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E-Learning in College: Bibliometric Analysis of Virtual Learning Environments and Online Course Delivery

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ABSTRACT

Electronic Learning, also known as e-learning, has become an integral part of modern education systems, revolutionizing traditional learning practices in higher education. This research paper presents a comprehensive bibliometric analysis of virtual learning environments (VLEs) and online course delivery in higher education. The study involves data collection from reputable academic databases, including Web of Science, Scopus, PubMed, Google Scholar, and institutional repositories. The research methodology includes co-authorship network analysis, journal and conference analysis, citation analysis, and keyword co-occurrence analysis using VOSviewer software. The analysis reveals collaborative patterns among researchers, influential publication outlets, highly cited papers, and emerging research themes in electronic learning. The results offer valuable insights into the evolution of electronic learning research, identifying key contributors, trends, and gaps in the field. This study aims to guide educators, researchers, and policymakers in enhancing electronic learning experiences and shaping the future of education in higher institutions.

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1. INTRODUCTION

In the digital age, education has witnessed a profound transformation with the integration of technology into traditional learning environments. Electronic learning, commonly known as e-learning, has emerged as a powerful and versatile educational approach that transcends the limitations of traditional classroom settings. With the advent of virtual learning environments (VLEs) and online course delivery platforms, higher education institutions have embraced these innovations to enhance pedagogical practices, foster student engagement, and broaden access to education [1], [2].

The integration of electronic learning in higher education has been driven by various factors. Advancements in information and communication technologies (ICTs) have paved the way for more interactive and dynamic learning experiences. Internet accessibility has grown exponentially, enabling learners to access educational resources and participate in virtual classrooms from anywhere in the world. Moreover, the COVID-19 pandemic has further accelerated the adoption of online education, demonstrating its resilience and adaptability in times of crisis [3]–[5].

The growing importance of electronic learning in higher education has led to a surge

in research activities exploring its impact, effectiveness, and future potential. As the volume of scholarly publications in this field continues to increase, there is a need to comprehensively analyze and understand the research landscape to identify significant trends, influential authors, and key areas of focus [6]–[9]

Technological advancements have had a significant impact on education. These advances have resulted in new teaching methods, increased access to education, and better learning experiences for students. Some of the key areas where technology has made a difference include, Electronic learning, or e-learning, has emerged as a popular educational method that relies on the latest technology, global information networks and multimedia [10]. This approach allows students to access educational resources and engage in learning activities at their own pace, wherever they are. The use of mobile devices and tablets in the classroom has been shown to have many benefits, such as improving the quality of teaching, catering to different learning styles, and increasing opportunities for collaborative networking and research [11] [12]. Assistive technology (AT) is particularly beneficial for children with autism spectrum disorder (ASD) and other special needs. AT can help these students overcome barriers to social interaction and enhance their learning experience [13]. The use of big data in education has enabled better understanding of student performance, identification of trends, and development of personalized learning experiences [14]. The integration of ICT in teaching and learning has been shown to improve instructional practices, make the learning process more engaging and interactive, and keep students motivated [15]. However, barriers such as poor internet connectivity, lack of infrastructure, and inadequate training for teachers still need to be overcome for ICT integration to be effective [15].

To fully utilize the potential of technological advances in education, it is important for educational institutions and policymakers to invest in infrastructure, provide training for teachers, and develop clear policies for the efficient use of technology [15]. As technology continues to evolve, it is imperative for educators and institutions to adapt and incorporate these advances into their teaching practices to ensure that students receive the best education possible [16].

A bibliometric analysis is a research method that uses quantitative analysis and statistics to analyze and map the intellectual structure of a specific field of study. It helps to identify research patterns, trends, and themes in the literature. Although there are several studies on e-learning in higher education, only a few have employed bibliometric analysis.

One such study is "Gamification in Higher Education: A Bibliometric Approach" [17]. This research analyzed 1029 papers on gamification in higher education (GHE) indexed by Web of Science (WoS). The study used VosViewer software to visualize the intellectual structure, conceptual dynamics, diffusion of knowledge, development over time, research trends, core authors, top journals, leading countries, and institutions, as well as the impact of collaboration. The findings helped to better understand the diversity of gamification approaches and the ways various scholars, countries, institutions, or universities reacted through research and scientific publications to the study of GHE space.

Another relevant study is "Academia's responses to crisis: A bibliometric analysis of literature on online learning in higher education during COVID-19" [18]. This research aimed to provide a holistic view of research that investigated online learning in higher education around the globe during the COVID-19 pandemic. The researchers used co-citation analysis and text mining afforded by VOSviewer to document and analyze research patterns and topics reported in peer-reviewed documents published between January 2020 and August 2021. The study discussed ongoing and

emerging challenges to online higher education, placing innovative pedagogies at the forefront of online learning, and the rapid but imbalanced distribution of evolving literature.

Lastly, "Online Formative Assessment in Higher Education: Bibliometric Analysis" [19] is a study that analyzed 898 papers on online formative assessment (OFA) in higher education using a PRISMA-compliant bibliometric method. The research aimed to provide a comprehensive understanding of the topic across a specific time period. The study identified the most influential sources, institutions, and research clusters related to online formative assessment in higher education.

These studies demonstrate the application of bibliometric analysis in understanding the trends, patterns, and themes in e-learning research in higher education. They provide valuable insights into the development of the field and help identify potential future research directions.

This paper aims to conduct a thorough bibliometric analysis of virtual learning environments and online course delivery in higher education. The study will delve into the extensive literature available in reputable academic databases, such as Web of Science, Scopus, PubMed, Google Scholar, and institutional repositories. By employing bibliometric analysis techniques, this research seeks to offer valuable insights into the evolution of electronic learning, shedding light on the prominent contributors, influential publications, and emerging research themes.

2. LITERATURE REVIEW

2.1 Evolution of Electronic Learning

The evolution of electronic learning can be traced back to the 1960s when researchers and educators started exploring the potential of computers in education. Early experiments with computer-based learning systems laid the groundwork for what would later become the foundation of e-learning. However, it was not until the advent of the internet in the late 20th century that e-learning truly gained traction [20]–[22].

The emergence of the World Wide Web allowed for the development of web-based educational resources, marking the birth of online learning environments. As internet connectivity became more widespread and technologies more sophisticated, universities and colleges began to integrate VLEs into their teaching methodologies. Virtual Learning Environments, such as Blackboard, Moodle, and Canvas, offered a range of tools and functionalities to facilitate the creation, delivery, and management of online courses [6]–[8].

2.2 Virtual Learning Environments (VLEs)

Virtual Learning Environments are web-based platforms designed to support teaching and learning activities in online and blended learning environments. VLEs provide a wide array of tools, including content management systems, discussion forums, quizzes, and gradebooks, fostering interactive and collaborative learning experiences. VLEs have become central to the implementation of e-learning initiatives in higher education institutions worldwide [23]–[26].

2.3 Online Course Delivery

Online course delivery refers to the process of providing educational content, instruction, and assessments through digital channels, primarily the internet. It enables students to access course materials, engage in virtual discussions, and submit assignments without the constraints of physical classrooms. Online course delivery is known for its flexibility and accessibility, accommodating diverse learning styles and catering to a broader student population [27], [28].

2.4 Research on Electronic Learning in Higher Education

The body of research on electronic learning in higher education has grown significantly over the past decade. Scholars have explored various aspects of e-learning, ranging from instructional design and pedagogical strategies to technology integration and student engagement. Some key areas of research focus include:

2.5 Pedagogical Approaches in E-Learning

Researchers have investigated the effectiveness of different pedagogical approaches in the virtual learning environment. Studies have examined the use of problem-based learning, collaborative learning, and flipped classrooms in online course delivery. The goal is to identify best practices that optimize student learning outcomes and promote active engagement in e-learning settings [29]–[31].

2.6 Technology Adoption and Integration

The acceptance and integration of technology in higher education have been subjects of interest. Researchers have explored the factors influencing instructors' adoption of VLEs and the challenges they face in effectively utilizing these platforms. Additionally, studies have investigated students' perceptions of e-learning technologies and their impact on the learning experience [32]–[35].

2.7 Learner Engagement and Motivation

Ensuring learner engagement and motivation is a critical aspect of e-learning. Studies have examined strategies to enhance student engagement, promote self-regulated learning, and foster a sense of community in virtual classrooms. Understanding factors that influence learners' motivation and persistence in online courses has been a focus of investigation [2], [36], [37].

3. METHODS

This study used a bibliometric research design to conduct a comprehensive analysis of the virtual learning environment (VLE) and the delivery of online courses in universities. The methodology of this study involves three main stages: data collection, data analysis, and visualization of VOSviewer.

3.1 Data Collection

Data for this bibliometric analysis will be collected from reputable academic databases and digital libraries, including Web of Science, Scopus, PubMed, Google Scholar, and institutional repositories. Search queries will be designed to ensure the inclusion of relevant literature on e-learning in higher education, focusing on VLE and online course delivery. The search will be limited to publications from the last decade (1964 to this year) to capture the latest developments and trends.

Search terms will include variations of the following keywords: "virtual learning environment," "online course delivery," "e-learning," "higher education," "online education," "distance learning," "web-based learning," and related terms.

3.2 Data Analysis

After data collection, bibliographic information, including author name, publication title, abstract, keywords, and number of citations, will be extracted from the retrieved publication. The analysis will be performed using VOSviewer, a widely used bibliometric analysis software.

Table 1. Metrics Data

Metrics Data	Information
Publication years	1964-2023
Citation years	59
Papers	980
Citations	325956
Cites/year	5524.68
Cites/paper	332.61
Authors/paper	1.95
h-index	289
g-index	524
hI,norm	232
hI,annual	3.93
hA, index	68

4. RESULTS AND DISCUSSION

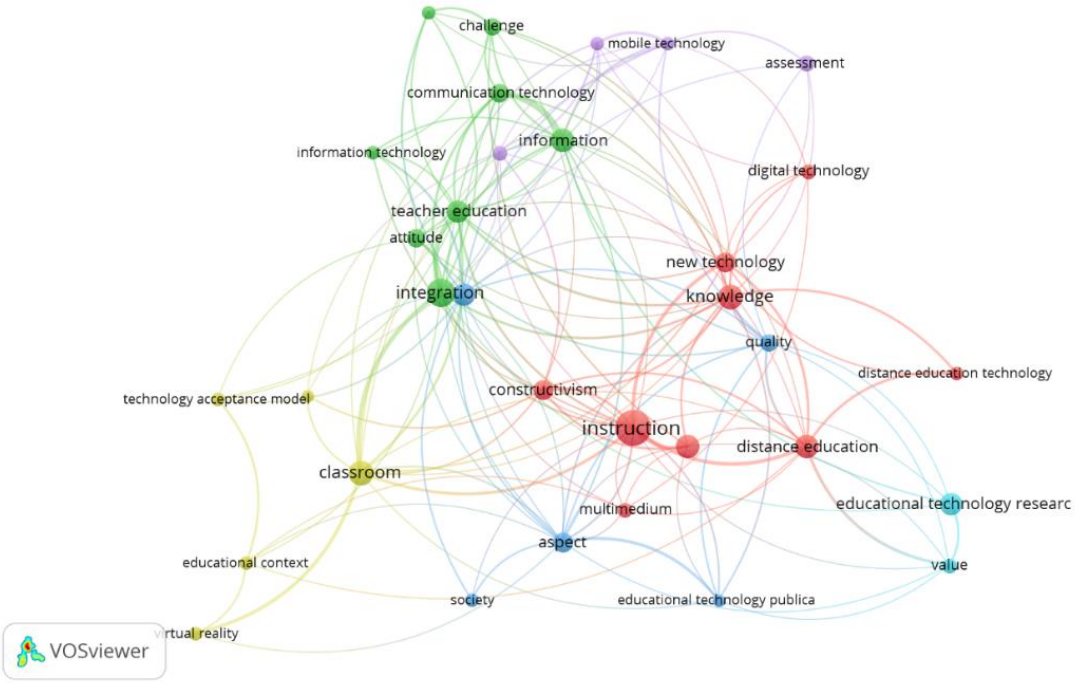

Figure 1. Research Mapping Results

The insights gained from this analysis offer directions for advancing electronic learning practices in higher education and inform decisions to optimize and improve virtual learning environments and online course delivery for the benefit of both educators and learners.

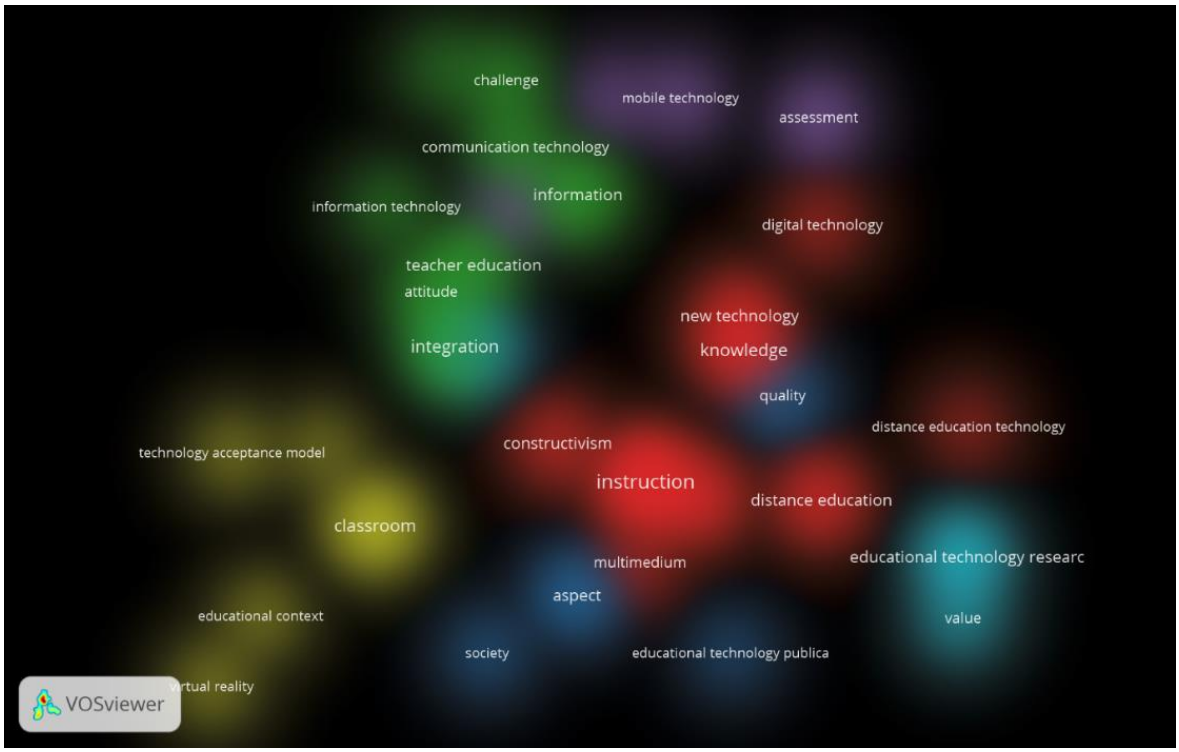

Figure 2. Cluster mapping results

The clusters offer valuable insights into the prevailing research trends and emerging topics, guiding researchers, educators, and policymakers in prioritizing research areas and driving innovation in electronic learning. The identification of these clusters contributes to a deeper understanding of the research landscape and informs future directions for advancing electronic learning practices in higher education.

Tabel 3. Keywords Analysis

Cluster	Total Items	Most Frequent Keywords (Occurrences)	Keyword
1	(7)	Constructivism (10), Digital Technology (15)	Constructivism, digital technology, distance education, instruction, knowledge, multimedium, new technology
2	(7)	Challenge (10), Teacher education (15)	21st century, attitude, challenge, communication technology, information technology, integration, teacher education
3	(5)	Innovation (10), Society (15)	Aspect, educational technology research, innovation, quality, society
4	(5)	Classroom (10)	Classroom, educational context, online learning, technology acceptance, virtual reality
5	(4)	Mobile Learning (15)	Assessment, education technology, mobile learning, mobile technology
6	(2)	Educational Technology (10)	Educational technology, value

Table 3 presents the results of keyword co-emergence analysis, which reveals groups of related keywords and provides insight into existing research themes

and emerging areas of interest in e-learning in higher education. Each cluster represents a group of keywords that are often mentioned together in captured publications.

Cluster 1 revolves around the theme of digital technologies and their impact on instruction and knowledge acquisition in distance education settings. Keywords in this cluster highlight the influence of constructivist learning theory in shaping digital learning experiences. The cluster emphasizes the importance of integrating new technologies, such as multimedia, to create dynamic and interactive learning environments that support a constructivist approach to education.

Cluster 2 focuses on the challenges and opportunities posed by communication and information technology in 21st century education. The cluster underscores the importance of teacher education and technology integration in pedagogy. The keywords in this cluster highlight the need for educators to develop positive attitudes towards technology integration and address emerging challenges in the context of 21st century learning environments.

Cluster 3 revolves around the theme of innovation and quality in educational technology research. This cluster underscores the importance of discussing various aspects of educational technology to improve the quality of the learning experience. The cluster highlights the role of research in driving innovation and its impact on the community education landscape.

Cluster 4 focuses on the use of technology in traditional classrooms and online learning environments. Keywords in this cluster explore the acceptance and integration of technology in educational contexts, including virtual reality applications. The cluster emphasizes the importance of understanding how technology is adopted and used in different educational environments.

Cluster 5 centers on the theme of mobile learning and the use of mobile technology in an educational context. The cluster highlights the importance of technology-assisted assessment and the potential of mobile learning as an effective approach to education. The keywords in this cluster underscore the growing interest in leveraging mobile technology to enhance the learning experience.

Cluster 6 is a smaller cluster with a focus on the value of educational technology. The cluster emphasizes the importance of recognizing the value and impact of technology in education, which may highlight the need for further research to explore the implications of applying educational technology.

Overall, the keyword co-emergence analysis provides a comprehensive overview of key themes and focus areas in e-learning research in higher education. These clusters offer valuable insights into prevailing research trends and emerging topics, guiding researchers, educators, and policymakers in prioritizing research areas and driving innovation in e-learning. The identification of these clusters contributes to a deeper understanding of the research landscape and informs future directions for advancing e-learning practices in higher education.

Table 4. Author with the Most Citations

Citations	Author and Year	Title
5742	JR Savery, TM Duffy	Problem based learning: An instructional model and its constructivist framework [38]
5181	S Bennett, K Maton, L Kervin	The 'digital natives' debate: A critical review of the evidence [39]
4425	PA Ertmer	Teacher pedagogical beliefs: The final frontier in our quest for technology integration? [40]
4243	M Roblyer, AH Doering	Integrating educational technology into teaching [41]

3696	RE Clark	Media will never influence learning [42]
3525	F Wang, MJ Hannafin	Design-based research and technology-enhanced learning environments [43]
3521	F Wang, MJ Hannafin	Design-based research and technology-enhanced learning environments [43]
3491	KF Hew, T Brush	Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research [44]
3339	RJ Spiro, PJ Feltovich, PL Feltovich, MJ Jacobson, ...	Cognitive flexibility, constructivism, and hypertext: Random access instruction for advanced knowledge acquisition in ill-structured domains [45]
2679	A Collins	Toward a design science of education [46]

It is clear that the years 1972 through 2022 are the ones in which the documents relating to the accounting environment are expressly quoted the most. This can be seen by looking at the graph. New information is less likely to be acknowledged, with the exception of works written by authors who have already conducted study in the topic and are quite well-known.

Tabel 5. Keywords results

Most occurrences		Fewer occurrences	
Occurrences	**Term**	**Occurrences**	**Term**
87	Instruction	17	Digital technology
53	Classroom	16	Multimedium
43	Knowledge	15	Education technology
38	Information	14	Mobile technology
38	Distance education	13	Virtual reality
35	Education technology research	13	Society
35	Innovation	12	Technology acceptance model
33	Teacher education	12	21st country
21	Quality	11	Online learning

Table 5 presents the results of the keyword analysis, showcasing the most frequently occurring terms (top occurrences) and the terms with fewer occurrences in the retrieved publications related to electronic learning in higher education.

Most Occurrences

Instruction - 87 occurrences: Instruction refers to the process of imparting knowledge or teaching within the context of electronic learning. It highlights the significance of effective instructional design and pedagogical strategies in online education. Classroom - 53 occurrences: Classroom denotes the traditional educational setting, and its frequent occurrence suggests that researchers are exploring the integration of technology within the classroom environment to enhance teaching and learning experiences. Knowledge - 43 occurrences: Knowledge is a fundamental concept in education, and its frequent appearance indicates the focus on understanding how electronic learning influences knowledge acquisition and dissemination. Information - 38 occurrences: Information is closely related to knowledge and suggests the importance of information technologies and their role in supporting electronic learning. Distance education - 38 occurrences: Distance education refers to education delivered remotely, typically through online platforms. Its prominence indicates the continued interest in exploring the effectiveness of distance learning methodologies. Education technology research - 35 occurrences: This term emphasizes the significance of research on educational technology and its impact on teaching and learning practices. Innovation -

35 occurrences: Innovation is a key theme, indicating the exploration of novel approaches and technological advancements in electronic learning. Teacher education - 33 occurrences: Teacher education underscores the importance of preparing educators to effectively integrate technology into their teaching practices.

Fewer Occurrences

Digital technology - 17 occurrences: While still relevant, the term "digital technology" appears less frequently, possibly indicating that the focus is more on specific aspects or applications of technology. Multimedium - 16 occurrences: Multimedium refers to the use of multiple media formats in e-learning. Its lower occurrence suggests that researchers might explore specific multimedia applications rather than general multimedia concepts. Education technology - 15 occurrences: Education technology, a broader term than "educational technology research," suggests that this term is used less frequently in research contexts. Mobile technology - 14 occurrences: Mobile technology appears fewer times, but its presence indicates the relevance of mobile devices in electronic learning. Virtual reality - 13 occurrences: Virtual reality (VR) is an emerging technology with potential applications in e-learning. While fewer in occurrences, its appearance suggests growing interest in VR's impact on online education. Society - 13 occurrences: The term "society" highlights the examination of the societal implications of electronic learning and its influence on education at a broader level.

Technology acceptance model - 12 occurrences: The Technology Acceptance Model (TAM) is a theoretical framework used to assess users' acceptance and adoption of technology. Its presence indicates the consideration of user acceptance in e-learning research. 21st century - 12 occurrences: The term "21st century" suggests a focus on education that aligns with the needs of the contemporary world. Quality - 21 occurrences: Quality is a crucial consideration in e-learning, reflecting the emphasis on delivering high-quality educational experiences in virtual environments. Online learning - 11 occurrences: Online learning represents the broader category of education delivered via the internet, indicating its relevance in the context of electronic learning.

The keywords' analysis provides an overview of the key terms frequently discussed in the field of electronic learning in higher education. These findings can guide researchers, educators, and policymakers in identifying significant research themes and areas of focus, allowing for informed decision-making and future research direction in electronic learning.

5. CONCLUSION

The bibliometric analysis conducted in this research sheds light on the research landscape of electronic learning in higher education. The findings illustrate the vibrancy of the field, with scholars actively collaborating and exploring various aspects of virtual learning environments and online course delivery. The prominence of certain keywords and themes indicates the evolving research focus and the continual efforts to enhance educational practices through technology integration.

Highly cited papers in the field underscore their impact and recognition as seminal works, contributing significantly to the advancement of e-learning practices in higher education. The knowledge generated from these influential publications continues to shape instructional design, pedagogical strategies, and technology integration in virtual learning environments.

The keyword co-occurrence analysis provides a comprehensive view of the prevailing research themes and emerging areas of interest. Themes such as constructivism, teacher education, innovation, mobile learning, and virtual reality highlight the diverse aspects of electronic learning being explored. Understanding these themes can guide future research efforts and inform decisions to optimize electronic learning experiences for educators and learners alike.

Overall, the findings from this bibliometric analysis underscore the importance of continued research and collaboration in electronic learning. As technology continues to evolve, the exploration of new instructional approaches and the integration of emerging technologies will be pivotal in shaping the future of higher education. By leveraging the insights gained from this analysis, educators and institutions can navigate the changing landscape of education, ensuring that electronic learning remains an effective and transformative force in higher education for years to come.

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REFERENCES

[1] G. Pan and P. S. Seow, "Preparing accounting graduates for digital revolution: A critical review of information technology competencies and skills development," *J. Educ. Bus.*, 2016, doi: 10.1080/08832323.2016.1145622.

[2] I. W. K. Suwastika, "Pengaruh E-Learning sebagai Salah Satu Media Pembelajaran Berbasis Teknologi Informasi Terhadap Motivasi Belajar Mahasiswa," *J. Sist. dan Inform.*, vol. 13, no. 1, pp. 1–5, 2018.

[3] A. Barlian and A. Herista, "Virtual Court as Alternative On the Future Criminal Justice System in Indonesia," 2020.

[4] T. Pressley, "Factors contributing to teacher burnout during COVID-19," *Educ. Res.*, vol. 50, no. 5, pp. 325–327, 2021.

[5] E. K. H. Emon, A. R. Alif, and M. S. Islam, "Impact of COVID-19 on the institutional education system and its associated students in Bangladesh," *Asian J. Educ. Soc. Stud.*, vol. 11, no. 2, pp. 34–46, 2020.

[6] R. R. Ravichandran and J. Mahapatra, "Virtual Reality in Vocational Education and Training: Challenges and Possibilities," *J. Digit. Learn. Educ.*, vol. 3, no. 1, pp. 25–31, 2023.

[7] G. B. Petersen, S. Klingenberg, R. E. Mayer, and G. Makransky, "The virtual field trip: Investigating how to optimize immersive virtual learning in climate change education," *Br. J. Educ. Technol.*, vol. 51, no. 6, pp. 2099–2115, 2020.

[8] T. A. Sharadgah and R. A. Sa'di, "Preparedness of institutions of higher education for assessment in virtual learning environments during the Covid-19 lockdown: Evidence of bona fide challenges and pragmatic solutions.," *J. Inf. Technol. Educ. Res.*, vol. 19, 2020.

[9] P. K. Dhakal, "Challenges of Virtual Learning Environment in Mathematics in the Context of Nepal.," *Int. J. Multidiscip. Perspect. High. Educ.*, vol. 7, no. 1, pp. 114–128, 2022.

[10] E. K. Abed, "Electronic learning and its benefits in education," *Eurasia J. Math. Sci. Technol. Educ.*, vol. 15, no. 3, 2019, doi: 10.29333/ejmste/102668.

[11] K. Nikolopoulou, "Secondary education teachers' perceptions of mobile phone and tablet use in classrooms: benefits, constraints and concerns," *J. Comput. Educ.*, vol. 7, no. 2, pp. 257–275, 2020, doi: 10.1007/s40692-020-00156-7.

[12] R. Asiyai, "Assessment of Information and Communication Technology Integration in Teaching and Learning in Institutions of Higher Learning," *Int. Educ. Stud.*, vol. 7, Jan. 2014, doi: 10.5539/ies.v7n2p25.

[13] O. Arslan, F. A. Inan, and Y. Murat OZDEMIR, "Educational Technology Trends for Children with Autism Spectrum Disorder Hyunchang Moon Selin Deniz Uzunosmanoglu," *TOJET Turkish Online J. Educ. Technol.*, vol. 21, no. 1, pp. 45–54, 2022.

[14] M. I. Baig, L. Shuib, and E. Yadegaridehkordi, "Big data in education: a state of the art, limitations, and future research directions," *Int. J. Educ. Technol. High. Educ.*, vol. 17, no. 1, p. 44, 2020, doi: 10.1186/s41239-020-00223-0.

[15] H. Akram, A. H. Abdelrady, A. S. Al-Adwan, and M. Ramzan, "Teachers' Perceptions of Technology Integration in Teaching-Learning Practices: A Systematic Review.," *Front. Psychol.*, vol. 13, p. 920317, 2022, doi: 10.3389/fpsyg.2022.920317.

[16] A. V. Valdez, "Educators Role on the Challenges of Education and Technology in Global and Local Era," vol. 269, no. CoEMA, pp. 91–95, 2018, doi: 10.2991/coema-18.2018.25.

[17] I. Irwanto, D. Wahyudiati, A. Saputro, and S. Laksana, "Research Trends and Applications of Gamification

in Higher Education: A Bibliometric Analysis Spanning 2013–2022," vol. 18, pp. 19–41, Mar. 2023, doi: 10.3991/ijet.v18i05.37021.

[18] L. Zhang, R. A. Carter, X. Qian, S. Yang, J. Rujimora, and S. Wen, "Academia's responses to crisis: A bibliometric analysis of literature on online learning in higher education during COVID-19," *Br. J. Educ. Technol.*, vol. 53, no. 3, pp. 620–646, 2022, doi: 10.1111/bjet.13191.

[19] N. E. Sudakova, T. N. Savina, A. R. Masalimova, M. N. Mikhaylovsky, L. G. Karandeeva, and S. P. Zhdanov, "Online Formative Assessment in Higher Education: Bibliometric Analysis," *Education Sciences*, vol. 12, no. 3. 2022. doi: 10.3390/educsci12030209.

[20] C. Stone and C. A. Dahir, *The transformed school counselor*. Cengage Learning, 2015.

[21] M. Leech, "Clusters and training policy," *Scottish Aff.*, 1999, doi: 10.3366/scot.1999.0053.

[22] R. Rasmitadila, H. Megan Asri, and R. Reza, "Teachers' Perceptions of the Role of Universities in Mentoring Programs for Inclusive Elementary Schools: A Case Study in Indonesia," *J. Educ. e-Learning Res.*, vol. 8, no. 3, pp. 333–339, 2022.

[23] T. Bari and M. Abualkibash, "Comparing Virtual Learning Techniques Upon Technology Acceptance And Student Engagement In Differing Classroom Environment," 2021.

[24] H.-M. Huang and S.-S. Liaw, "An analysis of learners' intentions toward virtual reality learning based on constructivist and technology acceptance approaches," *Int. Rev. Res. Open Distrib. Learn.*, vol. 19, no. 1, 2018.

[25] S. H. Aldulaimi, M. M. Abdeldayem, H. T. Jumaa, H. M. Mohamed, and M. L. Abdulrazaq, "Critical Challenges of Virtual Learning Environments (VLEs) and Learning Theories," in *2022 ASU International Conference in Emerging Technologies for Sustainability and Intelligent Systems (ICETSIS)*, 2022, pp. 29–36.

[26] C. Chan, V. Chan, and H. T. Tai, "The impact of implementing TEAM framework towards virtual learning environment," *Int. J. Creat. Multimed.*, vol. 1, no. 2, pp. 57–77, 2020.

[27] N. A. Özcan and H. K. Işıldar, "The Effects Of The Mindfulness Program On 12th-Grade High School Students'perceived Stress, Mindfulness, And Self-Efficacy Levels," *Mojes Malaysian Online J. Educ. Sci.*, vol. 9, no. 3, pp. 12–24, 2021.

[28] G. Roberts-Holmes and A. Bradbury, "Primary schools and network governance: A policy analysis of reception baseline assessment," *Br. Educ. Res. …*, 2017, doi: 10.1002/berj.3285.

[29] X. Kang and W. Zhang, "An experimental case study on forum-based online teaching to improve student's engagement and motivation in higher education," *Interact. Learn. Environ.*, pp. 1–12, 2020.

[30] I. J. Pettersen and E. Solstad, "The role of accounting information in a reforming area: a study of higher education institutions," *Financ. Account. …*, 2007, doi: 10.1111/j.1468-0408.2007.00423.x.

[31] L. Salemans and T. Budding, "Management accounting and control systems as devices for public value creation in higher education," *Financ. Account. …*, 2023, doi: 10.1111/faam.12365.

[32] M. D. H. Rahiem, "The emergency remote learning experience of university students in Indonesia amidst the COVID-19 crisis," *Int. J. Learn. Teach. Educ. Res.*, vol. 19, no. 6, pp. 1–26, 2020.

[33] C. Martin, "Promoting the entrepreneurship education using a blended learning approach," in *Conference proceedings of» eLearning and Software for Education «(eLSE)*, 2012, vol. 8, no. 01, pp. 220–225.

[34] N. Suprapto, T.-S. Chang, and C.-H. Ku, "Conception of learning physics and self-efficacy among Indonesian university students," *J. Balt. Sci. Educ.*, vol. 16, no. 1, p. 7, 2017.

[35] Y. Iskandar, "Hubungan Self-Efficacy dengan Prokrastinasi Akademik Mahasiswa Semester 5 Fakultas Bisnis dan Humaniora Universitas Nusa Putra (Sebuah Proposal Penelitian)," *J. Psikol. dan Konseling West Sci.*, vol. 1, no. 1, pp. 43–52, 2023.

[36] N. Banerjee, E. Stearns, S. Moller, and R. A. Mickelson, "Teacher job satisfaction and student achievement: The roles of teacher professional community and teacher collaboration in schools," *Am. J. Educ.*, vol. 123, no. 2, p. 0, 2017.

[37] A. Zarei and N. Akbari, "The professor support system in reality shock transition from traditional to virtual instruction in Covid-19 pandemic," *Futur. Med. Educ. J.*, vol. 11, no. 2, pp. 53–54, 2021.

[38] J. R. Savery and T. M. Duffy, "Problem Based Learning: An Instructional Model and Its Constructivist Framework," *Educ. Technol.*, vol. 35, no. 5, pp. 31–38, Jul. 1995, [Online]. Available: http://www.jstor.org/stable/44428296

[39] S. Bennett, K. Maton, and L. Kervin, "The 'digital natives' debate: A critical review of the evidence," *Br. J. Educ. Technol.*, vol. 39, no. 5, pp. 775–786, Sep. 2008, doi: https://doi.org/10.1111/j.1467-8535.2007.00793.x.

[40] P. A. Ertmer, "Teacher pedagogical beliefs: The final frontier in our quest for technology integration?," *Educ. Technol. Res. Dev.*, vol. 53, no. 4, pp. 25–39, 2005, doi: 10.1007/BF02504683.

[41] M. Roblyer and A. H. Doering, "Integrating Educational Technology into Teaching." USA : Pearson, 2007,

2007. [Online]. Available: http://hdl.handle.net/11162/66132

[42] R. E. Clark, "Media will never influence learning," *Educ. Technol. Res. Dev.*, vol. 42, no. 2, pp. 21–29, 1994, doi: 10.1007/BF02299088.

[43] F. Wang and M. J. Hannafin, "Design-based research and technology-enhanced learning environments," *Educ. Technol. Res. Dev.*, vol. 53, no. 4, pp. 5–23, 2005, doi: 10.1007/BF02504682.

[44] K. F. Hew and T. Brush, "Integrating technology into K-12 teaching and learning: current knowledge gaps and recommendations for future research," *Educ. Technol. Res. Dev.*, vol. 55, no. 3, pp. 223–252, 2007, doi: 10.1007/s11423-006-9022-5.

[45] R. J. Spiro, P. J. Feltovich, P. L. Feltovich, M. J. Jacobson, and R. L. Coulson, "Cognitive Flexibility, Constructivism, and Hypertext: Random Access Instruction for Advanced Knowledge Acquisition in Ill-Structured Domains," *Educ. Technol.*, vol. 31, no. 5, pp. 24–33, Jul. 1991, [Online]. Available: http://www.jstor.org/stable/44427517

[46] A. Collins, "Toward a Design Science of Education BT - New Directions in Educational Technology," 1992, pp. 15–22.