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Mapping Artificial Intelligence for Generation Z: A Systematic Literature Review of the Implications and Future Research Directions

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ABSTRACT

As artificial intelligence continues to evolve rapidly, it presents valuable opportunities for enhancing education for educators and Gen-Z learners. However, fully harnessing its potential to improve learning outcomes remains a complex challenge. This study aims to provide a critical mapping of research trends and gaps in the application of artificial intelligence for Generation Z in higher education by examining AI's impacts, contributions, and future research directions. The research analyzes 40 Scopus-indexed articles from the past ten years using a systematic literature review based on the PRISMA framework. The focus is on identifying, evaluating, and interpreting existing studies on AI's integration in Gen Z education, guided by specific research questions. AI influences every stage of education and streamlines tasks like attendance tracking, financial management, and student counseling. It also has the potential to foster critical thinking, creativity, and communication skills. However, concerns arise around academic integrity when students misuse AI tools to bypass genuine learning. The study's key contribution is its exploration of how AI can support personalized learning through four core dimensions: learning, teaching, assessment, and administration. Such dimension-specific investigations will strengthen the practical applicability of AI in higher education and advance evidence-based educational innovation for Generation Z.

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INTRODUCTION

Technology's crucial role in learning is well-established, with its continuous advancements consistently benefiting education (Sunarto, 2021b, 2021a). Artificial intelligence (AI), the latest technological development, offers significant potential to improve human lives when used responsibly (Michel-Villarreal, 2023). AI's rapid growth has brought numerous advantages to education, including enhanced teaching methods and materials for educators, richer learning experiences for students, and improved decision-making (Ouyang et al., 2023). Essentially, AI simplifies educators' work, increases their efficiency, anticipates student needs, provides effective evaluation tools, and delivers rapid learning support, ultimately boosting educational outcomes and system efficiency (Fernandez-Garcia et al., 2021). The strategic use of AI in higher education is globally recognized, with organizations like the World Education Organization highlighting its importance. Consequently, ethical guidelines, regulatory frameworks, and practical recommendations are being developed to ensure AI's ethical and effective implementation in education (Stefanova & Georgiev, 2024). By automating tasks, AI empowers both educators and

learners to concentrate on more valuable activities, leading to improved academic and professional performance (Tominc & Rožman, 2023).

Numerous studies explore AI's use in learning development, fostering students' digital skills, and evaluating the effectiveness of AI-driven learning activities (Kuleto et al., 2022). Recent research frequently focuses on two key areas: the evolving role of educators in the age of AI and AI's ability to facilitate personalized learning experiences (Tavares et al., 2023). AI's contributions to education can be categorized into four primary dimensions: learning, teaching, assessment, and administration (Ouyang et al., 2023). In the learning dimension, AI can personalize assignments, analyze student work to provide tailored feedback, and enhance students' adaptability and interaction within digital environments. For teaching, AI can offer adaptive strategies, improve teaching effectiveness, and support educators' professional growth. Regarding assessment, AI can assist with grading and predict student performance by identifying individual strengths and weaknesses, enabling targeted interventions. Finally, in administration, AI can optimize management platforms, provide personalized services, and inform educational decision-making.

AI is ideally suited to support differentiated learning, ensuring personalized educational experiences tailored to each student's unique potential and personality. Beyond this, AI can cultivate valuable student competencies like creativity, literacy, collaboration, and emotional regulation (Stefanova & Georgiev, 2024). In mathematics, a study comparing teacher and AI (specifically, ChatGPT) problem-solving abilities (Vecchiarini & Somià, 2023) found that AI-generated solutions, without proper guidance, can be unsuitable for students' skill levels. In contrast, teachers can adapt to individual student needs. This highlights the importance of skillful prompting when using AI. A survey of mathematics teachers in Sweden and Finland (van den Berg & du Plessis, 2023) revealed a balanced perspective on the potential and risks of AI in education. However, it also raised concerns about students prioritizing AI tools over actual math learning. Previous studies explored AI's role and impact on mathematics education, examining trends, methods, applications, and opportunities for both educators and students (Pisica et al., 2023). By analyzing its application at every level of the learning process, this study will explore the potential of AI for Generation Z learners. The way that Gen Z thinks, learns, and envisions the future aligns well with AI. They grew up with the internet, social media, and smart technology, so they are more than just AI consumers. AI is not something foreign to them; they already interact with it. This paper offers a critical evaluation of the benefits and drawbacks of artificial intelligence in higher education for Generation Z, highlighting its contributions and offering suggestions for further study and application.

RESEARCH METHOD

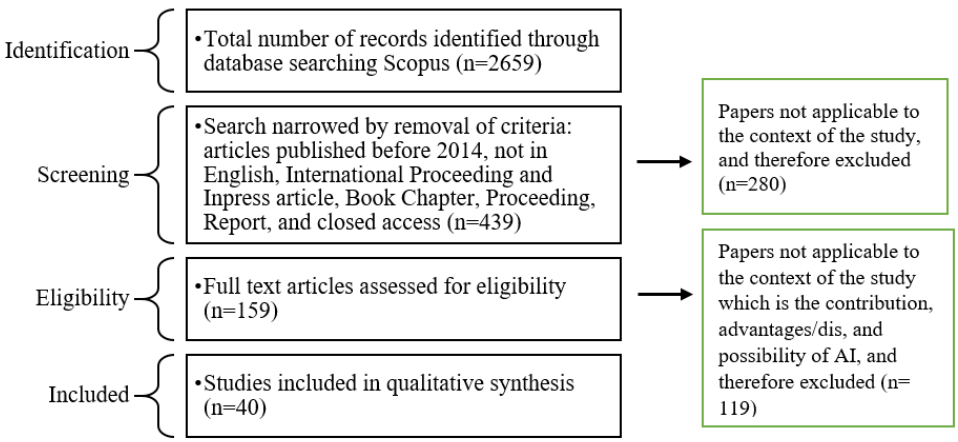


Figure 1. Research methodology

This systematic literature review (SLR) identified, evaluated, interpreted, and analyzed existing research on the contributions, benefits, drawbacks, and future potential of AI for Generation Z in higher education. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, the review process involved four stages: identification, screening, eligibility, and inclusion (Malik et al., 2023). The identification phase involved locating relevant articles through keyword and database searches. During the screening phase, articles were selected based on pre-established criteria. The eligibility phase then assessed these articles to confirm they met the inclusion criteria. Finally, in the inclusion phase, the remaining articles were analyzed. These methodological steps are illustrated in Figure 1 below.

Identification

The first step in this systematic literature review (SLR) using PRISMA was identification, in which the researcher defined the search terms. In the identification stage, the keywords that guided the article search were determined first (Djono et al., 2024). This identification step involves searching for synonyms, related concepts, and variations for keyword determination (Leong et al., 2024). For this study, the keywords "artificial intelligence" and "higher education" were used, and the data were collected in June 2024. The Boolean operators used to filter the data are TITLE-ABS-KEY ("Artificial intelligence" AND "education") AND PUBYEAR > 2014 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA , "SOCI")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (EXACTKEYWORD , "Education") OR LIMIT-TO (EXACTKEYWORD , "Teaching") OR LIMIT-TO (EXACTKEYWORD , "Artificial Intelligence") OR LIMIT-TO (EXACTKEYWORD , "Learning")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SRCTYPE , "j")). A search of the Scopus database using these keywords yielded 2659 articles.

Screening

The second stage involved applying the inclusion and exclusion criteria (detailed in Table 1) to the initially identified articles, resulting in a selection of 439 articles. Articles were selected through four steps: searching, screening, evaluating, and synthesizing (Kamal et al., 2023). The search was conducted in the Scopus database, then filtered according to established criteria, evaluated against relevant concepts, and synthesized to obtain final results aligned with the objectives. Some types of documents and sources are excluded due to lack of rigorous review. Articles from the previous ten years, beginning in 2016, were chosen for this study. Since these publications have undergone stringent peer-review procedures, the document types included are journal articles, review articles, and research articles. Since the majority of reputable journals use English to ensure that study findings can be read and understood by the international academic community, English was selected as the language of publication. To improve accessibility for researchers, open-access articles were chosen.

Table 1. Inclusion and exclusion

Criteria	Inclusion	Exclusion	Result
Year	2014-2023	Less than 2014	1972
Document Type	Article, Review Article, Research Article	International Proceedings and Article in press	710
Language	English	Other than English	663
Source Type	Journal	Book, Proceedings, Report	658
Access	Open Access	Closed Access	439

Eligibility

After screening, 439 articles remained. Focusing on the most prolific publishers, the researcher identified five key sources: MDPI (62 articles), Springer (39), Elsevier (35), IEEE (13), and Taylor & Francis (10), totaling 159 articles. To ensure the validity and reliability of bibliometric and

systematic literature reviews, this study prioritizes journals published by large academic publishers due to their consistent metadata quality, international reputation, and strict peer-review criteria. All article titles, abstracts, and main content were carefully reviewed to ensure their alignment with the requirements in Table 1 (Leong et al., 2024). Keywords from the thesaurus, keywords from previous studies, and recommended keywords from the database were all used to achieve the objective.

Inclusion Criteria

The final eligibility stage involved a full-text review of the 159 articles. This assessment aimed to identify articles directly relevant to the research questions:

- RQ1: What is the contribution of AI in education for Generation Z?
- RQ2: What are the advantages and disadvantages of applying AI to learning for Gen Z?
- RQ3: What are the possibilities for developing research in the field of AI in education?

The assessment process yielded 40 relevant articles. These included seventeen (17) from MDPI, two (2) from Taylor & Francis, four (4) from IEEE, nine (9) from Elsevier, and eight (8) from Springer. The remaining articles were excluded from the study. In this study, VOSviewer is used to analyze trends in articles on AI in the field of education.

RESULTS AND DISCUSSION

The analysis conducted in this research revealed several key findings that underscored the importance of AI in Generation Z's learning: (1) the volume of supporting literature, (2) the countries with the most publications, (3) trending research topics, (4) author collaborations, and (5) the advantages and disadvantages of AI use for Generation Z. The impact of artificial intelligence on higher education, particularly for digitally native Generation Z students, was a critical area of study. As this generation populated universities, AI presented novel opportunities to enhance learning, teaching, and assessment. Understanding how AI has shaped Generation Z's higher education experience was vital to developing effective, tailored strategies that address their specific learning needs and preferences. Following the analysis of 119 articles on AI in Generation Z learning, Figure 2 presents a research overview summarizing the key discussion points.

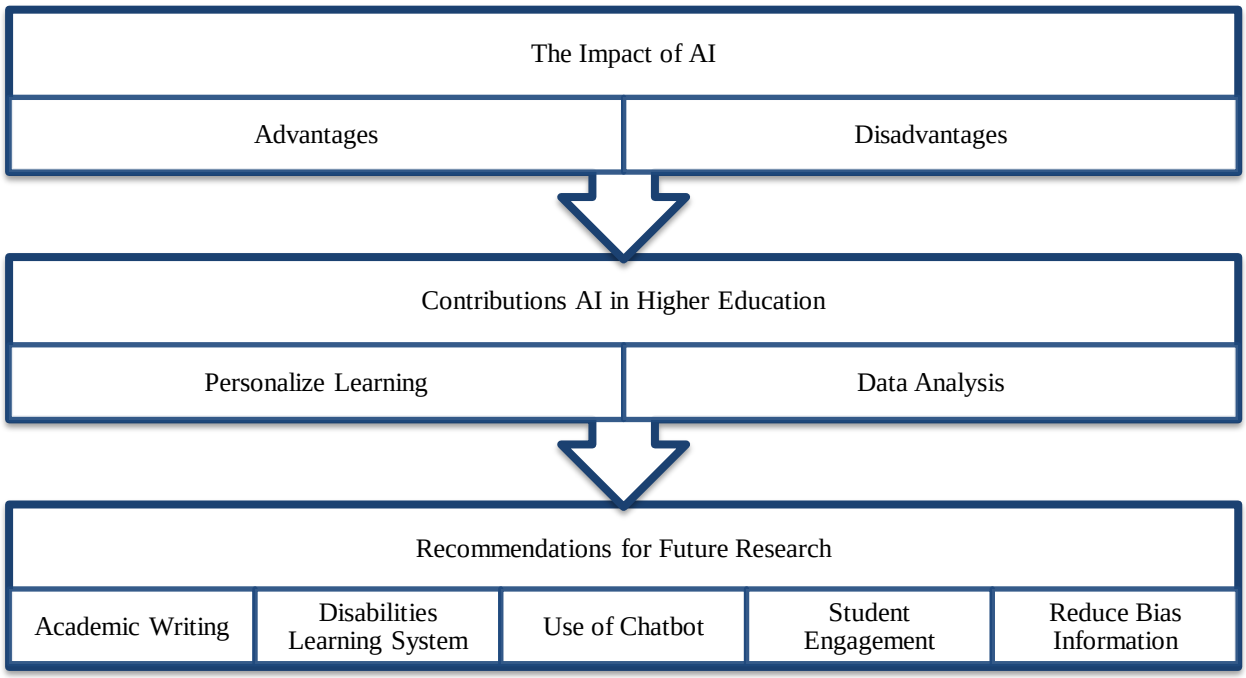


Figure 2. Research overview

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The Number of Articles

Educational researchers have explored the role of AI and published their findings in various journals. A Scopus database search, using the keywords "artificial intelligence" and "higher education" (and applying the exclusion criteria described in the methodology section), identified 439 relevant articles published within the last ten years (2014-2023). The yearly distribution of these articles is shown in Figure 3.

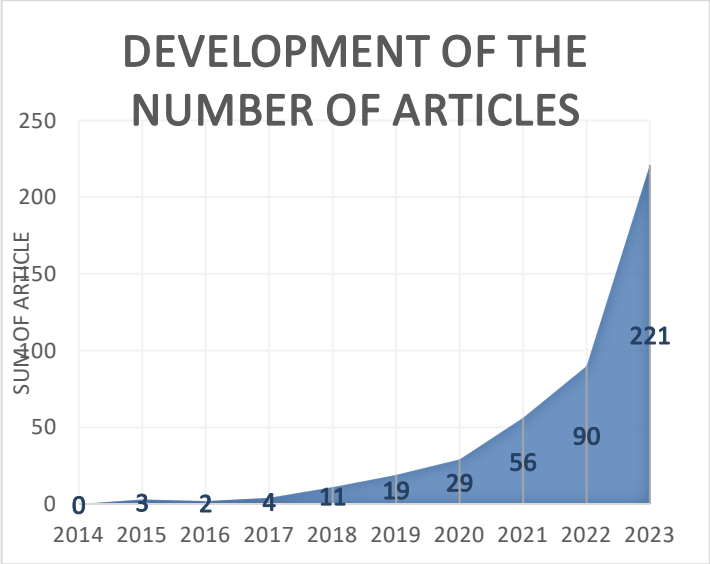


Figure 3. Development of the number of Articles

Figure 3 illustrates a consistent upward trend in the number of publications on AI in education, suggesting its growing integration into learning practices. Data from Scopus up to mid-2024 shows a significant surge in output, with 257 articles already published, surpassing the total for 2023.

The Country with the Highest Number of Articles

From the 439 articles, five countries, such as China, the UK, the USA, Spain, and Australia, emerged as the most prolific contributors (see Figure 4), demonstrating the rapid growth of AI implementation in Generation Z's education within these nations.

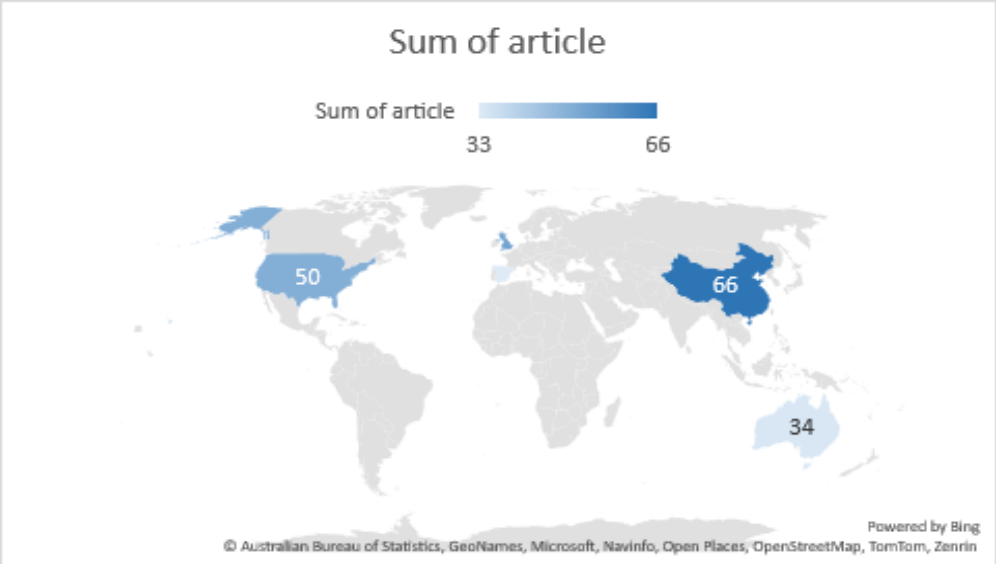


Figure 4. The five countries with the highest number of articles

Figure 4 above illustrates that authorship output and scholarly influence exhibit distinct patterns, despite China contributing the most articles on artificial intelligence in education. The most prolific individual author is Elena from Spain, while the most highly cited author is Bañeres et al. (2023), with 81 citations, whose influential work applies text mining techniques to examine research trends in artificial intelligence within the educational domain. This distinction highlights that publication volume does not necessarily correspond to citation impact or thematic influence. Their analysis reveals a move towards data-driven, pedagogically focused AI applications, such as learning analytics and early warning systems, pointing to encouraging institutional settings and ongoing research initiatives. This combination explains why Spain is at the forefront of AI research in higher education.

Related Topic Trends

VOSviewer was used to analyze the relationships between topics and identify current trends, as visualized in Figure 5. This analysis complements the individual topic reviews.

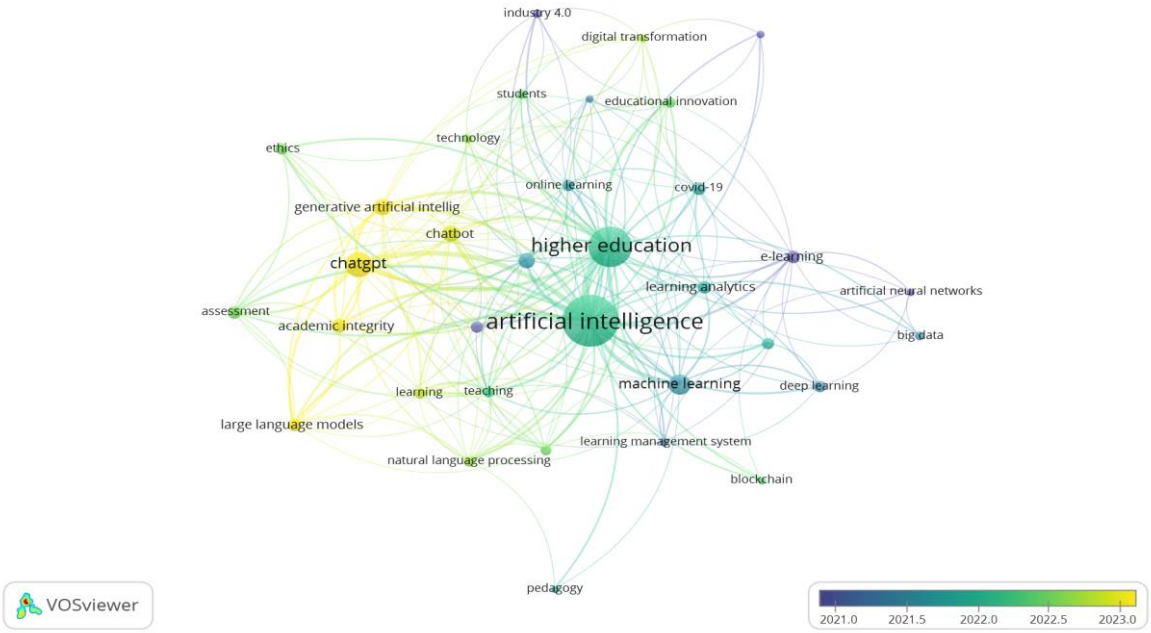


Figure 5. The relationship between topics and topic trends

Figure 5 shows that artificial intelligence and higher education are currently trending topics (indicated by the light yellow color), suggesting significant potential for future innovation at the higher education level, where currently higher education is filled by Gen Z.

The Relationship Between Authors

Beyond topical analysis, VOSviewer also allows for the visualization of author collaborations, which is crucial for understanding connections within the research community. Figure 5 illustrates these relationships, grouping authors by their connections. For instance, the yellow group, representing authors with the most recent publications, demonstrates collaborative links in producing joint articles. One such collaboration, resulting in the paper "Artificial Intelligence in Higher Education: A Protocol Paper for a Systematic Literature Review" (Tan et al., 2023), addresses the increasing diversity of AI types in education by proposing a platform to catalog relevant literature, including the functionalities and considerations educators should be aware of. However, the small number of authors linking across clusters suggests that cross-group research collaboration remains weak. This circumstance points to a conceptual and institutional fragmentation of research. The lack of inter-cluster connectivity may impede the integration of

interdisciplinary viewpoints, which is crucial for the creation of thorough and contextually appropriate AI applications for Generation Z, even though this indicates a high degree of specialization.

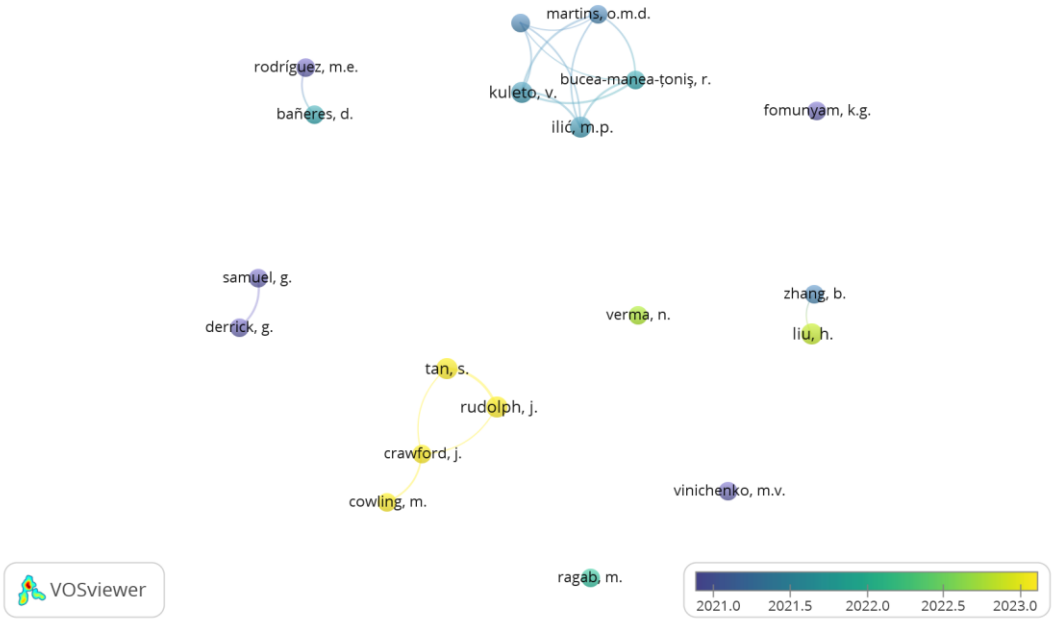


Figure 6. The relationship between authors

The Advantages and Disadvantages of Utilizing AI for Generation Z

This research investigates AI's contributions to Generation Z's learning, the pros and cons of AI in education, and potential future research directions. Focusing on four key dimensions of AI's role in learning—learning (D1), teaching (D2), assessment (D3), and administration (D4)—Table 2 presents the distribution of the 40 selected articles across each research question and dimension.

Table 1. Article contributions to each question and per dimension

ID	Author	City/Country of research location	RQ 1				RQ2				RQ3			
			D1	D 2	D 3	D 4	D 1	D 2	D 3	D 4	D 1	D 2	D 3	D 4
ELSEVIER														
1	(Segbenya et al., 2023)	Ghana		v			v	v	v		v			
2	(Dakakni & Safa, 2023)	Beirut, Lebanon	v				v		v				v	v
3	(Habibi et al., 2023)	Indonesia	v										v	v
4	(Martín-Núñez et al., 2023)	Spanyol	v		v		v				v		v	
5	(Malik et al., 2023)	Indonesia	v								v		v	
6	(Lai et al., 2023)	Hong Kong	v				v	v	v					
7	(Vecchiarini & Somià, 2023)	Southeast region of the United States.	v	v					v			v	v	

ID	Author	City/Country of research location	RQ 1				RQ2				RQ3			
			D1	D 2	D 3	D 4	D 1	D 2	D 3	D 4	D 1	D 2	D 3	D 4
8	(Rodway & Schepman, 2023)	United Kingdom		v	v			v						
9	(Hornberger et al., 2023)	German					v	v						
IEEE														
10	(Fernandez-Garcia et al., 2021)	Spanyol			v		v	v					v	
11	(Kostopoulos et al., 2021)	United Kingdom	v		v		v		v				v	
12	(Deo et al., 2020)	New South Wales, Australia	v	v			v	v			v			
13	(Tedre et al., 2021)	Finlandia	v		v						v		v	
MDPI														
14	(Tanveer et al., 2020)	Saudi Arabia	v	v	v	v	v	v		v	v			v
15	(Quy et al., 2023)	Vietnam	v	v		v	v		v			v		
16	(Mohd Rahim et al., 2022)	Malaysia		v	v						v			v
17	(Tominc & Rožman, 2023)	Slovenia	v			v			v	v	v	v		
18	(Bozkurt et al., 2021)	Turki	v	v	v	v	v	v			v		v	v
19	(Bucea-Manea-ţoniş et al., 2022)	South Africa	v		v		v	v				v		
20	(Pérez-Suay et al., 2023)	Spain			v	v	v		v					v
21	(Michel-Villarreal, 2023)	Mexico	v			v	v			v				v
22	(van den Berg & du Plessis, 2023)	Helsinki	v	v			v	v			v			
23	(Kiryakova & Angelova, 2023)	Bulagaria	v	v	v									
24	(Chang et al., 2023)	Canada					v				v			
25	(Ilieva et al., 2023)	Bulgaria	v					v				v		

ID	Author	City/Country of research location	RQ 1				RQ2				RQ3			
			D1	D 2	D 3	D 4	D 1	D 2	D 3	D 4	D 1	D 2	D 3	D 4
26	(Pisica et al., 2023)	Romania	v		v					v				v
27	(Oliveira & Matos, 2023)	Portugal			v					v				v
28	(Lister et al., 2021)	United Kingdom									v			v
29	(Tavares et al., 2023)	Portugal	v	v	v		v		v		v	v		
30	(Kuleto et al., 2022)	Romania and Portugal	v	v			v			v	v	v		
SPRINGER														
31	(Pellas, 2023)	Greece	v							v	v			
32	(Cox, 2021)	United Kingdom		v						v	v			
33	(Essel et al., 2022)	Ghana	v							v				
34	(Bañeres et al., 2023)	Spanyol										v		v
35	(Ouyang et al., 2023)	China	v	v				v			v	v		v
36	(Yang et al., 2023)	China	v	v			v				v		v	
37	(Chan, 2023)	Hong Kong												
38	(Sajja et al., 2023)	USA	v	v			v				v	v		
TAYLOR														
39	(Nikolic et al., 2023)	Sydney	v				v				v	v		
40	(Shi et al., 2023)	China	v	v			v	v				v		

This systematic literature review does not concentrate on AI at the algorithmic level (e.g., comparing specific machine learning or deep learning models), according to the analysis of the 40 final papers. Rather, the reviewed research mostly examines AI at the functional and application levels in higher education settings, especially as it concerns Generation Z students.

The learning dimension is the most frequently discussed in the reviewed articles, closely followed by the teaching dimension, reflecting their central roles in the educational process. The administrative dimension appears least frequently, suggesting that AI's application in this area warrants further investigation and development. Like other technologies, AI in education has both advantages and disadvantages. Studies have shown that AI is well-suited to Generation Z learners, fostering critical thinking and preparing them for a technologically advanced future (Hornberger et al., 2023). Research also indicates that AI can improve student performance and autonomy through personalized learning (Dakakni & Safa, 2023). Furthermore, AI simplifies processes, appealing to Gen Z's preference for ease of use (Lai et al., 2023). AI's ability to provide comprehensive support materials, monitor student progress, and cater to diverse learning styles can reduce boredom and enhance independent learning (Chang et al., 2023). AI can even accurately predict student performance, helping to prevent academic failure (Deo et al., 2020),

and can be combined with gamification to boost student engagement (Pellas, 2023). From the educator's perspective, AI can identify at-risk students, enabling targeted interventions (Bucea-Manea-ţoniş et al., 2022). AI also facilitates adaptive learning, helping struggling students catch up (Quy et al., 2023). In assessment, AI tools like ChatGPT have demonstrated positive impacts (Nikolic et al., 2023), and AI can efficiently evaluate student success (Tedre et al., 2021).

AI-powered learning can provide Gen Z with personalized feedback, enabling students to understand and correct their mistakes more effectively. AI also facilitates continuous learning evaluation (Sajja et al., 2023), giving educators a comprehensive view of each student's progress. This underscores AI's potential to streamline administrative tasks in education, thereby reducing operational and bureaucratic costs (Oliveira & Matos, 2023). However, research has also identified drawbacks to AI-driven learning, presenting opportunities for future development. Studies on AI in language learning (Lai et al., 2023) revealed concerns about academic integrity during summative assessments, as teachers struggled to verify the honesty and accuracy of student responses. Furthermore, some students misuse AI by simply copying answers without engaging with the material or developing a deep understanding (Dakakni & Safa, 2023). Research has also indicated that over-reliance on AI can negatively impact students' written and verbal communication skills (Segbenya et al., 2023), as well as create opportunities for plagiarism (Chang et al., 2023). Finally, students may develop an over-dependence on AI-generated information without developing the ability to critically evaluate its accuracy (Segbenya et al., 2023).

Beyond student-related challenges, research has also identified institutional weaknesses in AI implementation. One study (Deo et al., 2020) highlighted the difficulty of integrating AI technology due to a lack of institutional human resources. Pellas (2023) stresses the importance of AI training for students, staff, and administrators within educational institutions, along with education on academic integrity to combat student dishonesty and continuous evaluation. Pérez-Suay et al. (2023) emphasize the need for a balanced approach, where human instructors provide holistic insights, critical analysis, and guidance to ensure students use AI effectively. The need for ethical guidelines in AI education is also clearly highlighted (Bucea-Manea-ţoniş et al., 2022). Finally, concerns regarding data privacy, security, and potential surveillance impacting student and educator autonomy have been raised (Cox, 2021). The advantages and downsides of using AI in higher education across learning, teaching, assessment, and administrative dimensions are summarized in Table 2.

Table 4. Comparison of dimension, benefit, advantages and disadvantages

Dimension	Key Benefits	Advantages	Disadvantages
Learning	Personalization, learner engagement	Adaptive learning paths, real-time feedback, increased student engagement	Overreliance on AI, reduced critical thinking, cognitive offloading
Teaching	Instructional efficiency, timely feedback	Reduced workload, enhanced feedback quality, support for instructional design	Pedagogical dependency, diminished teacher autonomy, skill deskilling
Assessment	Automation, scalability	Faster grading, consistent evaluation, scalable assessment processes	Academic integrity risks, algorithmic bias, limited transparency
Administration	Decision support, operational efficiency	Data-driven decision-making, optimized resource allocation, improved planning	Data privacy concerns, governance complexity, ethical and accountability issues

Dimension	Key Benefits	Advantages	Disadvantages
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Teaching	Instructional efficiency, timely feedback	Reduced workload, enhanced feedback quality, support for instructional design	Pedagogical dependency, diminished teacher autonomy, skill deskilling

Learning, teaching, assessment, and administration—the four facets of AI deployment in higher education—are intricately linked and function as a cohesive system. While both aspects rely on assessment systems that quantify learning outcomes at scale, AI-driven personalization in learning depends on instructional design and teaching strategies bolstered by automated feedback. The governance, data administration, and decision-support systems required for the efficient and moral application of AI in teaching, learning, and evaluation are provided by administrative functions.

The Contribution of AI to Generation Z in Higher Education

Generation Z, generally defined as those born between 1997 and 2012, is deeply connected to technology and has extensive access to information and digital content. Growing up with smartphones, social media, and other digital platforms greatly influences how AI functions in their lives, especially in the classroom. AI-driven learning, also known as machine learning, uses computers and algorithms to make learning and understanding easier. A study of 302 UK students (Rodway & Schepman, 2023) found that they believe AI can personalize and adapt learning to their individual needs, potentially improving academic performance, and provide real-time assessment of their progress.

Further research suggests that AI can enhance the learning experience by making it more interactive and providing students with rapid feedback from instructors (Lai et al., 2023). A study of 245 Indonesian undergraduates across 25 institutions (Malik et al., 2023) found that AI can assist with content creation, improve academic writing, and aid in developing research proposals, ultimately enhancing students' writing skills and performance. This is corroborated by research showing AI's contribution to improving academic writing style and language skills (Bañeres et al., 2023). Studies have also concluded that chatbots and other AI tools can help educators create learning materials, organize information, boost student engagement, personalize learning, and revolutionize assessment strategies for a more effective educational environment (Bozkurt et al., 2021). Additionally, AI can help bridge communication gaps between students and instructors and offer flexible, self-directed learning pathways through intelligent educational frameworks powered by advanced language models (Pisica et al., 2023).

AI offers significant advantages not only for students but also for the institutions that implement it (Martín-Núñez et al., 2023). AI empowers institutions to develop immersive, innovative, and interactive learning environments that cultivate curiosity, critical thinking, and problem-solving skills in Gen Z students. Furthermore, institutions can leverage AI to create engaging virtual learning environments (Oliveira & Matos, 2023) and gain insights into student motivation, expectations, and behaviors (Habibi et al., 2023). AI can assist institutions in predicting and analyzing student performance, identifying potential failure indicators, and refining teaching strategies to reduce failure rates (Deo et al., 2020). It can also bridge the gap between technology and students' everyday lives (Tedre et al., 2021). Research indicates that AI can reshape learning experiences by influencing instructional design and shifting traditional methods towards more engaging approaches (Pellas, 2023). Furthermore, AI can facilitate student-instructor interaction and improve academic performance and motivation (Essel et al., 2022). For institutions, AI can enhance interdisciplinary research, increase efficiency, and prepare

students for the future job market by developing the necessary technical skills (Ilieva et al., 2023). Studies also suggest that AI empowers teachers to promote independent learning, fosters critical thinking, and democratizes access to education, potentially reducing costs. Finally, AI can contribute to institutional data analysis, automate data collection and timelines, and optimize resource allocation (Bañeres et al., 2023).

According to the reviewed studies, AI is a major facilitator of adaptive and personalized learning that aligns with the digital learning preferences of Generation Z. Learning analytics, adaptive platforms, and conversational tools are examples of AI-supported systems that improve engagement, give prompt feedback, and promote academic success through customized learning pathways. Beyond personalization, AI supports teachers in instructional design and assessment while fostering the development of academic skills, especially writing and research. The literature on AI's involvement in data-driven decision-making at the institutional level, such as performance prediction and early risk detection, supports better learning outcomes and retention. AI also promotes multidisciplinary collaboration, increases organizational efficiency, and develops the digital and analytical skills necessary for future employment. All things considered, AI's contribution to higher education goes beyond discrete applications and operates across interrelated institutional and pedagogical dimensions.

Finding Research Development Possibilities in the Field of AI

Research in this area remains limited, and researchers and lecturers are encouraged to explore the growing trend of AI in teaching and learning. Based on existing studies (Hornberger et al., 2023), future research could focus on AI's role in academic writing at universities, strategies for leveraging AI to enhance student engagement and academic achievement, and the use of chatbots as adaptable learning tools. Other potential research areas include using AI to predict student learning outcomes (Dakakni & Safa, 2023), evaluating student performance expectations and learning efforts (including social influence, motivation, habits, and hedonistic traits) with AI technology (Habibi et al., 2023), and examining the impact of AI on students' work skills (Segbenya et al., 2023).

Further AI research could explore AI's potential for providing real-time feedback to improve learning outcomes (Deo et al., 2020) and its use as a decision-making tool (Kostopoulos et al., 2021). Future studies could also investigate how AI can enhance learning experiences, idea generation, information organization, project-based assessments, tools for understanding complex concepts, and school safety risk considerations (Nikolic et al., 2023), and innovative teaching methods for cognitive development and foreign language acquisition (Shi et al., 2023). Additionally, there's a need for more research on AI's role in revolutionizing learning systems, reducing barriers, and increasing student engagement (Sajja et al., 2023). Finally, exploring how AI can foster critical thinking, problem-solving, and collaboration among students, as well as developing adaptive online learning platforms, are crucial future research directions (Bañeres et al., 2023).

Future research could also investigate how AI can support students with disabilities, particularly in terms of classroom participation, interaction, and overall learning experience (Lister et al., 2021). Additionally, AI can play a role in facilitating independent learning by providing access to reliable scientific resources and filtering out biased information (Chang et al., 2023). This aligns with research suggesting that AI can assist teachers in lesson planning, providing frameworks for ideas, resources for critical thinking, and tools for gathering data for adaptive learning (Pérez-Suay et al., 2023). The peculiarity of this study is its integrative synthesis of AI research in higher education, demonstrating that, despite rapid technological advancement, Generation Z's acceptance of AI remains fragmented, especially in the Indonesian setting. This paper offers a fresh perspective on promoting individualized and sustainable higher education for Generation Z by conceptualizing AI as an adaptable educational ecosystem that links learning outcomes, student behavior and motivation, inclusion, and data-driven decision-making.

CONCLUSION

This article examines the use of AI in education, focusing on Generation Z, a digitally native cohort. Given their constant engagement with technology, AI can play a significant role in their lives. Using the PRISMA methodology, 159 articles were initially screened, with 40 ultimately selected for in-depth analysis to address the three research questions. The 40 analyzed articles demonstrate AI's pervasive influence across all facets of education, from planning and implementation to evaluation, and even administrative tasks like attendance, finance, and counselling. These articles highlight AI's positive contributions, such as enhancing students' critical thinking and creative problem-solving skills through more interactive and adaptable learning experiences. AI can also mitigate communication challenges in online learning environments by simulating peer-to-peer interaction. Furthermore, AI's ability to personalize learning has proven particularly beneficial. However, like any technology, AI in education also has downsides. A key concern for educators is verifying student honesty, as students may rely on AI-generated answers without engaging in critical analysis, leading to inaccuracies in their work. Focusing on the four key dimensions of AI's role in education—learning, teaching, assessment, and administration—we find the following contributions: Within the learning dimension, AI facilitates personalized assignments based on individual competence and improves adaptability and integration within digital learning environments. In teaching, AI enhances educators' teaching abilities, develops personalized learning tools, and supports their professional development. For assessment, AI enables automated assessments and predicts student performance to proactively address potential failures. Finally, in administration, AI supports faster and more accurate decision-making, improves the quality and convenience of services, and enhances the performance of academic platforms. Beyond the observed impacts of AI in education, this research highlights several promising areas for future investigation: Exploring AI's potential to enhance the quality of academic writing, utilizing AI to predict student learning outcomes and proactively prevent academic failure, leveraging AI to improve teaching and learning (e.g., through real-time feedback and reducing barriers for students hesitant to ask questions), and further developing AI-driven personalized learning approaches. This evaluation presents a Generation Z-centered perspective in higher education, in contrast to previous assessments that focus on specific AI technologies or isolated educational outcomes. It reframes AI as an integrated educational ecosystem by combining data from learning, teaching, evaluation, and administration, offering a fresh perspective on current methods and potential paths for sustainable, customized higher education.

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