

Modern Technology of the Education: A Bibliometric Analysis

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Abstract

Incorporating technology into the education system has become essential for transforming and enhancing educational practices in contemporary times. This paper explores the connection between the integration of advanced technology in education and its potential to promote educational development and increase student engagement, particularly for second language acquisition purposes. By carrying out a biometric analysis, the study aims to accelerate the attainment of desired second languages. The research covers all relevant publications spanning from 2017 to 2021, utilizing the Vosviewer software for similarity visualization. In November 2022, an analysis of 3,603 publications recorded in the Scopus database revealed the most prominent subjects addressed by these journals. The findings indicated that technology usage has become a crucial component of contemporary life across various sectors, including education, engineering, medicine, manufacturing, and more. It has become essential. Furthermore, the research established that advancements in multimedia information technology have contributed to the enhancement of modern educational technology. Currently, technology plays a vital role within the Teaching Association of colleges and universities. This study suggests that education authorities worldwide, particularly in developing nations, should focus on expanding technology usage in teaching and offer training for teachers and students to utilize modern technological methods. This will lead to improved educational processes, higher quality of education, and accelerated learning for students.

Keywords: Modern Technology, Education, Abibliometric Analysis, Language, Education Research

Introduction

Modern technology plays a huge role in all scientific and practical fields, but it has become one of the important tools to achieve what is hoped for. Remarkably, modern technology has

greatly influenced education, and many researchers have called for the need to use modern technology and Information Technology in the educational system. Modern teaching techniques have been spread all over the world and its useful and easy for teachers. Modern teaching technologies educate children well and make them understand clearly and easily. Moreover, in this era, there is an increasing use of the Internet for educational applications; which means that students and teachers will increasingly use technology in open and flexible learning systems. Technology plays an important role in enhancing and developing our learning system. This necessitates exploring the desired results, as well as the unintended consequences of using modern teaching technologies for the professional development of teachers. Having certain skills and abilities to use various modern teaching techniques is necessary for both students and teachers. Therefore, it is necessary to equip them for the era of modern teaching technology (Kayumova, 2019)

There is an increasing need for teachers to use new technological solutions for teaching purposes, and to set it as an example for students to independently use technology for educational purposes. Thus, for example, using mobile devices in the classroom, teachers take a more active role and become designers of learning experiences for their students. That is, the teacher's competency in the field of ICT remains a crucial element in the development of Education (Oludele et al., 2014). The internet is a source to broadening horizons". Due to the prevalence of the internet, the availability to access it will cause rapid access to Information Technology in many areas. Using technologies that are connected to the internet by professors in formal classes will help students easily distinguish between reliable websites and unreliable ones. This can motivate students to search for materials available on the internet outside the formal classes, which could lead to a higher level of education for children compared to the conventional education system. (Szymkowiak et al., 2021)

Therefore, modern educational technology, represented by computer-supported networked education has a profound impact on education (4-Xi, X, Li..). At the same time, all kinds of information updated on the Internet influence the educational paradigms in traditional education, and both students and teachers are overwhelmed with rich educational resources. (Shi, 2021). Providing the digital learning environment in educational institutions involves the using of all its elements, namely: IT services, applications, systems, etc. Which can be easily merged, updated, added, deleted, and changed. This curriculum will create and develop a digital learning environment for educational institutions encouraging innovation in education and ICT (Shi, 2021)

The experiment conducted by a group of researchers also demonstrated that "e-learning stimulation" and "social influence" had a positive effect on behavioral intention, while "favorable conditions" did not affect using the e-learning portal. Moreover, the usage behavior had a positive effect on stimulating e-learning. The results will assist policymakers and practitioners in developing countries to better understand the motivations of e-learning for students. Authenticity/value adopting the auto model (Maldonado et al., 2011). Other results of the research conducted by other researchers have indicated that the quality of the system, the self-efficiency of the computer, the quality of information, and the perceived pleasure and accessibility to it, have a significant impact on the usability of the e-learning system (Salloum et al., 2019). Therefore, a study was conducted by applying modern technology in education to achieve the following objectives

- Positive use of modern technology in education.
- Understanding modern technologies and conducting training for teachers and students.
- Presenting the material more interestingly and attractively.
- Directing students towards technological activities for the development of the educational process.
- Diagnose the students learning obstacles and assist them to overcome their study problems.

For this purpose, the objectives of this study are to analyze online learning publications indexed in scope, using bibliometric measurements and visualization analysis. Moreover, in the current study, all data were collected from scopes, the world's leading abstract database, and citations of peer-reviewed research. Therefore, these research data included many leading journals in the field of modern technology of Education.

This analysis demonstrated: how research interests in modern technology of Education have changed over time. In addition, this paper illustrates scientific cooperation between the main contributors of technology and its relationship with education that was not available (not present) in previous studies. Exclusively this paper will intend to answer the following questions

1. What has been the contribution of modern technology toward education curriculum for the past decade?
2. What are the most relevant journals and authors on modern technology of education?
3. Which countries are the most productive in the field of modern technology in the field of education research?
4. What are the basic search keywords in the last decade of modern technology of education?

Materials and Methods

This review aims to reveal the most productive studies conducted on modern technology in the field of education research. To achieve this bibliometric analysis, a review was carried out in this study. This research was conducted on the first of October 2022, where the Scopus database was used in this research. The initial search revealed that there are 5942 articles on modern technology for education students. The main keywords that were used were modern, technology, and education. The paper covered the period commenced in 2017 to 2021. This included the subject, "society" or a reduction to the subject "companies" or a reduction to the subject "arts". Finally, the paper's language applied only to articles published in the English language and excluded any other languages. Moreover, the number of final articles used in this review where 3603 articles belonging to students in the field of Arabic language and communication.

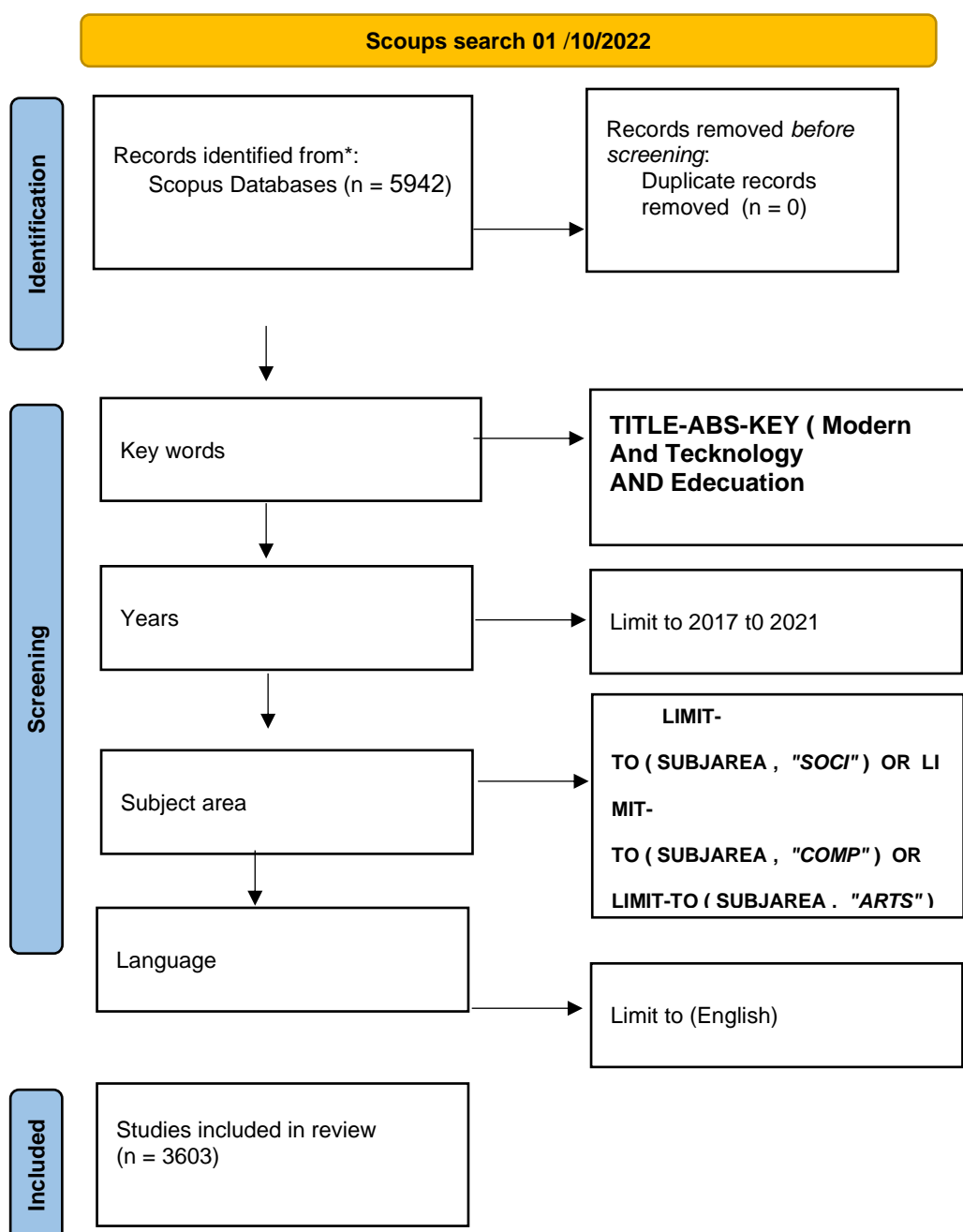
Bibliometric Analysis

The method of bibliometric analysis was used in this study. Which include other methods such as the bibliometric-ACEs, the most frequently main keywords, the most cited journals, the most published journals, the journals that have published the most studies on this topic, the countries that have published the most studies on this topic, the publishing cooperation between countries, main keywords that used and the relationship between them, the most cited authors, the relationship between authors, the jointly cited journals and the most

published areas examined. The Phosphor program is one of the programs that is widely used in the visualization of bibliometric networks, to detect the visualization of the network in the analysis.

Such an audit is carried out for the following purposes. Firstly, modern technology and education systems have been developed dramatically, with increasing numbers of research. Thus, it is required to investigate the thematic structure, especially in the study area through using an accurate method that can spontaneously examine large-volume literary data. After that, current research is conducted to provide visions into what was discussed, trends in modern times as well as, technology and education.

Table 1
Inclusion and Exclusion Criteria



inclusion criteria	Keywords + any related keywords
exclusion criteria	Medical fields Engineering fields Conference papers Nonindexed papers

Findings

Research Question 1

How many publications on modern technology in education in the last decade?

This figure shows the big difference between what was published in 2017 and 2021. The number of publications in 2017 reached 458 articles, which is less than what was published in 2021. It is learned that the publication in 2021 recorded the highest number which reached 1047 articles. Followed in abundance in 2020, where the number was 905 articles, followed in 2019 where the number was 690 articles. The publication in the year 2018 increased compared to the year 2017, which exceeded five hundred where 504 articles.

The researcher has set aside only five years to study the case due to the large number of articles published during this period. The total number of articles has reached 13,565, and after identifying the last five years, identifying only three aspects of the topic, and then selecting articles published in the English language only, the number of articles has reached 3,603 articles.

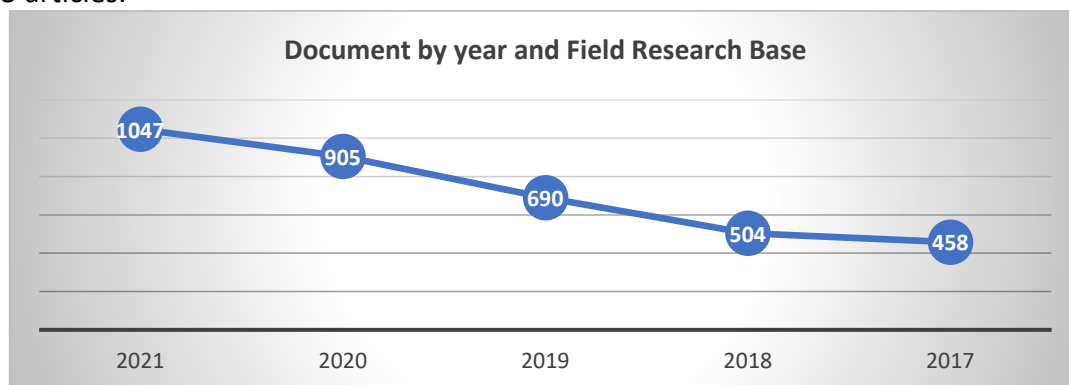


Fig 1. Document by year and Field Research Base

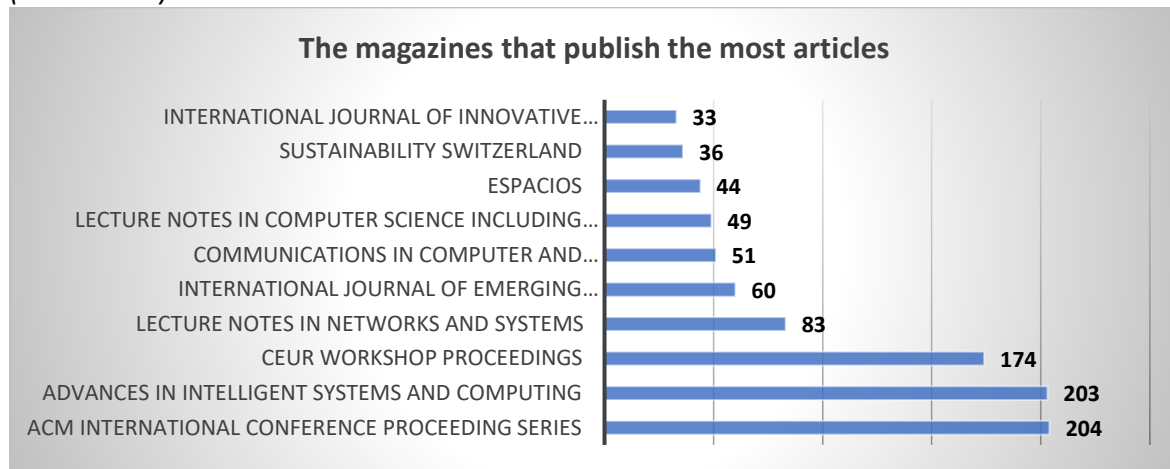
Research Question 2

What are the most relevant journals and authors on modern technology of Education?

In the content analysis conducted for the most cited journals, the following axes were selected: "total publication ", " total citation ", "citation of the journal result", " most cited Article", "Times cited", " publisher " As analysis criteria as shown in Table 2.

Table 2

The ten best highly productive journals in modern technology and education during the years (2017-2021)



Document of The Year By Suri

It has been discovered that the most prolific journal in terms of publishing articles with the same title is the International Conference of the Society, boasting 204 publications. This is closely followed by the Journal of Developments in Intelligent Systems with 203 articles, the Thong Workshop with 174 articles, and Lecture Notes in Networks and Systems with 83 articles. The International Journal of Emerging Technologies in Learning has published 60 articles on the topic, followed by Communications in Computer and Information Sciences with 51 articles. The last published journals in this field are the International Journal of Innovative Technology and Engineering Exploration, which has 33 articles, and Sustainability with a total of 36 articles.

Table 2

Journal	TP	TC	Cite score	The most cited article	Times Cited	Publisher
ACM International Conference Proceeding Series	44179	44929	1.0	Serverless Edge Computing: Vision and Challenges	33	ACM
Advances in Intelligent Systems and Computing	29624	26852	0.9	Impact of COVID-19 on digital transformation and sustainability in small and medium enterprises (smes): a conceptual framework	50	Springer Nature
Lecture Notes in Networks and Systems	14098	9307	0.7	Analysis of Different Interference	1	Springer Nature

				Mitigation Techniques Based on Bit Error Rate (BER) in 5G		
International Journal of Emerging Technologies in Learning	1479	5682	3.8	Remote Academic Platforms in Times of a Pandemic <i>Open Access</i>	44	International Association of Online Engineering
Communications in Computer and Information Science	21465	18992	0.9	Fighting an Infodemic: COVID-19 Fake News Dataset	55	Springer Nature
Lecture Notes in Computer Science	81183	172674	2.1	A Term Weighted Neural Language Model and Stacked Bidirectional LSTM-Based Framework for Sarcasm Identification	1016	Springer Nature
Sustainability	36485	181699	5.0	Plant growth promoting rhizobacteria (PGPR) as green bioinoculants: Recent developments, constraints, and prospects	140	Multidisciplinary Digital Publishing Institute (MDPI)
International Journal of Innovative Technology and Exploring Engineering 2019 and 2018	8638	5200	0.6	Factors influencing the entrepreneurial capacity of young farmers for farmer succession	5	Blue Eyes Intelligence Engineering and Sciences Publication
Smart Innovation, Systems, and Technologies	6960	7815	1.1	A Survey on Transfer Learning	30	Springer Nature
Eurasia Journal of Mathematics, Science and Technology Education	775	3177	4.4	Learning Mathematics from Home During COVID-19: Insights from Two Inquiry-	9	Modestum Ltd.

				Focussed Primary Schools		
Man in India	669	33	0.0	Model for employer- sponsored education of teachers: Opportunities and challenges	40	Man In India
Procedia Computer Science	8474	30930	3.6	Deep Learning in Image Classification using Residual Network (ResNet) Variants for Detection of Colorectal Cancer	44	Elsevier

Note: TP = Total Publications, TC = Total Citation.

As depicted in Table 2, the most prolific journal concerning contemporary educational technology was the International Conference Follow-Up series "ASM," with a total of 44,179 publications and 44,929 citations. Subsequently, "Advances in Intelligent Systems and Computing" ranked second with 29,624 publications and 26,852 citations, while "Lecture Notes in Networks and Systems" was third with 14,098 publications and 9,307 citations. Table 2 further illustrates the distribution of these leading journals concerning modern technology of education.

On the other hand, RQ2 has also studied the most prolific authors of modern technology in the field of educational research. The content analysis carried out for the most productive authors in modern technology in the field of educational research focused on the following things: "author", "total publications", "h-index", "total citations", "current affiliation", and "country".

Research Question 3

Which countries are the most productive in the field of modern technology in the field of education research?

The data reveals that the Russian Federation leads with participation in 857 research studies. In contrast, both Australia and Germany have significantly fewer contributions, with 77 and 80 studies respectively.



Fig. 3. Country and research field base Publication

The chart displays publication statistics categorized by countries and primary fields. It consists of three clusters and features nations with the greatest number of published papers. The Russian Federation leads the way with 857 articles, followed by China with 647 articles. Next in line are the United States and Ukraine, then India and the United Kingdom. Other countries are shown in the figure.

Table 3

Top 10 countries and educational institutions

Country	educational institutions	TP
Russian Federation	Studies in Systems, Decision and Control	857
China	Educational Technology Research and Development	647
United States	continuance intention of students toward participation in MOOCs	255
Ukraine	CEUR Workshop Proceedings	218
India	Computational Intelligence	161
United Kingdom	Proceedings - 2017 IEEE 19th Conference on Business Informatics,	104
Kazakhstan	Computer Applications in Engineering Education	90
Poland	4th International Conference of the Virtual and Augmented Reality in Education	82
Germany	Computer Applications in Engineering Education	80
Australia	Turkish Online Journal of Educational Technology	77

Research Query 4

What are the top keywords in the field of modern educational technology in the last ten years?

A co-occurrence analysis was conducted for the bibliometric examination of frequent keywords, selecting 'author's keywords' as the primary unit. In this study, a collection of 400 keywords was chosen from the given data set, as depicted in Figure 4.

Figure 4: Post-analysis results based on keyword occurrences.

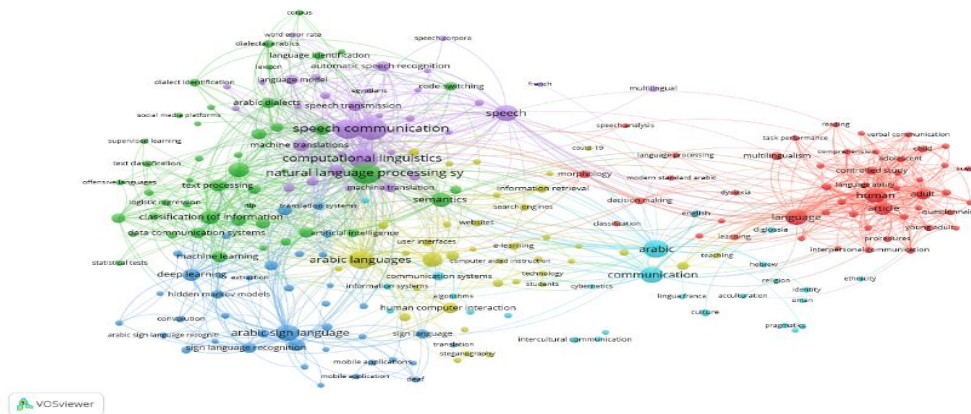


Fig. 4. Analysis results of publications by keywords

Upon analyzing Figure 4, it becomes clear that the studies incorporate keywords such as "online learning readiness" (speech communication "AUC" = 98), "computational linguistics" (AUC = 83), "speech recognition" (AUC = 76), "Arabic Languages" (UK = 66), "Natural Language Processing System" (UK = 64), and "Arabic Sign Language" (UK = 53). Subsequently, Speech, Essay, Human, Modern Standards, and Learning Systems were also discussed.

	Keyword	
1	Natural language processing system	64
2	Speech communication	98
3	Computational linguistics	83
4	Speech recognition	76
5	Human	44
6	Arabic languages	66
7	Speech	51
8	Artikel	31
9	Arabic sign language	53
10	learning system	20
11	Modern standards	22

Discussions

The objective of this research was to examine the connection between contemporary technology and education, with a focus on language education, during the years 2017 to 2021. It aimed to assess how effectively learners can achieve high-quality learning by utilizing technology to overcome learning obstacles, attain educational objectives, and meet expectations. It was observed that most newspapers were published in the last two years; in 2021, there were 1047 publications, while in 2020, a total of 905 papers regarding modern technology and education were released. This evaluation of publication sources highlights the discovery of new technological attributes and their significant role in advancing education, motivating learners and educators to engage in the educational process.

In 2021, a sum of 1,047 publications focusing on new technology for educational purposes were released, based on the examination of 3,603 research publications gathered from the

Scopus database. This literature assessment presents a summary of the positive correlation between modern technology teaching techniques and educational evaluation using content analysis along with bibliometric measurements. The investigation of these publishing sources highlights the discovery of innovative aspects of technology and its significant role in advancing education while motivating both students and teachers to engage in the learning process.

This research, focused on modern technology and education, has garnered significant interest from scholars and professionals in the educational field. Numerous informative and beneficial studies have been conducted, aimed at enhancing language education and simplifying the process of acquiring second languages for learners. The incorporation of technology in education has been widely embraced by students at various levels, particularly at the university level. A review analysis called Investigating Student Adoption of E-Learning through the Development of a Comprehensive Technology Acceptance Model revealed that computer self-efficacy, subjective/social norms, perceived enjoyment, system quality, information quality, content quality, accessibility, and computer play are the most prevalent external factors of TAM.

The e-learning program's range was broadened through the factors mentioned above to assess student acceptance of e-learning across five distinct universities in the UAE. The researchers determined that the quality of the computer system, self-efficacy, and computer games significantly influenced the usability of the e-learning system. In addition, information quality, enjoyment, and accessibility were found to positively impact both the perceived ease of use and perceived usefulness (Salloum et al., 2019). The importance of knowing the acceptance of e-learning by university students in Jordan and how to convince them of the importance of using technology was highlighted in another study. The study also emphasized the need to motivate students' intentions to use technology in their learning environment by presenting a positive perception of the usefulness of technology (Al-Adwan et al., 2013)

The researcher further emphasized the importance of concentrating on how technology can aid students in enhancing their academic performance and efficiency, rather than exclusively focusing on the actual usage of technology. The conclusion was that this approach would enable learners to discern the advantages of e-learning and investigate the possibilities it offers for performance improvement more readily. Consequently, this would promote increased engagement in e-learning through a constructive and innovative mindset. (Amer Al-Adwan, and other, 2013). The Internet serves as a crucial instrument in harnessing modern technology, offering fast access to information across various domains, thereby enhancing effectiveness and conserving time. Emphasis is placed on the significance of digital technology in contemporary approaches to learning and teaching (Szymkowiak etl., 2021). Information systems enhance effectiveness and time conservation, serving as a crucial instrument for competition and decision-making in business administration and growth. They hold particular significance in innovative approaches to education and learning (Szymkowiak etl., 2021). For the past two decades, the Internet has been widely utilized for educational purposes, with numerous impressive instances of web-based learning arising. Various methods of content distribution encompass online and open sharing of educational materials created by both individuals and organizations. For instance, YouTube Edu offers access to a vast array of educational videos generated by teachers and students (Hubalovsky et al., 2019)

Similarly, Apple has developed an educational media package known as iTunes-U, which enables learners to bypass conventional educational lectures and instead opt for free, easily accessible mobile learning experiences. (Szymkowiak et al., 2021). From the articles gathered through Scopus data, there is a consensus among researchers regarding the necessity of incorporating technology in education. They emphasize its significance in attaining high-quality education and achieving the intended objectives of the educational process. Technology can also help expand learning across various domains and enhance students' problem-solving abilities (Baojing & Jiaqi, 2020)

A specialist emphasized the significance of contemporary teaching methods in this technologically advanced era, with the understanding that current classrooms have been adapted and furnished with state-of-the-art teaching tools (Vijayalakshmi Murugesan, 2019), Another specialist pointed out that the increasing prevalence of online innovations and technologies has led to the adoption of tech-based learning methods in higher education institutions (Al-Adwan et al., 2013). A different scholar contends that the increasing prevalence of information technology coupled with the ubiquity of computers and electronic devices has led to the global rise of online learning. As a result, educational information has become an essential need and an unescapable direction for the transformation and growth of education in this digital era. One key aspect of educational informatics involves employing contemporary and sophisticated information technology (Hrytsenchuk & Trubachev, 2021)

The most fruitful publication concerning contemporary technology in education was determined to be the ASME International Conference Proceedings Series. This was closely followed by Advances in Intelligent Systems, Workshop recommendations, and Lecture Notes in Networks and Systems. The Scopus data lists' results and charts revealed that the discrepancy between the top three journals is narrow, with publication numbers ranging from 204 to 174. Additionally, the final four journals display a similar closeness, with publication numbers ranging from 33 to 49. This demonstrates that all the journals have a keen interest in publishing topics related to utilizing cutting-edge technology in education, as mentioned in the subjects published within these journals.

The analysis revealed that the most frequent publication of such articles under the same title is the ACM International Conference Follow-up Series, which published 204 articles. This is closely trailed by Developments in Intelligent Systems with 203 articles, recommendations of Workshop with 174 articles, Lecture Notes in Networks and Systems with 83 articles, International Journal of Emerging Technologies in Learning with 60 articles, Communications in Computer, and Information Sciences with 51 articles. The International Journal of Innovative Technology and Review had the fewest publications on the same topic, with only 33 articles on Engineering, followed by Sustainability, which had 36 articles. The data revealed that numerous authors have contributed to the topic of contemporary technology in education, with minimal differences among them. Leading the list, Vaganova authored 14 articles, followed by Smirnova with 12, Sergeeva with 9, Akhmadshin and Bagrova with 8 each, Kruchinin and Paschennik with 7, and Konanits, Lapina, and Oxodji all having penned six articles. This highlights the dedication of researchers to exploring modern technology in education as they seek innovative ways to simplify its use while designing new platforms for both educators and learners.

Significantly, Russia conducted the most research on this subject with 857 studies. Australia and Germany had noticeably fewer studies at 77 and 80 respectively. China emerged as a strong contender with 647 articles, while the United States contributed 255 articles to the discussion on modern technology in education. Despite having lower numbers than China and Russia, these figures demonstrate considerable interest in this area globally. Even Australia's contribution of 77 articles underlines the importance of embracing modern technology in education.

The continuous dedication to enhancing educational methodologies results in new and valuable discoveries annually, benefiting students, educators, researchers, and rival institutions alike. By developing state-of-the-art technology and efficient strategies across various fields, such as language instruction, they contribute significantly to the growth of academia.

Conclusion

This analysis aims to highlight the crucial findings resulting from the discussion of outcomes. We deduced that e-learning, technological advancements, and modern tools play significant roles in enhancing education generally, and specifically in the teaching of second languages in the contemporary era. This applies to both traditional classrooms and remote learning through the Internet. Both traditional and online teaching methods positively impact learning outcomes, emphasizing the value of incorporating modern technologies.

Students appreciate and engage with education that utilizes up-to-date technology and tools, as it enables them to efficiently achieve their educational objectives while ensuring knowledge and information acquisition. The benefits of educational technology in the learning process include time conservation, sensory perception, comprehension, skill development, structured thinking, problem-solving enhancement, verbal engagement, aesthetic appreciation, diversified evaluation techniques, learner excitement, self-guided learning encouragement, and collaborative skill improvement.

Ultimately, it empowers learners to elevate their educational experience. As a result, this study recommends implementing educational technology across all learning stages and calls for concerted efforts by various educational institutions to acquire devices such as electronic boards, smart classrooms, learning resource centers, educational video films, internet access, social media integration, interactive videos, digital televisions, mobile learning platforms, e-books, etc. Furthermore, these institutions must provide training for teachers and professors by organizing suitable courses that equip them with e-learning proficiencies and effective utilization of teaching technologies for interacting with students.

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