions that can be adapted to the conditions and specific needs of different students, such as housewives, farmers, industrialists, and employees, and allows for continuous learning by meeting different demands [20]. Second, all citizens can profit from ICT; its advantages are not just for students [20]. For instance, computer-based e-learning applications can offer convenient ways to process educational content, organize efficient educational processes, monitor knowledge effectively, and provide a secure confidentiality system [35]. These innovations in educational management can be projected to the development of management in other sectors. It can also benefit the educational management business [7] and thus present opportunities for management innovations in society; At the same time, the E-learning context allows the emergence of new professions that are needed by the society but the word traditional university system does not allow and support the realization [20], opening the way for the construction of professional enrichment and expansion of the society and adapting to its development.

3.2 Challenges

In this systematic literature review, the second research question was also answered, and the challenges posed by high technology to the field of learning in higher education are summarized in the following categories: 1. The challenge of individual consciousness; 2. The challenge of adapting to the new teaching environment; 3. The challenge of resource preparation. The result is shown in Table 5.

Table 5

The challenges posed by high technology to learning in Higher education

Challenge of individual consciousness	[5], [12], [20], [28], [32]
Challenge of adapting to the new teaching environment	[7], [30], [34]
Challenge of resource preparation	[2],[12], [14], [15], [16], [19],[20], [21], [28], [30], [31]

3.2.1 Challenge of individual consciousness

Amidst the surge of advanced technology, higher education is experiencing an unparalleled transformation in learning. This has given rise to novel challenges, one of which is the issue of evolving individual consciousness, primarily manifested in students' deficiency in self-control and teachers' inadequate awareness to effect change. On the one hand, pupils have become less focused and disciplined as a result of the widespread use of high-tech devices [12]. In the face of these challenges, lecturers have a new responsibility to provide close, flexible supervision that enables and encourages students to learn independently and responsibly. Training and practice in time management, independent learning, and self-discipline education should be strengthened to help students become more self-disciplined and better suited to higher education in the context of advanced technology. This is especially true given the rapid development of ICT tools in education, where the same tool can be used for both learning and entertainment [32]. However, many educators are unaware of the value of technology in the classroom [28]; they favor conventional learning methods and lack confidence when it comes to using e-technology for instruction, which may be the result of inadequate training [5]. As a result, educators must alter the way they see the integration of high technology into the classroom and help students embrace and be confident in the manner of learning that is supported by technology [20].

3.2.2 Challenge of adapting to the new teaching environment

The teaching environment has been impacted by high-tech technology, which challenges classroom communication and lecture content. This systematic review of new literature finds that classroom communication is a coin with two sides, with both benefits and challenges. Some scholars have argued that high technology has brought positive impacts on interaction in higher education [1,2,13,15,28,34] However, the perception that high technology limits classroom communication also exists. For example, in the teaching and learning process supported by technology, unlike the traditional classroom setting, which can be the kind of face-to-face communication that can help the teacher interpret the students' body language, technology seems to be more adept at providing verbal and written communication. The other modes of communication are limited, and the teacher feels uncomfortable with the situation [28]. In addition, the classroom is supported by technology, interactive learning activities, and passive learning, which are still present and effective, and teachers should encourage learning to engage in active learning [34]. As technology advances, so does the field of education, but whether the content and teaching and learning methods are up to date must be addressed. The ability of digital tools to control how teaching is planned and delivered means that the creative and content-enhancing elements of teaching may be reduced. As a result, the digital experience and skills of academic teachers may be questioned by students, which impacts their professional autonomy [7]. on the other hand, the technological context always requires teachers and universities to innovate quickly so that students can be interested in the knowledge conveyed by the lecturer in every class [30], which places new demands on the content and teaching tools.

3.2.3 Challenge of resource preparation

Inadequate resource preparation is reflected in two aspects: teacher training and infrastructure. First, Higher education faces a major challenge in the form of inadequate technological training [28,31]. Some teachers lack the necessary training, which hinders their ability to use the technology effectively in the classroom [19]. These teachers also lack the necessary knowledge to implement

new blended pedagogies in a technologically-enabled environment, which results in low usage rates of blended education tools when they are adopted [16]. second, Inadequate infrastructure for technology is another issue for higher education [12,20]. Many nations continue to struggle with the issue of the digital divide [9], and according to [21], the use of digital technology for education at higher education institutions in the Latin American area is influenced by high-tech infrastructure and Internet access. Whereas the digital divide faced by higher education institutions, learners from low-income families or living in remote/rural areas (economically or socially disadvantaged learners) have adverse consequences as they do not have access to the hardware, software, and internet coverage required for effective e-learning [3]. Therefore, at the policy level, consideration should be given to planning for the future with specific interventions to enhance the technological preparation of e-learning projects [20], improve physical and infrastructural resources [31], improve the e-learning experience by improving the Information and Communication Technology (ICT) e-Service Quality (e-SQ) and e-Information Quality (e-IQ) [30], and also pay attention to avoid hacker attacks [15].

4. Discussion

We have already demonstrated that the impact of high technology on learning in higher education has a positive side, bringing benefits and challenges to the current development of higher education. Applying SLR to study the impact of Higher technology on learning in Higher Education, we found that the method is both practical and inspirational. It helps the researcher to have a comprehensive understanding of the current status and frontier trends of research in the field of higher education under the technological environment, which provides a comprehensive background and reference for the subsequent research; meanwhile, by systematically collecting, organizing, and analyzing the relevant literatures, the researcher can find out the inadequacies of the previous research, to find out a new direction and entry point for his/her research. We found that enhanced communication and exchange is one of the more significant benefits of high technology to higher education learning, with the most significant percentage of scholars in the selected articles agreeing with it [1,2,13,15,28,34]. Real-time communication saves time and increases students' motivation to learn [2]; technology helps future generations analyze students' learning data more carefully and provide more personalized learning guidance. However, some scholars believe that communication under technical support hinders the development of in-depth communication because communication is only conducted through voice and text [7,28]. Most scholars consider the typical challenges facing the higher education sector in developing a technologized society to be the construction of high-tech technological facilities and the lack of training for educators. On the one hand, this is related to the sense of change in institutions [12,28] and on the other hand, it also reflects a potential challenge to the equity of education [21].

5. Conclusion

To conclude, this systematic review of papers related to the impact of high technology on learning in higher education has been conducted. As a result, a comprehensive and detailed classification and description of the ongoing evolutionary advantages and challenges that technology brings to higher education have been filled. The main findings highlighting the benefits and challenges of high technology for learning in higher education are as follows: The field of higher education is experiencing the baptism of the wave of science and technology, which has brought significant positive effects. Students' learning ability has been rapidly improved, the academic atmosphere of university is becoming increasingly active, and the learning opportunities provided by higher

education are becoming more and more diverse. These changes are due to the rapid development of technology and continuous innovation. However, just as every coin has two sides, advances in technology have also brought challenges to higher education institutions. The first problem is the adaptability of individual teachers. The individuals here include both teachers and students. Faced with the rapid development of science and technology, their ideas and ways of thinking have not yet completed the necessary transformation. This means that although technology offers more possibilities for teaching, their adaptability and acceptance in practical applications have yet to be improved. In addition, from a broader societal perspective, the training of teachers in digital literacy and the equipping of technical facilities are also inadequate. In the digital and information-based educational environment, teachers' digital literacy has become an important standard to evaluate their teaching quality. At the same time, complete technical facilities are also the key to ensure the quality of teaching. In response to these challenges, future research can be deeply discussed from the following aspects: First, the scientific and technological education training for teachers and students should be strengthened to promote the change of their way of thinking and concepts. Secondly, we should increase the investment in teachers' digital literacy training and improve the relevant technical facilities. Thirdly, educational innovation should be encouraged to promote the pace of educational information construction. Finally, education policy research and formulation should be strengthened to meet the challenges posed by science and technology. The government and all sectors of society should work together to provide the necessary policy support and financial guarantee for higher education institutions to promote the sustainable development and progress of the education sector.

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