Chapter Five

AI and Virtual Learning: The Future Forward

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Introduction

The rapid advancement of digital technologies and artificial intelligence (AI) is reshaping education, driving the shift toward virtual learning. The post-pandemic era has accelerated digital transformation, highlighting the need for innovative, flexible, and technology-driven pedagogical approaches.

According to UNESCO, one and a half billion students around the world were engaged in remote learning at the height of the COVID-19 pandemic in March 2020. New learning approaches and strategies are arising, characterised by efficiency, just-in-time delivery, solution orientation, anywhere access to learning material, as well as an internet-based learning process, especially after the pandemic crisis.

Virtual learning environments are no longer an alternative but an essential mode of education, fostering a shift from traditional classroom-based learning to an interactive, AI-driven, and just-in-time knowledge-sharing ecosystem.

Digital transformation in education has redefined learning methodologies, moving beyond static content delivery to dynamic, interactive, and AI-powered solutions.

Web-based learning platforms, Massive Open Online Courses (MOOCS), Learning Management Systems (LMS) and the development of Virtual Collaborative Learning (VCL) have played a crucial role in this

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shift. These technologies allow students to engage in flexible learning, access resources anytime and anywhere, and participate in collaborative activities across geographical boundaries.

With the development of the skills required in the digital transformation era, the higher education sector needs to include digital technologies in their pedagogical approaches, implementing online teaching in learning environments that use a diverse range of digital tools. Web-based, or online, teaching is grounded in cyberspace and allows students the flexibility to learn anytime and anyplace, and at a time when they choose to focus on the course content. The creation of a virtual learning environment gives opportunities for eliminating many of the barriers related to traditional classroom learning. In these new learning processes, learners are not simply passive recipients of know-how and expertise, but rather co-creators of their just-in-time and action-based learning, more characterised by interpretation, experimentation and problem solving rather than description and analysis.

Researchers emphasize the importance of considering technological, social, and educational affordances when designing effective technology-mediated collaborative learning processes (Herrera-Pavo, 2021; Kirschner et al., 2024). They assert that it is essential to consider the virtual learning environment that facilitates collaboration, the dynamics of social interactions and group work, and the specific learning context to ensure an optimal learning experience.

To exploit the real potential of digital transformation in learning, it is necessary to reshape the processes that support designing, development, and delivery of learning in a just-in-time, and action-oriented manner, and to integrate it into day-to-day activities.

In addition, today AI is transforming digital education by creating adaptive, intelligent learning environments. It is being argued that AI have a significant influence on the way education is both delivered and received today, and it has potentialities to enhance virtual learning by making learning more responsive, interactive, and customised to each learner's needs (Pereira et al., 2022). Instead of a one-size-fits-all approach, AI ensures that educational content is relevant, structured, and tailored to individual learning styles.

Although literature highlights the numerous advantages AI brings to education, it is still in its early stages and remains underdeveloped. In this chapter, we aim to explore the role of AI in virtual learning and its impact on higher education through a Structured Literature Review

(SLR). The goal is to envision a future research agenda for the integration of AI in virtual collaborative learning environments and to contribute to shaping the future of digital learning ecosystems.

This chapter is structured as follows: In the next section, we describe the methodology used for conducting the Structured Literature Review (SLR). Third section presents the descriptive analysis of the literature, while fourth section provides the cluster and content analysis. Finally, fifth section discusses the findings and outlines a future research agenda.

Methodology

The methodological approach used to address the research questions of this chapter is a structured literature review that focuses on Artificial Intelligence and Virtual Learning. The SLR is a methodology used to depict and synthesise the state of the art on a given topic (Christofi et al., 2019; Danese et al., 2018; Nofal et al., 2018; Tranfield et al., 2003). The aim of a systematic literature review (SLR) is to identify how the literature has developed so far and to define a future research agenda, including implications for both theory and practice (Kraus et al., 2022).

Many researchers have provided guidelines and approaches for realising a comprehensive SLR. Different authors, such as Massaro et al., 2016; Petticrew and Roberts, 2006; Tranfield et al., 2003, argue that one of the first steps is to define relevant research questions to increase the reliability and validity of the study and to better identify relevant and significant research papers to be analysed for the scope of the study.

Therefore, to initiate the SLR process, we formulated research questions focusing on the literature's development, its focal points, and potential implications (Massaro et al., 2016).

The identified research questions were as follows:

RQ1 How is literature on AI and virtual learning evolving?

RQ2 What is the specific focus of the literature?

RQ3 What are the implications of this research?

It has been argued that the quality of an SLR is influenced by the sources used to conduct it. Scopus and WOS databases are considered the most reliable ones. We chose the Scopus database for two main reasons:

- Scopus has consistently demonstrated broader and more comprehensive coverage of academic journals-encompassing over 20,000 peer-reviewed publications – when compared to Web of Science (WOS) (Mishra et al, 2017; Thelwall, 2018).
- An analysis of journal coverage in Scopus and WOS revealed that the number of journals indexed exclusively in WOS is relatively lower (Mongeon & Paul-Hus, 2016). In fact, nearly 97% of journals included in WOS are also indexed in Scopus (Waltman, 2016).

The identification of reliable search keywords is also a very relevant process. For the scope of our study, the search string – AI OR 'artificial Intelligence' AND 'virtual learning' OR 'eLearning' in the title, abstracts and keywords was used. This process allows us to extract 652 research papers in the first stage. Data was collected in January 2025, and the time horizon chosen for the articles to review was fixed at 2015–2025, as we are interested in seeing how the recent literature has been evolving, given the recent development of AI.

However, it is worth noting that the concept of AI is relatively new in scientific literature. Some exclusion criteria were used to effectively address the study aims and research questions, such as research topics, publication type and language (Crossan & Apaydin, 2010; Follmer & Jones, 2018; Kauppi et al., 2018; Nguyen et al., 2018). We included in our sample only articles written in the English language, published in the field of computer science, social sciences, engineering, business management and decision sciences. The initial sample was further analysed to reduce false negatives and increase false positives (Petticrew & Roberts, 2006) through a further abstract reading.

The exclusion criteria, applied to titles, abstracts and keywords (Kauppi et al., 2018), returned a sample of 174 articles, which allowed us to include in the final sample only papers relevant to addressing our research questions (Christofi et al., 2019). The final sample was analysed to identify the evolution and distribution of papers over time, the geography of the publications, the most cited and influential authors, the keywords, and citations.

Finally, through a bibliographic coupling analysis (Kessler, 1963) and a content analysis based on the data extracted, we constructed a final sample of 12 publications for realising a deeper content analysis that allowed the identification of research areas and future directions. Bibliographic coupling analysis (Van Eck & Waltman, 2017), performed

TABLE 5.1 SLR phases

Phases	Steps
1st Step: Material selection	Definition of database used for the material collection phase Definition of keywords Definition of time span considered for the review Definition of inclusion and exclusion criteria.
2nd Step: Descriptive analysis	Distribution of papers over time Distribution of papers among journals and subject areas Keywords frequency Most productive countries
3rd Step: Content analysis	Clusters identification using citation matrix Discussion of papers and identification of future research agenda

through VOSviewer software, measures the connectivity of each research paper in the sample on the basis of the references that they share (Boyack & Klavans, 2010). The strength of relatedness increases when a document receives more citations. This kind of analysis reveals the similarities in leading works' subject matter in the forms of papers, sources, authors, organisations, and countries. In this case, the unit of analysis was 'document,' and the threshold was 'a minimum of one citation for document.'

The content analysis consists of reading all papers classified in the clusters created through bibliographic coupling with the aim of identifying the commonalities of the research, the main research themes that emerge and the open questions and issues for future research.

The steps followed in the review process are illustrated in Table 5.1.

Descriptive Analysis

Moving from a descriptive analysis of the previous literature at the intersection of the fields of AI and Virtual learning, our aim is to provide an overview of the trends of publications, a geographical analysis of authorship and citations, the distribution of papers in journals, citation trends, and, ultimately, an overview of the publications on the phenomenon under investigation.

Publication Trends

Descriptive analysis started with the study of the evolution of publications over time. As shown in Figure 5.1, it is evident the increasing number of publications in the last 10 years (thus from 2015 to 2025). The

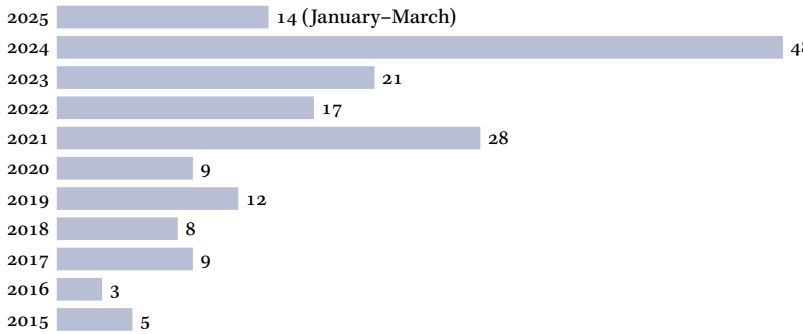

FIGURE 5.1 Publications Trend

trend grows steadily, and in 2024, there is a peak of 48 publications. A growing trend is also expected for 2025, considering that fourteen papers have already been published in the first two months.

Geographical Analysis of Co-Authorship and Citations

Table 5.2 presents the distribution of publications by country, in terms of the number of articles. The country is identified based on authorship for each publication. In the case of authors from different countries, the article is counted once for each different nationality. The total number of countries identified is 54. Figure 5.2 shows a high modularity of publications, as all countries are in the initial phases of publication in the field of AI and virtual learning. The analysis demonstrates that the UK have the highest number of publications (15), followed by the USA and India (14) and Saudi Arabia (13). Other countries have a very low level of research paper production in the field, as the number of publications ranges from one to five, except for Spain, with 8 publications.

TABLE 5.2 Publications per Country

Ranking	Country	Documents	Ranking	Country	Documents
1	United Kingdom	15	8	Peru	5
2	India	14	9	Taiwan	5
3	United States	14	10	Australia	4
4	Saudi Arabia	13	11	Canada	4
5	Spain	8	12	China	4
6	Czech Republic	5	13	Indonesia	4
7	Malaysia	5			

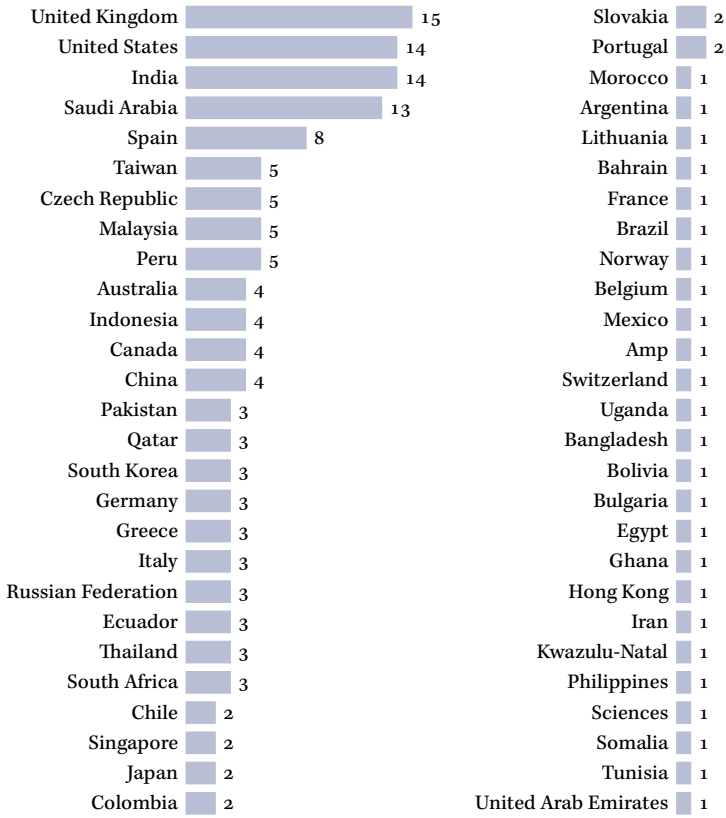

FIGURE 5.2 Publications per Country

TABLE 5.3 Top Three Citations per Country

Country	Citations	Number of publications
Saudi Arabia	318	13
United Kingdom	213	15
United States	207	14

Concerning the citations per country, as can be seen in Table 5.3, the top three countries are Saudi Arabia (318 publications), the UK (213 publications) and the USA (207 publications).

Table 5.4 illustrates the trend of publications and citations by country. The table reveals a high level of fragmentation in terms of the countries contributing to research on this topic, further highlighting the underdeveloped state of the literature in this field.

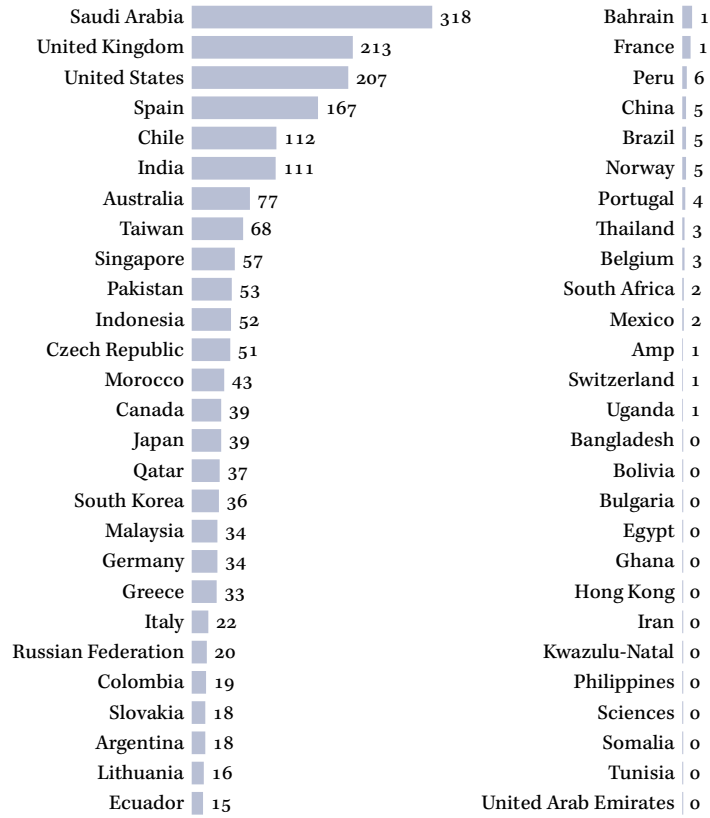

FIGURE 5.3 Number of Citations per Country

Distribution of Papers by Journals

To identify where the papers are mostly published, we analysed the distribution of publications by source of journals, following Dumay and Cai's (2014) indication. The findings revealed a high fragmentation in the distribution of papers in journals, too. As could be evinced by Appendix 1, the 174 articles in the sample analysed were published in 109 scientific journals. The three top journals result to be *Lecture Notes in Computer Science* (with 11 publications), *Communications in Computer and Information Science* (with nine publications), and *IEEE Access* (with nine publications), with the remaining journals having less than six and 89 journals having just one publication (Table 5.5 and Figure 5.4 on p. 72). The findings also underlined that those contributions came not only from the field of management but also from information systems.

TABLE 5.4 Trend of Publications and Citations by Countries

Country	(1)	(2)	Country	(1)	(2)
Saudi Arabia	13	318	Bahrain	1	13
United Kingdom	15	213	France	1	11
United States	14	207	Peru	5	6
Spain	8	167	China	4	5
Chile	2	112	Brazil	1	5
India	14	111	Norway	1	5
Australia	4	77	Portugal	2	4
Taiwan	5	68	Thailand	3	3
Singapore	2	57	Belgium	1	3
Pakistan	3	53	South Africa	3	2
Indonesia	4	52	Mexico	1	2
Czech Republic	5	51	Amp	1	1
Morocco	1	43	Switzerland	1	1
Canada	4	39	Uganda	1	1
Japan	2	39	Bangladesh	1	0
Qatar	3	37	Bolivia	1	0
South Korea	3	36	Bulgaria	1	0
Malaysia	5	34	Egypt	1	0
Germany	3	34	Ghana	1	0
Greece	3	33	Hong Kong	1	0
Italy	3	22	Iran	1	0
Russian Federation	3	20	Kwazulu-Natal	1	0
Colombia	2	19	Philippines	1	0
Slovakia	2	18	Sciences	1	0
Argentina	1	18	Somalia	1	0
Lithuania	1	16	Tunisia	1	0
Ecuador	3	15	United Arab Emirates	1	0

NOTES Column headings are as follows: (1) documents, (2) citations.

Analysis of Keyword Frequency

This section presents a cluster analysis of the most frequently used keywords in titles and abstracts to identify key areas within this field. Keywords were extracted and grouped into clusters (Figure 5.5) using VosViewer software, which generated a map based on their occurrence frequency in the sampled papers. Specifically, we defined the threshold

TABLE 5.5 Top Ten Sources

Source	Documents
Lecture Notes in Computer Science (including subseries *Lecture Notes in Artificial Intelligence* and *Lecture Notes in Bioinformatics*)	11
Communications in Computer and Information Science	9
IEEE Access	9

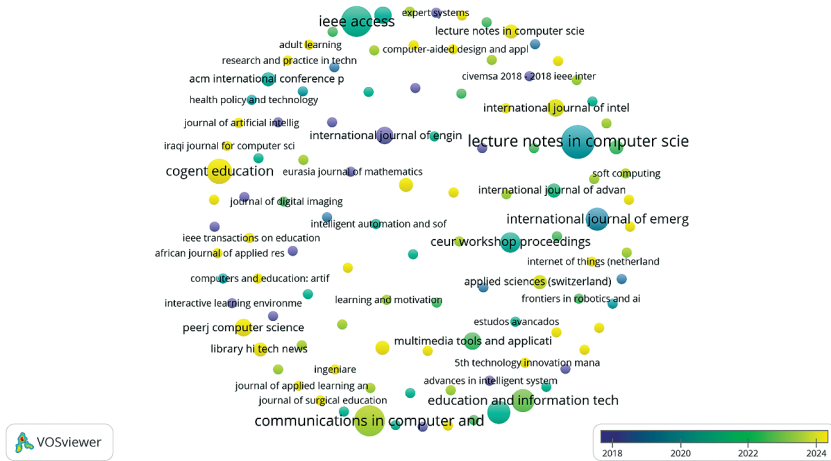

FIGURE 5.4 Main Journals

as the minimum number of occurrences of a keyword equal to 3, and VosViewer generated a co-occurrence clustering map in the field of artificial intelligence and virtual learning. Through the co-occurrence chronology of keywords, the first co-occurrence time between keywords can be clearly displayed, which will help us understand the research in the field.

Top Three Cited Papers

The analysis also focused on finding out the most cited paper and the citations of papers per year and per author. Table 5.6 shows the citations received per paper and per year. The most cited paper resulted in the paper by Mehmood et al. (2017), followed by the paper by Vázquez-Cano (2021) and the paper by Muniasamy and Alasiry (2020). Obviously, the papers published recently have fewer citations and thus are useful to analyse the most influential papers (authors) in terms of citations.

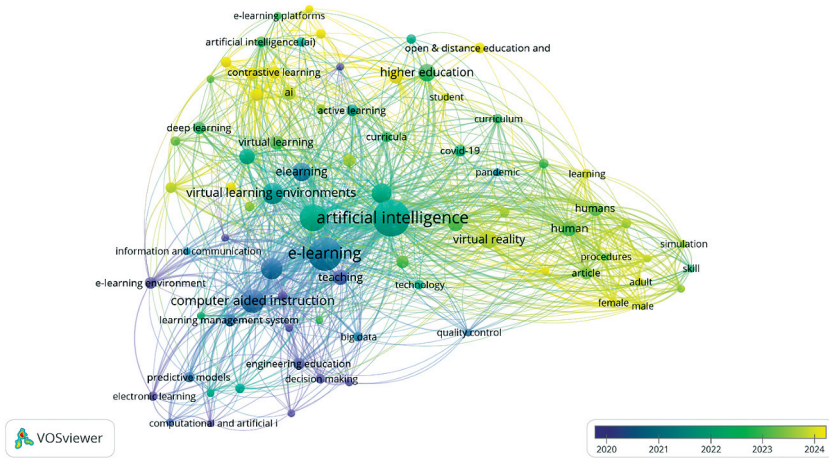

FIGURE 5.5 The Co-Occurrence Chronology View of Keywords

TABLE 5.6 Top Three Cited Papers

Author	Citations
Mehmood et al. (2017)	122
Vázquez-Cano et al. (2021)	112
Muniasamy & Alasiry (2020)	73

Cluster and Content Analysis

The phase of content analysis commenced with coupling analysis (Kessler, 1963) performed through VosViewer software, which measured the connectivity of each research paper of the sample based on the references that they share (Boyack & Klavans, 2010).

Bibliographic coupling refers to the connectivity of objects and is measured on the basis of the number of references they share. The strength of their relatedness (coupling) increases when a document receives more citations. It provides the similarities of the two works' subject matter in the form of documents, sources, authors, organisations, and countries. As described by Martyn (1964, p. 236), 'two papers that share one reference contain one unit of coupling, and the value of a relationship between two papers having one or more references in common is stated as being of strength one, two, etc., depending on the number of shared references.'

To facilitate the content analysis of the selected papers, we employed the clustering algorithm developed by Van Eck and Waltman (2017).

TABLE 5.7 Bibliographic Coupling Cluster

Cluster	Authors	Key words
Cluster 1	Hu (2024)	AI, chatbot, ethical dilemma, thinking aloud pair problem solving, virtual learning companion
	Polakova & Ivenz (2024)	Chat GPT, classroom practice, EFL, gen Z, higher education, language teaching & learning, open & distance education and elearning, writing assistance tool, writing skills
	Vázquez-Cano et al. (2021)	Artificial intelligence, chatbot, communication, education, mobile learning, virtual learning environments
Cluster 2	Bernal (2024)	Automated assessments, eLearning, GPT, large language models, natural language processing
	Vandamme & Kaczmarski (2023)	Accusation, AI, AI chatbot, AI ethics, AI misuse, argumentation, assessment, case study, Chat GPT, computer-based education, defense, dyssocial, dyssocial techniques, e-learning, education, explanation, generating fake news, gnost, hidden curriculum, higher education, justification, large language models, lying, manipulation, OPENai, personality, plagiarism, prediction, primary school education, skills, ZEROgpt
	Yang & Wen (2023)	AI, college students, online education, personalised learning

Continued on the next page

The strength of relatedness increases when a document receives more citations. As outlined in the methodology section, the units of analysis were documents and sources, and relevance was assessed by considering articles that predominantly shared at least 1 reference (Boyack & Klavans, 2010). The outcome of this analysis resulted in 4 clusters and 12 papers, grouped with different colours in the map created by the tool (Table 5.7). Cluster 1 includes three papers, cluster 2 comprises three papers, cluster 3 contains three papers, and cluster 4 has three papers.

The utilisation of clustering was intended to avoid the fragmentation of results and the scattering of related topics across various domains. These clusters were established to amalgamate articles that represented a distinct topic or approach.

Starting from these clusters, the full text of these papers has been read, and the main topic areas have been identified to synthesise the body of knowledge. After carefully analysing the papers extracted from the cluster analysis and considering that research in this field is still

TABLE 5.7 *Continued from the previous page*

Cluster	Authors	Key words
Cluster 3	Demertzi & Demertzis (2023)	Adaptive educational system, eLearning, machine learning, ontologies matching, recommendation system, semantics
	Idowu et al. (2024)	Bias mitigation, data science applications in education, evaluation methodologies, human-computer interface
	Saleem et al. (2024)	Artificial intelligence, CHATgpt, e-learning, heutagogical tool, heutagogy, higher education, learning, medical education, medicine, open & distance education and elearning, Shuyan Wang, The University of Southern Mississippi, United States
Cluster 4	Gomez et al. (2021)	ambient intelligence, artificial intelligence, computer aided instruction, cooperative systems, electronic learning, intelligent agents, learning management systems
	Lutfiani et al. (2023)	artificial intelligece, bibliometrics, chatbot, eLearning, LMS
	Nagro (2021)	AI in education, artificial intelligence, conventional education, COVID-19, e-learning, pandemic

TABLE 5.8 Topic Areas

Themes	Authors
Theme 1: Integration of AI Tools in Virtual Learning Platforms	Hu (2024); Vázquez-Cano et al. (2021); Bernal (2024); Lutfiani et al. (2023); Yang & Wen (2023).
Theme 2: AI's Role in Enhancing Customized Learning and Optimizing Educational Management Systems	Demertzi & Demertzis (2023); Gomez et al. (2021); Idowu et al. (2024); Nagro (2021); Polakova & Ivenz (2024); Saleem et al. (2024).

in its early stages, we have classified the papers into two main themes (Table 5.8).

In the next section, we will provide a discussion of the key papers related to these themes.

Discussion

Theme 1: Integration of AI Tools in Virtual Learning Platforms

The papers grouped in cluster 1 have a common theme, the use of AI tools in education platforms, with the aim of enhancing the outcomes

of the learning process. Specifically, the study of Hu (2024) explores the role of an AI chatbot to support interactive virtual learning involving 135 university students in Taiwan. The authors experiment with what happens when an AI chatbot is used to support students in comparison to two control groups that followed the traditional problem-solving methods. The study indicates that the AI-assisted approach improved problem-solving skills, ethical reasoning, and learning motivation, demonstrating its effectiveness in fostering deeper engagement with ethical decision-making. Polakova and Ivenz (2024) emphasise the role of AI in providing instant, tailored feedback that helps students refine their writing skills more effectively than traditional methods. By conducting a quasi-experimental study with 110 university students, the authors assessed the writing proficiency through pre-tests, post-tests, questionnaires, and focus group interviews. The results emphasized the importance of integrating AI-driven technologies into language learning to support evolving educational needs.

The study of Bernal (2024) focuses on exploring how large language models (LLMS) such as GPT could enhance interactive learning if integrated into e-learning platforms. The authors demonstrate with this study the high transformative potential of Generative AI models in redefining online education, creating opportunities for more personalised learning experiences as well as for improving students' interaction, adaptability, and the overall effectiveness of online learning platforms.

The study of Lutfiani et al. (2023) highlights how it is possible to personalise content delivery, facilitate interaction between students and teachers, and enhance accessibility through AI-powered recommendation systems.

How AI algorithms and tools could impact enhancing knowledge representation in eLearning environments and optimising student engagement, comprehension, and retention is the focus of the studies of Vandamme and Kaczmarski (2023) and Yang and Wen (2023). Both studies, however, emphasise the essentiality of critical thinking and the ethical concerns of AI related to transparency, bias, and data privacy.

These studies within this theme demonstrate the relevance of increasing confidence in AI-driven learning tools to create more engaging, personalised, and effective educational experiences, through real-time feedback, interactive engagement, and greater flexibility. Additionally, the researchers agree that AI has the potential to transform

radically virtual learning approaches. Yet they also emphasise the need for ethical and responsible use of AI as well as the importance of human control in AI-generated learning experiences.

Theme 2: AI's Role in Enhancing Customised Learning and Optimising Educational Management Systems

The papers grouped in cluster 2 have as a common focus the role of AI in creating personalised learning experiences by creating customised content, monitoring students' learning process and enhancing teaching practices. The studies also emphasise the relevance of AI tools in optimising resource and their management.

The study of Demertzi and Demertzis (2023) points out the role of adaptive educational systems (AESS) in tailoring content to individual student needs based on their skills and experiences. The authors argue that by combining machine learning techniques such as semi-supervised classification and recommendation mechanisms, it is possible to customise educational content, ensuring that students receive instruction suited to their competencies and learning styles.

While the study of Idowu et al. (2024) focuses on analysing the importance of fairness in AI-driven education. They analyse how AI models used for educational assessment may be unfairly influenced by factors such as age, gender, and disability. The study proposes the use of AI tools to provide actionable, personalised feedback to students with the aim of ensuring fairness.

The study of Saleem et al. (2024) titled 'CHATgpt As an Innovative Heutagogical Tool in Medical Education' focuses on arguing how ChatGPT could be used as a heutagogical (self-directed learning) tool in medical education. The authors explore the potentialities of generative AI as a virtual instructor, for content creation, implementation of personalised learning, skills development, and assessment (in the context of medical studies). The study also addresses the ethical issues of integrating AI into higher education with a particular emphasis on assuring accuracy and responsibility for the professions.

Gomez et al. (2021) argue that AI tools are very relevant for the management of resources and activities in virtual learning environments. Gomez et al. (2021) argue that the use of multi-agent systems (MAS) can significantly enhance adaptive learning experiences by tailoring resources to individual needs, thereby improving student satisfaction and engagement in virtual learning environments.

In summary, the papers under this theme highlight the potential of AI tools and solutions to enhance learning management, automate assessments, and provide intelligent support for both students and faculty. Notably, all studies emphasise that AI integration requires careful design, ensuring adaptability, accessibility, and ethical considerations to maximise its benefits in education.

Conclusions

This chapter, which analyses the current state of the literature on AI and virtual learning, demonstrates that while there is a growing academic interest in understanding the role, potential, and risks associated with AI in virtual learning environments, the literature in this field remains underdeveloped.

The systematic literature review (SLR) highlights that AI is set to play a transformative role in virtual learning platforms and educational management systems. Research suggests that AI tools and solutions hold transformative potential for:

- Customising learning experiences
- Optimising resource management
- Enhancing student engagement and outcomes

Nevertheless, the success of AI integration depends on:

- Ethical and responsible implementation
- Active involvement of both educators and learners
- Cultivation of creative and critical thinking alongside AI use

However, given the growing interest in AI for virtual learning, we have identified at least three research lines for a future research agenda.

- *Explore Hybrid AI-Human Learning Models:* It is crucial to explore hybrid AI-human models to better understand the interaction and to identify which processes can be automated, augmented, or innovated through AI implementation.
- *Institutionalising AI Integration in Education:* Research focused on defining strategies for institutionalising AI in educational platforms is essential. Establishing the best practices for AI integration at the institutional level could significantly contribute to increasing awareness and understanding of the importance of de-

veloping and implementing AI-driven educational tools. These tools can support customised, flexible, and tailored learning experiences, enhance content management, and optimise resource allocation and assessment processes.

- *Prioritise Ethical and Inclusive AI Use:* To fully harness the benefits of AI in education, ongoing research must prioritise the ethical and responsible use of AI-driven technologies. This involves addressing critical issues such as bias, transparency, data privacy, and equitable access to AI-powered learning environments. Researchers should develop strategies to mitigate AI-related biases and ensure that AI tools are designed to support diverse learning needs, fostering inclusivity rather than reinforcing existing inequalities.

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Appendix 1: Distribution of Articles by Journal

Lecture Notes in Computer Science (including subseries) – 11
Communications in Computer and Information Science – 9
IEEE Access – 9
Cogent Education – 6
Education and Information Technologies – 5
International Journal of Emerging Technologies in Learning – 5
Proceedings of the International Conference on Virtual Learning – 5
CEUR Workshop Proceedings – 4
International Journal of Engineering Education – 3
International Journal of Information and Learning Technology – 3
International Journal of Intelligent Systems and Applications… – 3
Multimedia Tools and Applications – 3
PEERJ Computer Science – 3
ACM International Conference Proceeding Series – 2
Applied Sciences (Switzerland) – 2
Computers and Education – 2
Ieee Transactions on Learning Technologies – 2
International Journal of Advanced Computer Science and Applications – 2
International Journal of System Assurance Engineering… – 2
Lecture Notes in Computer Science (including subseries) – 2
Library Hi Tech News – 2
2016 IEEE Conference on E-Learning, E-Management and E-Services – 1
2022 IEEE European Technology and Engineering… – 1
35th Bled Econference: Digital Restructuring and Human (Re)Action – 1
5th International Conference on Artificial Intelligence, Big Data,… – 1

5th Technology Innovation Management and Engineering Science… – 1
Adult Learning – 1
Advances in Intelligent Systems and Computing – 1
African Journal of Applied Research – 1
African Journal of Hospitality, Tourism and Leisure – 1
Applied Ergonomics – 1
Applied Mathematics and Nonlinear Sciences – 1
APTISI Transactions on Technopreneurship – 1
British Journal of Guidance and Counselling – 1
CIVEMSA 2018 – 1
Cluster Computing – 1
Computer Applications in Engineering Education – 1
Computer-Aided Design and Applications – 1
Computers and Education: Artificial Intelligence – 1
Cyberpsychology, Behavior, and Social Networking – 1
Development and Learning in Organizations – 1
E-Learning and Digital Media – 1
EASEAI 2021 – 1
Educational Technology and Society – 1
Elearning and Software for Education Conference – 1
Estudos Avancados – 1
Eurasia Journal of Mathematics, Science and Technology Education – 1
European Journal of Dental Education – 1
European Journal of Engineering Education – 1
Expert Systems – 1
Formacion Universitaria – 1
Frontiers in Education – 1
Frontiers in Robotics and AI – 1
Frontiers in Virtual Reality – 1
GMS Journal for Medical Education – 1
Health Policy and Technology – 1
IEEE Latin America Transactions – 1
IEEE Transactions on Education – 1
IEEE Transactions on Neural Systems and Rehabilitation Engineering – 1
IEICE Transactions on Information and Systems – 1
Indonesian Journal of Electrical Engineering and Computer Science – 1
Ingeniare – 1
Intelligent Automation and Soft Computing – 1
Intelligent Systems Reference Library – 1

Interactive Learning Environments – 1
International Journal of Advanced Science and Technology – 1
International Journal of Artificial Intelligence in Education – 1
International Journal of Civil Engineering and Technology – 1
International Journal of Data Mining and Bioinformatics – 1
International Journal of Education and Practice – 1
International Journal of Educational Research and Innovation – 1
International Journal of Educational Technology in Higher Education – 1
International Journal of Engineering Pedagogy – 1
International Journal of Information Technology and Decision Making – 1
International Journal of Instruction – 1
International Journal of Intellectual Property Management – 1
International Journal of Interactive Multimedia… – 1
International Journal of Mobile Learning and Organisation – 1
International Journal of Performability Engineering – 1
International Journal on Advanced Science, Engineering… – 1
Internet of Things (Netherlands) – 1
Iraqi Journal for Computer Science and Mathematics – 1
Journal of Applied Learning and Teaching – 1
Journal of Artificial Intelligence and Technology – 1
Journal of Digital Imaging – 1
Journal of Ecohumanism – 1
Journal of Information Systems Engineering and Management – 1
Journal of Metaverse – 1
Journal of Research On Technology in Education – 1
Journal of Surgical Education – 1
Knowledge Management and E-Learning – 1
Learning and Motivation – 1
Lecture Notes in Business Information Processing – 1
Library Philosophy and Practice – 1
Mechanical Systems and Signal Processing – 1
Nurse Education Today – 1
Obrazovanie i nauka – 1
Proceedings of Connect 2021 – 1
Research and Practice in Technology Enhanced Learning – 1
Revista de gestao social e ambiental – 1
Revista iberoamericana de tecnologias del aprendizaje – 1
Scientia paedagogica experimentalis – 1
Smart Innovation, Systems and Technologies – 1

Societies – 1
Soft Computing – 1
Studies in Computational Intelligence – 1
Sustainability (Switzerland) – 1
Technology, Knowledge and Learning – 1
TEM Journal – 1
Turkish Online Journal of Distance Education – 1