6th CoMBInES
Volume 6 No 1 (2026)

Accepted : July 11th, 2026
Published : September 30th, 2026
DOI : 10.37253/combines.v6i1.12790

Conference on Management, Business, Innovation, Education and Social Science
https://journal.uib.ac.id/index.php/combines

The Impact of Digital Technology and Generation Z's Characteristics on their Learning Preference-Systematic Review

***Yang Suk Lan*[1]**
yangsl@utar.edu.my[1]

[1]Faculty of Creative Industries, Universiti Tunku Abdul Rahman, Kajang, Selangor

Abstract

The use of digital technology in the classroom is a notable innovation in higher education aimed at improving the quality of learning. However, there are obstacles to the successful integration of digital technology in higher education, including a lack of technological infrastructure, the requirement for qualified instructors, and the need to modify teaching strategies to accommodate the learning preferences of Generation Z. Thus, the goal of the systematic review was to look at the traits of Generation Z and how digital technology influences their choices for learning. This systematic review follows the PRISMA standards (Preferred Reporting Items for Systematic Review and Meta-Analysis). A specific protocol was used to guide the literature search in line with the review's goals, consisting of three main stages: identification, screening, and article inclusion. This protocol outlines pertinent details, including search keywords, the database to be utilised, and selection criteria. The review's findings demonstrate how educators can plan and create more engaging teaching strategies by having a deeper understanding of Generation Z's characteristics. The results indicate that the characteristics of Generation Z, such as their short attention span versus the high demand of fast-paced digital technology, have significantly influenced their learning preferences on digitised documentation, real-world case studies and immersive learning methods. Additionally, the interactive experiences provided by digital technology are well-suited to the characteristics and learning styles of Generation Z, making it easier for them to learn and overcome their learning challenges. Furthermore, educational institutions can enhance learning outcomes and experiences by creating digital learning models that are tailored to Generation Z.

Keywords:

Generation Z; Digital Technology; Learning Preferences

Introduction

Current generations' traits have been greatly impacted by social dynamics and technological developments (Wajdi et al., 2025). Today, the most common teaching approach

is still the instructor-led lecture (Calabrese, 2023; Gutersohn, 2023; Huilaja et al., 2022; Schlesinger et al., 2021). Furthermore, teaching the curriculum solely through lectures, which was effective for earlier generations, but is not the best approach for today's classrooms. Generation Z's tolerance for learning that is only provided through the Socratic method has declined, mostly due to the widespread use of technology in their life (Winarjo, 2025; Cain et al., 2022). It is wise to find and use the most effective ways to satisfy both the demands of the workforce and the expectations of Generation Z while instructing this group. According to research, Generation Z must possess current technical capability in order to enter the workforce today (Cain et al., 2022). Since Generation Z students are the future of all organisations, it is critical to comprehend what they require from higher education in order to meet the demands of potential employers (Alamäki et al., 2021).

This study aims to help educators and administrators proactively modify their pedagogy and procedures to meet the needs of this new student population. Due to the pressing need for change, educational institutions must rethink their teaching strategies in order to comprehend the distinctive traits of Generation Z (Kim, 2024; Purmono, 2023; Wardi et al., 2025). Through a thorough examination of digital technology instructional strategies, contextual elements, and the distinctive traits of Generation Z, this review clarifies how educators and policymakers can better assist Generation Z in creating an effective digital technology environment and how educators can use digital technology to create an effective teaching strategy. Furthermore, this study presents a structured analysis process based on the following research questions:

RQ1: What are the key characteristics that define Generation Z in the context of education?

RQ2: How do the characteristics of Gen Z and digital technology influence their learning preferences?

RQ3: Which digitalised educational solutions do students most often use in their study process?

Literature Review

This review aims to give a thorough overview of recent studies on how Gen Z's traits and digital technology affect their learning preferences. The results, which are shown in Table 1 thorough analysis of the relationship between Gen Z's traits and digital technologies. However, most of the literature focuses only on AI or specific digital technologies, such as ChatGPT, as digital technology is not limited to AI. Many researchers have done their studies solely on a certain digital technology, and the participants in each study come from a wide variety of higher education programs. For example, McCarthy and Yan (2024) and Aryadoust et al. (2024) demonstrated how generative AI supports individualized and constructive learning in reading comprehensive on and the development of listening assessments appropriate for different skill levels. In addition, Zaim et al.'s (2025) study, through the use of interactive whiteboards, quizzes, a virtual environment for project implementation, educational films, course-based games, and interactive learning tools, digital solutions are also profoundly altering teaching courses (El-Sabagh, 2021; Wohlfart & Wagner, 2023; Potocan et al., 2025). As a result, while the majority of the literature has highlighted the benefits of AI technology, but many of them have not examined how users, particularly Gen Z, perceive it and how it affects their preferred methods of learning.

Table 1. A Synthesis of Selected Articles Overview and Detailed Analysis

	Synthesis of Gen Z Characteristic	Author (Year)
Gen Z traits	Short attention span. Normally, they have an average attention duration of 8 seconds.	Zulfachmi et al. (2025); Mantha & Krishna (2024); Saxena & Mishra (2021); Giray (2022)
	Demand for fast info, but neglect of the accuracy of the info. They lack the digital literacy skills to be conscientious, responsible media consumers. e.g. they cannot discern between valuable and non-valuable information.	Mantha & Krishna (2024); Hernandez-de-Menendez et al. (2020); Giray (2022)
	Underdeveloped social skills and are more prone to anxiety and depression. Less proficient in basic physical, perceptual motor, cognitive and social tasks.	Lochner (2025); Hernandez-de-Menendez et al. (2020)
	In favour of concise communication, often opting for texts over lengthy conversations. They prefer consultation methods that provide a quick turnaround time and are easy to use (e.g. being in the WhatsApp group with their Lecturer).	Hernandez-de-Menendez et al. (2020); Cain et al. (2022)
Gen Z Preferred learning platform and methods	Prefer visual and interactive content, e.g. such as VR, mixed reality, and AI systems. The brain section responsible for visual ability is far more advanced, making pictorial forms of learning like joint projects and interactive games more receptive than auditory learning, including lectures.	Saxena & Mishra (2021); Kuleto et al. (2021); Potocan et al. (2025); Cain et al. (2022)
	Prefer online training via videos. e.g. study has been found to have more daily visits to YouTube, 72%, it is touted as being a favourite method of learning.	Hernandez-de-Menendez et al. (2020); Kuleto et al.(2021); Giray (2022); Nicholas (2020)
	Prefer practical and effective learning and teaching methods	Mantha & Krishna (2024); Giray (2022)
	Prefer immediate feedback, collaboration, require flexibility	Alamäki & Marttinen (2021); Wardi et al.

Table 1 (Continue)

and independent learning.	(2025); Cain et al. (2022); Nicholas (2020)
Prefer "crowdsourcing" decision through online platforms; e.g. seeking reviews, recommendations, and insights from online influencers, especially via Instagram	Mantha & Krishna (2024)
Learners' perceived usefulness of ChatGPT in improving learning efficiency can directly impact learners' emotional states and engagement levels, and positive perceptions of its value in facilitating personalised, efficient learning may increase learners' sense of control, reduce boredom, and enhance their overall enjoyment of the learning process.	Mehrvarz et al. (2025)
Prefers learning from the internet and through listening rather than reading.	Saxena & Mishra (2021)
They are technologically savvy and in constant contact with people 24/7, with low or no tolerance of being without digital resources. e.g. Spends around 15.4 hours per week on their smartphones, which are always in their possession	Saxena & Mishra (2021)

Each of the literatures included here discusses a distinct sort of digital technology, hence their research focuses on a particular viewpoint on that technology. Therefore, in this systematic review, the author synthesises the various forms of digital technology reported in the studies. This review found that the majority of researchers favour the digital technology they proposed, but only a few of them critically and comprehensively criticized its disadvantages. Whatever the usage of any digital technology, there are always pros and cons to the devices. We shall not only look at the benefits of digital technology, especially when it is intended to be implemented and introduced to learners in higher institutions. A lot of external and internal factors should also be considered while encouraging students to use digital technology, such as the sufficient support of the infrastructure and qualified instructors who are experienced in using the high technology of devices.

Apart from the aforementioned studies, which are limited in the scope of their research, there are still some that, after comprehending the traits of Generation Z, have extensively offered highly helpful teaching strategies and guidelines for educators. For instance, an overview of Generation X, Y (Millennials), and Z and their traits in academics is given in Cain et al's (2022) study. They summarized of the ways that technology is now used in education is given, along with a framework for how lecturers might engage students more effectively. Additionally, Ding et al.'s (2025) study develops an extended model that uses the Technology

Acceptance Model (TAM), Perceived Risk Theory (PRT), and the Big Five Personality (BFP) framework to investigate the impact of BFP traits on Generation Z designers' willingness to pay for AI drawing tools. For the first time, this study methodically investigates how personality factors affect Generation Z designers' technology acceptance behaviours, offering new perspectives and theoretical advancements in the fields of personality psychology and technology acceptance research.

Conversely to artificial intelligence, social media is a crucial component of the vast and intricate social networks that comprise technology. Influencers on social media frequently have a significant impact on Gen Z peers, changing their relationships, views, and behaviours. Social computing is linked to social behaviour and makes it easier to monitor social influences on behaviour, nurturing values and beliefs (Xu et al., 2025). Furthermore, social media has been shown to increase awareness, make communication easier, support and maintain relationships, lower the cost of books, improve social and communication skills, and reduce stress (Xu et al., 2025). Besides, emotions can be conveyed, and personal features of debate and feedback can be added by fusing audio and visual components. (Mantha & Krishna, 2024). Although the use of technology in the classroom enhances and supplements instruction, it still cannot replace qualified and committed educators. Especially, cultural barriers and past experiences can be a support for understanding differences when it comes to teaching and learning for Gen Z. However, gaining proficiency with technology opens up new possibilities for involving students, encouraging teamwork, and stoking their curiosity. Therefore, to motivate students to engage in online learning, technological expertise must be incorporated.

Research Methods

The PRISMA guidelines (Preferred Reporting Items for Systematic Review and Meta-Analysis) are used in this systematic review. This PRISMA protocol, created by Page et al. (2021), provides a thorough checklist intended to increase the accuracy and transparency of the review process. Furthermore, a particular protocol was used to guide the literature search following the goals of the review, which consists of three main stages: identification, screening, and article inclusion. The identification stage began with data collection through the Google Scholar (GS), ScienceDirect (SD), EBSCO and Scopus database, using an official institutional account. The keywords used were "digital technology" AND "Generation Z" AND "learning style" OR "learning preference", which were searched in the title, abstract, and keywords (TITLE-ABS-KEY) sections. The search terms, database to be used, and selection criteria are among the important details described in this protocol (Table 2). Additionally, a specific protocol was to steer the literature search in alignment with the review objectives. This protocol outlines pertinent details, including search keywords, the database to be utilised, and selection criteria. For the search, four databases, Google Scholar (GS), ScienceDirect (SD), EBSCO and Scopus, were chosen for their widespread use across diverse disciplines, given the continuous evolution of technology impacting information archiving and retrieval methods. To ensure a comprehensive yet current scope, the publication date range was confined from 2020 to 2025, encompassing the past five years and providing an overview of developments over the last 5 years based on the information in the selected papers. This ensures that the review is firmly grounded in the most up-to-date literature reflecting the current information and synthesis in the digital era. The initial search yielded 26,090 published documents from 2020 to 2025. These documents were then exported in RIS or CSV format for further analysis.

Table 2. Inclusion and Exclusion Criteria of The Systematic Review

Characteristics of the Literature	Inclusion Criteria	Exclusion Criteria
Type of publication	Journal articles, conference papers, thesis	Reports, books, book chapters
Time	Only articles published in the 2020-2025	Journal articles published before 2020
Language	Articles are written in English	Articles are not written in English
Geography	No exclusion	No exclusion
Population groups	Higher education/Tertiary level students	Secondary education and Primary education students
Type of policies/interventions in scope	Perceptions and evaluations regarding Gen Z and digital technology within learning and educational purposes	No intervention of Digital Technology/Generative AI / AR/VR or social media

This study employs a Systematic Literature Review (SLR) approach, following the PRISMA protocol. After screening through the articles (figure 1), A total of 105 academic articles indexed in the ScienceDirect (SD), EBSCO and Scopus databases from 2020 to 2025 were analysed using the bibliometric tools VOSviewer. The results indicate two main clusters in the literature on learning preference on digital technology for Gen Z: (1) perception and learning experiences; (2) digital content and media; This study uses a qualitative content analysis method with a Systematic Literature Review (SLR) approach to answer specific questions, namely: how do the characteristics of Gen Z and digital technology influence their learning preferences published in reputable international journals indexed by the four database over the past five years, namely 2020–2025. During the screening stage, a filtering process was conducted based on inclusion and exclusion criteria (figure 1). Articles without full-text access, not from reputable scientific journals, duplicates, or not directly relevant to the topic of cross-generational pedagogy were excluded from the dataset. After this process, 21,757 articles remained suitable for analysis. The final stage, the inclusion stage, involved an in-depth selection process based on relevance to the research theme and metadata completeness. From this process, 105 validated articles were selected and used as the basis for mapping and bibliometric analysis using the VOSviewer tool.

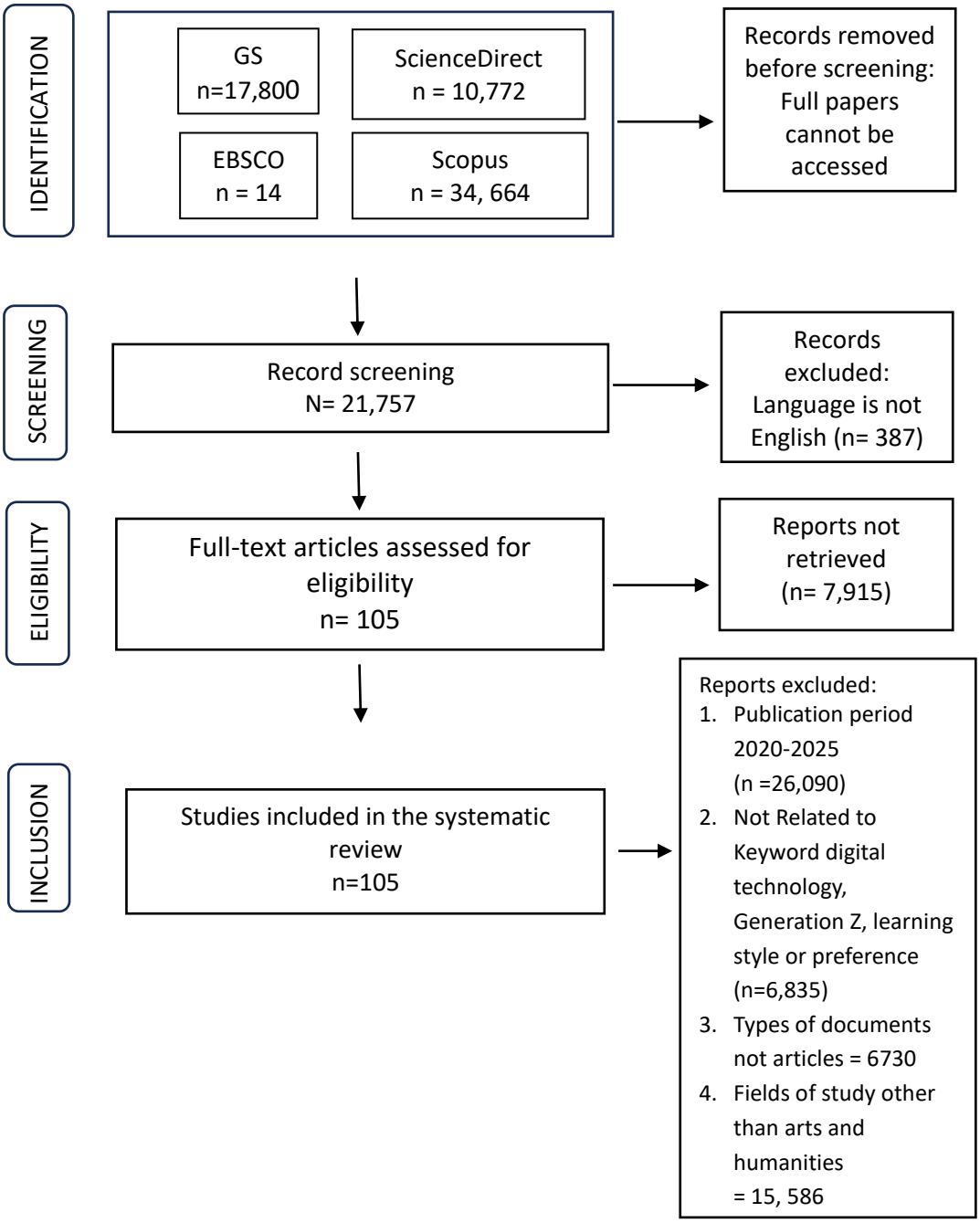


Figure 1. Stages of article retrieval

Table 3. Keyword Clusters Based on VOSviewer Analysis

Cluster	Number of Keywords	Keywords
Cluster 1	22 items	Genarative artificial intelligence, Outcome, Chatgpt, tool, teacher, geneative ai, learning, process, challenge, fileld, lack, influence,

Table 3 (Continue)

		interative, relationship, role, data, model,
Cluster 2	24 items	literature, artificial intelligence, approach, importance Design methodology approach, practical implication, interview, data, artificial intelligence, impact, survey, university, higher education, attitude, use, perception, study, effectiveness, teacher, gen z, generation, preference, challenge, group, article, term, paper, perception.

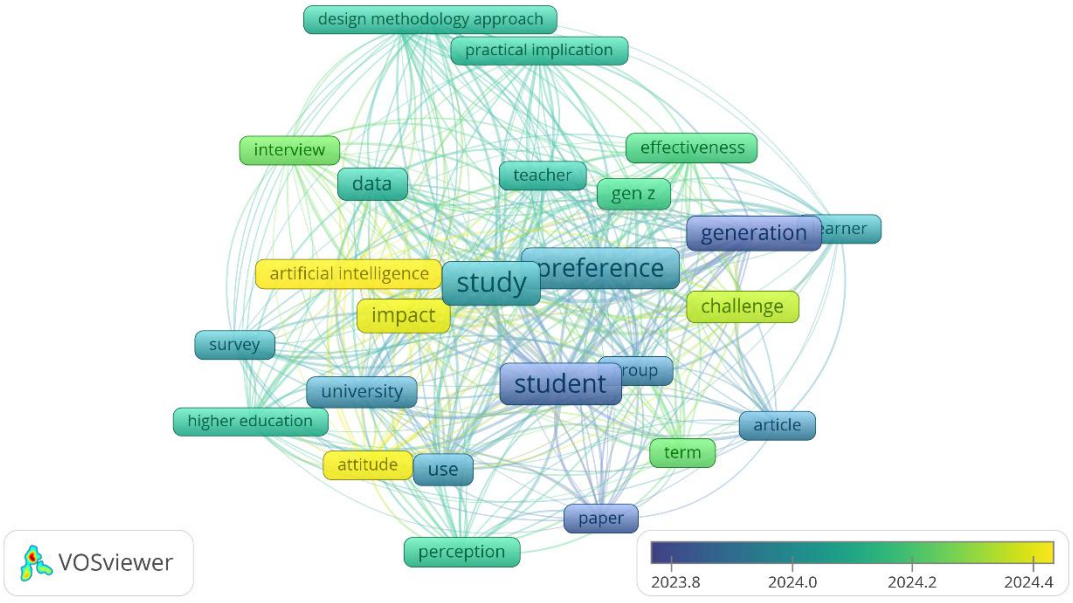


Figure 2. The trend of topics in Gen Z and digital technology influences their learning preferences

The overlay visualisation image (figure 2) from VOSviewer provides an overview of the temporal development of keywords used in scientific publications related to the issue, the characteristics of Gen Z and digital technology influence their learning preferences. The colors in the network indicate the dominant year of appearance for each keyword, with a spectrum ranging from dark blue (early 2023) to bright yellow (approaching 2024). From this visualization, it can be seen that the word "student," "study" and "preference" which are the

center of the largest node in the network, has a blue-purple color, indicating that this concept has been a focus since the beginning of data collection. This shows that discourse on students' study preference has long been a concern in literature studies. Keywords such as "generation," "unversity," "paper," "use," and "article" are also predominantly blue, indicating that these terms appear more frequently in early literature around 2023. Meanwhile, words such as "attitude," "impact," "artificial intelligence," and "challenge" are highlighted in bright yellow, meaning these topics appear more intensely in recent publications toward the end of 2023 and into 2024. This shows a shift in the focus of studies from identifying generations and the learning style context to more specific issues of behavior and digital technology, such as students' trust in digital media and their intention to learn through online platforms. Other keywords such as "effectiveness," "gen z," and "perception" are in the middle with a blue-green color, indicating the continuity of these topics throughout the publication period.

Results and Discussion

The selected articles were specifically chosen to address targeted research questions, and their findings are synthesised and presented in Tables 1 for a comprehensive overview and detailed analysis. Each article was selected based on relevance to the study's objectives and adherence to rigorous inclusion criteria, ensuring that only the most pertinent and insightful research contributions were included. Table 1 provides an overview of selected results, offering a perception of Gen Z students towards digital technology and their learning preferences in this context. In summary, all selected articles are relevant to the current research. For instance, according to Hernandez-de-Menendez et al. (2020), students frequently use technology to improve or expedite the academic process because it improves the teaching and learning experience. Additionally, technology can foster the development of new competencies and skills. Furthermore, the use of quizzes, interactive whiteboards, a virtual environment for project implementation, educational films, course-based games, and interactive learning tools is an example of how digital solutions are drastically altering teaching courses (El-Sabagh, 2021; Wohlfart & Wagner, 2023; Potocan et al., 2025).

However, Hernandez-de-Menendez et al. (2020) also note that the high implementation and maintenance costs remain a problem. In addition, social interactions are not fostered by this technology, and its efficacy in education has not been thoroughly established. Lastly, a person with virtual skills may not always act in the same way in real life. Therefore, although many researchers have supported that digital technology helped and enhanced students' competencies and skills, the side effects of technology, such as a decrease in physical social interactions and insufficient infrastructure, should not be overlooked.

According to Alamäki and Marttinen (2021), Gen Z is actually born into a world that is integrated, globally connected, and has always had access to the Internet. They are adept at multitasking and frequently challenge accepted practices (Alamäki & Marttinen, 2021). According to Alamäki and Marttinen (2021), they anticipate an educational setting where they can engage in the same manner as they do in their virtual worlds, requiring fast information and substituting "interaction" for traditional "communication." But it's important to consider certain disadvantages of digital technology. Wajdi (2024), for instance, contends that our capacity to have meaningful in-person interactions is being undermined by our growing reliance on digital communication technology. High-level anonymisation raises ethical concerns and

hazards related to data biases and information losses (Mantha & Krishna, 2024). Furthermore, human relationships like sympathetic interactions with professors or study instructors cannot be replaced by AI (Alamäki & Marttinen, 2021). Additionally, continuous smartphone monitoring and/or use can lead to poor academic performance, reduced physical activity, stress, anxiety, disengagement, sleep disturbances, and a deterioration in well-being (Giary, 2022). Moreover, short attention spans may make standard teaching methods difficult, necessitating the adoption of interactive and captivating strategies by educators. (Wajdi et al., 2024). 22). Due to their short attention spans in an avearge of 8 seconds for Gen Z (Hawthorne-Castro, 2020), this generation prefers succinct communication and frequently chooses texting over long talks (Mantha & Krishna, 2024). An excessive dependence on technology could result in less in-person connection, which would affect social and communication abilities. (Wajdi et al., 2024).

As stated by Mantha and Krishna's (2024) study, Gen Z is actually a multimodal learner, which means that they learn best by using a variety of senses and methods rather than just one. They benefit from a combination of visual (seeing), auditory (hearing), reading/writing, and kinesthetic (doing/hands-on) approaches to better understand and retain information. Because the new Gen Z learners are more gifted and technologically savvy, they require immediate feedback, are easily bored, prefer teamwork, need flexibility and independence, require personalised learning paths, and are not constrained by geography, proximity, or time zones (Alamäki & Marttinen, 2021). Additionally, Gen Z communicates frequently rather than for extended periods of time, and they spend the majority of their time online. This alters how Gen Z learns in universities; in contrast to earlier generations, they prefer to learn through images, videos, and audio rather than text (Hernández-de-Menéndez et al., 2020). The environmental environment has a greater influence on the architectural differences in Generation Z's brains than heredity. Pictorial learning, such as group projects and interactive games, is more receptive than auditory learning, such as lectures, because the brain region responsible for visual ability is much better developed (Saxena & Mishra, 2021). Instagram, Facebook, Tik Tok, YouTube, personal websites, social gaming, etc. are methods of mass communication and information sharing; Gen Z prefers learning from the internet and through listening rather than reading; spends about 15.4 hours a week on their smartphones, which are always with them; has an average attention duration of 8 seconds; may expect prompt feedback; communicates in short bursts of information instead of long messages; and prefers to learn through listening rather than reading (Saxena & Mishra, 2021). Significantly, these results served as a basis for the conception of the current study.

Even though most research focuses separately on Gen Z's learning preferences and the effects of digital technology, some literature has helped author to have a better understanding of Gen Z's characteristics and learning style. Furthermore, some studies focus only on artificial intelligence, even though digital technology encompasses more than just AI; social media and virtual reality are also included in this category. Consequently, the literature can be broadly categorised using the following standards in Table 1: the characteristics of Gen Z and their preferred learning platform and methods that contrast with the incorporation of technology include their short attention spans and inclination for quick and easy methods of learning and information, as well as their ease of access to information about today's cutting-edge technology. This methodical technique offers a clear framework for comparing and evaluating

the results across the chosen literature and enables a targeted investigation of the research issues.

However, it is regrettable that there are still insufficient studies that provide a thorough understanding of how digital technology affects Gen Z's learning preferences; some of the literature either concentrates primarily on the impact of artificial intelligence or only addresses Gen Z's learning style and other factors separately. This was further supported by the fact that, when researchers looked into a similar topic, ChatGPT and the general AI context were the most relevant and popular, while the majority of occurrences related to the earlier research found very little relevance to the topic of Gen Z's preferred learning style and the impact of digital technology. As a result, the current study was relatively new and helped advance the field's understanding of how digital technology affects Gen Z's learning preferences.

Conclusions

Understanding students' preferred methods is key to unlocking the secrets of individual learning, regardless of whether Gen Z favours kinesthetic or multimodal learning. Every student uses a different combination of learning techniques, such as active engagement, visual processing, or cooperative exploration; it is not a one-size-fits-all game. Research indicates that while certain styles may predominate, they interact dynamically to shape each student's learning path (Mantha & Krishna, 2024). Mentoring and challenging our Digital Native students, the next generation of adults, is a dual duty of university faculty. Assignments must be updated, communication must be tailored to their preferred approaches, and they must be ready for the fast-paced demands of their immediate professional realities (Mantha & Krishna, 2024).

Digital documentation, real-world case studies, and immersive learning are what Generation Z prefers. To accommodate students' changing learning preferences, methodological procedures should be changed throughout a course. It seems to make sense to assume that different courses will employ different methodological or instructional approaches if it is acknowledged that different students learn in different ways. (Cain et al., 2022). The most pressing need, according to the results of this systematic review, is to hasten the adoption of digital teaching strategies and resources. This will lessen the predominance of traditional textbooks in the educational process and give students more easily accessible digital content that suits their preferences (Potocan et al., 2025).

References

Alamäki, A., & Marttinen, K. (2021). Adopting artificial intelligence for the learning and teaching of Generation Z in higher education.https://esignals.fi/research/en/2021/06/24/adopting-artificial-intelligence-for-the-learning-and-teaching-of-generation-z-in-higher-education/

Aryadoust, V., Zakaria, A., & Jia, Y. (2024). Investigating the affordances of OpenAI's large language model in developing listening assessments. *Computers and Education: Artificial Intelligence*, 6, 100204. https://doi.org/10.1016/j.caeai.2024.100204

Cai, Q., Lin, Y., & Yu, Z. (2024). Factors influencing learner attitudes towards ChatGPT-assisted language learning in higher education. *International Journal of Human–Computer Interaction*, 40(22), 7112-7126. : https://doi.org/10.1080/10447318.2023.2261725

Cain, C. C., Morgan Bryant, A., Buskey, C. D., & Meyers Ferguson, Y. (2022). Generation Z, learning preferences, and technology: An academic technology framework based on enterprise architecture. *The Journal of the Southern Association for Information Systems*, 9(1), 1-14. https://doi.org/doi:10.17705/3JSIS.00019

Calabrese, J. (2023). A Pilot Study to Compare Lecture and Active Learning. *Journal of Occupational Therapy Education*, *7*(2), 8.

Chan, C. K. Y., & Zhou, W. (2023). Deconstructing student perceptions of generative AI (GenAI) through an expectancy value theory (EVT)-based instrument. *arXiv preprint arXiv*:2305.01186. https://orcid.org/0000-0001-6984-6360

Ding, N., Chen, M., & Hu, L. (2025). Examining the impact of big five personality traits on generation Z designers' subscription to paid AI drawing tools using SEM and FsQCA. *Scientific Reports*, 15(1), 17587. https://doi.org/10.1038/s41598-025-02926-8

El-Sabagh, H. A. (2021). Adaptive e-learning environment based on learning styles and its impact on development students' engagement. *International Journal of Educational Technology in Higher Education*, 18(1), 53. https://doi.org/10.1186/s41239-021-00289-4

Giray, L. (2022). Meet the centennials: Understanding the generation Z students. *International Journal of Sociologies and Anthropologies Science Reviews*, 2(4), 9-18. https://doi.org/10.14456/jsasr.2022.26

Gutersohn, C., Schweingruber, S., Haudenschild, M., Huber, M., Greif, R., & Fuchs, A. (2023). Medical device education: study protocol for a randomised controlled trial comparing self-directed learning with traditional instructor-led learning on an anaesthesia workstation. *BMJ open*, *13*(9), e070261.

Hanawi, S. A., Saat, N. Z. M., Hanafiah, H., Taufik, M. F. A. M., Nor, A. C. M., Hendra, A. K., ... & Azlan, T. N. A. I. (2022). Relationship between learning style and academic performance among the generation Z students in Kuala Lumpur. *International Journal Of Pharmaceutical Research And Allied Sciences*, 11(3-2022), 40-48. https://doi.org/10.51847/bznxqWIsQL

Hernández-de-Menendez, M., Escobar Díaz, C. A., & Morales-Menendez, R. (2020). Educational experiences with Generation Z. *International Journal on Interactive Design and Manufacturing (IJIDeM),* 14(3), 847-859. https://doi.org/10.1007/s12008-020-00674-9

Huilaja, L., Bur, E., Jokelainen, J., Sinikumpu, S. P., & Kulmala, P. (2022). The effectiveness and student perceptions of peer-conducted team-based learning compared to faculty-led teaching in undergraduate teaching. *Advances in medical education and practice*, 535-542.

Jayaputri, H. E. (2024). ChatGPT in action: Unraveling its impact on student motivation in English language learning. Scope: *Journal of English Language Teaching*, 8(2), 448-456. https://journal.lppmunindra.ac.id/index.php/SCOPE/

Kim, K. (2024): Medical student needs for e-learning: Perspectives of Generation Z. – *Korean Journal of Medical Education* 36(4): 389-399. doi: 10.3946/kjme.2024.312

Kuleto, V., P, M. I., Stanescu, M., Ranković, M., Šević, N. P., Păun, D., & Teodorescu, S. (2021). Extended reality in higher education, a responsible innovation approach for generation y and generation z. Sustainability, 13(21), 11814. https://doi.org/10.3390/su132111814

Lai, J. W. (2024). Adapting self-regulated learning in an age of generative artificial intelligence chatbots. *Future Internet*, 16(6), 218.

Lochner, A. (2025). Student-lecturer interactions: Do traditional methods appeal to Generation Z students?. Perspectives in Education, 43(1), 19-35.

Mantha, M. S., & Krishna, P. V. (2024). A Literature Review of Learning Preferences, Motivational Factors and Training Needs Among Different Generations of Baby Boomers, Gen x, Gen y and Gen z Students and Professionals. *Education and Society*, 48(1), 53-64. https://www.researchgate.net/profile/Vamsi-Pratapa/publication/378129374_Education_and_Society

McCarthy, K. S., & Yan, E. F. (2024). Reading comprehension and constructive learning: Policy considerations in the age of artificial intelligence. *Policy Insights from the Behavioral and Brain Sciences*, 11(1), 19–26. https://doi.org/10.1177/23727322231218891

Mehrvarz, M., Salimi, G., Abdoli, S., & McLaren, B. M. (2025). How does students' perception of ChatGPT shape online learning engagement and performance?. *Computers and Education: Artificial Intelligence*, 100459.

Nicholas, A. J. (2020). Preferred learning methods of generation Z.

Page, M. J., Moher, D., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & McKenzie, J. E. (2021). PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. *bmj*, 372. http://dx.doi.org/10.1136/bmj.n160

Potocan, V., Nedelko, Z., & Rosi, M. (2025). Digitalization of higher education: Students' perspectives. *Education Sciences*, 15(7), 847. https://doi.org/10.3390/educsci15070847

Purmono, B. (2023): Entrepreneurial intention among Generation Z: Education, self-efficacy, and attitude. – Enrichment: *Journal of Management* 13(1): 16-31. https://doi.org/10.35335/enrichment.v13i1.1228

Saxena, M., & Mishra, D. K. (2021). Gamification and gen Z in higher education: A systematic review of literature. *International Journal of Information and Communication Technology Education (IJICTE)*, 17(4), 1-22. https://orcid.org/0000-0002-6457-8376

Schlesinger, S. L., Heuwieser, W., & Schüller, L. K. (2021). Comparison of self-directed and instructor-led practice sessions for teaching clinical skills in food animal reproductive medicine. *Journal of Veterinary Medical Education*, *48*(3), 310-318.

Shahzad, M. F., Xu, S., & Javed, I. (2024). ChatGPT awareness, acceptance, and adoption in higher education: The role of trust as a cornerstone. *International Journal of Educational Technology in Higher Education*, 21(1), 46. https://doi.org/10.1186/s41239-024-00478-x

Wajdi, M., Susanto, B., Sumartana, I. M., Sutiarso, M. A., & Hadi, W. (2024). Profile of generation Z characteristics: Implications for contemporary educational approaches. *Kajian Pendidikan, Seni, Budaya, Sosial dan Lingkungan*, 1(1), 33-44. https://doi.org/10.58881/kpsbsl.v1i1.8

Wardi, R. H., Hassan, M. H., Yusof, U. Z. M., & Rosman, R. (2025). Gen Z's Learning Preferences in Creative Design: A Conceptual Framework. *Quantum Journal of Social Sciences and Humanities*, 6(3), 332-343. https://doi.org/10.55197/qjssh.v6i3.771

Winarjo, W. (2025). Generational Shift in Learning Discomfort: A Systematic Literature Review of Pedagogical Tensions Between Millennials and Generation Z. *Journal of Strategy and Transformation in Educational Management*, 16-29.

Wohlfart, O., & Wagner, I. (2023). Teachers' Role in Digitalizing education: An umbrella review. *Educational Technology Research and Development*, 71(2), 339–365. https://doi.org/10.1007/s11423-022-10166-0

Wu, Y. (2024). Study on the impact of utilizing ChatGPT and other AI tools for feedback in EAP writing classrooms on the discursive writing performance of English major students. *Transactions on Social Science, Education and Humanities Research*, 4, 143-150. https://pdfs.semanticscholar.org/55dc/6b87a45d8a80c4a267582c422230512ab02f.pdf

Xu, D., Feng, S., & Huang, Z. (2025). Positive and negative factors of the influence of new media and the digital environment on ideal and belief education among university students in China. *The Journal of General Psychology*, 152(2), 306-329. https://doi.org/10.1080/00221309.2024.2385105

Xu, X., Wang, X., Zhang, Y., & Zheng, R. (2024). Applying ChatGPT to tackle the side effects of personal learning environments from learner and learning perspective: An interview of experts in higher education. *PLoS One*, 19(1), e0295646. https://doi.org/10.1371/journal.pone.0295646

Yaseen, H., Mohammad, A. S., Ashal, N., Abusaimeh, H., Ali, A., & Sharabati, A. A. A. (2025). The impact of adaptive learning technologies, personalized feedback, and interactive AI tools on student engagement: The moderating role of digital literacy. *Sustainability*, 17(3), 1133. https://doi.org/10.3390/su17031133

Zaim, M., Arsyad, S., Waluyo, B., Ardi, H., Al Hafizh, M., Zakiyah, M., ... & Hardiah, M. (2025). Generative AI as a Cognitive Co-Pilot in English Language Learning in Higher Education. *Education Sciences*, 15(6), 686. https://doi.org/10.3390/educsci15060686

Zulfachmi,Normala, R., Wan., R., Puji, R. Aggry, S. (2025). Systematic literature review of learning model using augmented reality for generation Z in higher education. *Indonesian Journal of Electrical Engineering and Computer Science.* Vol. 39 (2),1109-1120.