

 Research Article

# Student's Perception of Syllabus Adoption in Higher Education; Redesigning for the Age of AI

Tlalane Mosae<sup>1</sup> , Rekha Kaushal<sup>1</sup> 

<sup>1</sup>School of Liberal Arts, GD Goenka University, Gurgaon, India

## Abstract

This research investigates the incorporation of artificial intelligence (AI) within higher education curricula, concentrating on students' views regarding necessary syllabus modifications to adequately prepare for a future influenced by AI. The study delineates three primary objectives: to determine what elements should be included in the syllabus, to identify key AI tools for academic growth, and to understand the challenges associated with embedding AI into current educational frameworks. A qualitative research study was adopted, employing semi-structured interviews with ten students selected through purposive sampling. A thematic analysis was performed to uncover recurring themes and insights. The results reveal a significant demand for AI literacy, project-based learning, and practical applications as vital components of a restructured syllabus. Students identified tools such as Grammarly, ChatGPT, and specialized AI platforms for various disciplines as essential for academic achievement. Nonetheless, the challenges of over-reliance on AI, diminished creativity, and complacency were also noted. This investigation highlights the necessity for a syllabus that effectively balances technological integration with the maintenance of creativity and critical thinking. By considering student perspectives, higher education institutions can enhance readiness for graduates poised to enter an AI-influenced job market. The implications of this study suggest that educators should emphasize the inclusion of project-based learning modules that motivate students to leverage AI tools for addressing real-world challenges. Faculty development programs should aim at providing educators with the competencies required to assist students in the ethical and productive application of AI. Future inquiries should examine faculty opinions and the long-term effects of AI-enhanced syllabi.

**Keywords:** Artificial Intelligence, Higher Education, Syllabus, Student Perception

✉ Correspondence  
Tlalane Mosae  
[mosaetalane@gmail.com](mailto:mosaetalane@gmail.com)

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## 1. INTRODUCTION

When the content in digital files speaks aloud, when the computer programs engage in one of the highest forms of multisensory integration and intellectual exchange, the educated conversation., what new roles do teachers and learners play? The enormous influence of Artificial intelligence in higher education is evident. AI technologies, including generative AI tools like ChatGPT, are becoming integral to educational settings, offering both opportunities and challenges (Chan & Hu, 2023). This transformation requires a re-evaluation and adaptation of the syllabus and curriculum to ensure it stays current, captivating, and aligned with the skills needed for the digital era (Qureshi et al. 2021; Koval, 2023)

Popenici and Kerr (2017) define AI as a computing system that can perform human-like functions and is capable of engaging in human-like processes such as learning, adapting, synthesizing, self-correction, and processing complex tasks using data. One key advantage of AI is personalized learning, where systems assess students' strengths and weaknesses to provide customized educational materials (Gligorea et al., 2023). Additionally, Intelligent tutoring platforms improve learning outcomes (Kulik & Fletcher, 2016).

Furthermore, it is key to consider students' perspectives on integrating AI into their academic programs. Students' opinions on the integration of artificial intelligence (AI) in higher education are strongly shaped by their perceptions of how effectively educational institutions are preparing them for future careers. With the continuous advancement of AI technologies, there is a growing concern about the adequacy of the current syllabus in preparing learners with the necessary skills and knowledge for a successful workforce driven by AI. Studies have shown that many students believe their universities are not adequately preparing them for careers that increasingly require AI competencies, causing uncertainty about their ability to compete in an AI-driven job market (Sit et al., 2020; Kalnina et al., 2024). It is important to update curricula and educational resources to align with AI work environments and offer suggestions for future research.

Redesigning the syllabus must not only account for AI tools but also address the ethical, practical, and societal implications of their use. As AI becomes more embedded in education, from automated grading to personalized learning platforms (Akgun & Greenhow, 2021; Gligorea et al., 2023), learners must be equipped with the skills to critically evaluate, utilize, and innovate with these tools. Furthermore, syllabus adoption in this context requires balancing technological integration with the preservation of core human-centered learning principles, such as critical thinking and ethical reasoning. This research explores students' perspectives on the adoption and redesign of syllabi in the age of artificial intelligence. By investigating their worries and expectations, the research seeks to uncover methods for successfully incorporating AI into higher education syllabi, creating a learning atmosphere that equips students with a swiftly changing future.

## **2. REVIEW OF LITERATURE**

### **2.1. AI in Higher Education**

AI-driven educational technologies are emerging as formidable assets that present numerous opportunities to elevate the teaching and learning experience, customize instructional approaches, and enhance educational outcomes. A particularly significant advantage of AI in the realm of educational technology lies in its capacity to individualize learning experiences (Akgun & Greenhow; Gligorea et al., 2023). Tailored learning adapts educational material to accommodate the distinctive desires, likes, and learning styles of each student, thereby fostering greater engagement (Zaman, 2023; Dishon, 2017). This is accomplished through the analysis of extensive data pertaining to students' performance, strengths, and weaknesses, with the learning content being modified accordingly.

Adaptive learning platforms are a prime example of AI-driven personalized learning (Huang et al., 2021). These platforms employ advanced algorithms to collect students' data and modulate the complexity of exercises and learning paths by individual student progress (Cui et al., 2019). For instance, when a student excels in a particular topic, the system presents more challenging tasks to keep them engaged and motivated (Zhai, 2022). Conversely, should a learner encounter difficulties with certain concepts, the platform provides supplementary resources and practice to reinforce comprehension (Zhai, 2022). This methodology is meticulously designed to facilitate more well-organized and effective learning by providing students with personalized educational experiences that align with their unique needs and capabilities (Zhai, 2022).

AI-powered intelligent tutoring systems (ITS) contribute an additional dimension to personalized education by delivering tailored support and feedback (Crompton & Burke, 2023). These systems utilize language processing and machine learning algorithms to comprehend student inquiries, provide explanations, and track progress. Intelligent tutoring solutions simulate one-on-one instruction, offering customized feedback that closely resembles the guidance provided by a human tutor (Kakish & Pollacia, 2018; Wang et al., 2024). This method enhances students' ability to grasp complex concepts more effectively and bolsters their overall academic performance. A notable illustration of an Intelligent Tutoring System (ITS) is the 'Cognitive Tutor,' developed by Carnegie Learning. Research indicates that students utilizing the Cognitive Tutor experience substantial improvements in their learning outcomes when compared to those who depend on traditional pedagogical methods (Nye, 2015). Furthermore, these adaptive systems substantially enhance academic outcomes by addressing diverse learning requirements and creating a more inclusive and effective educational environment (Gligorea et al., 2023; Er-Rafy et al., 2024). In conclusion, AI-driven adaptive learning signifies a transformative shift within education, advocating for personalized learning experiences that are attuned to the individual needs of students.

### **2.1.1. Importance of AI Literacy for Future Career Success**

The swift progress in machine learning technology has profoundly impacted education, emphasizing AI literacy at all levels. As AI shapes industries and professions, fostering AI literacy in teacher education, STEAM, and social studies is essential for preparing individuals to engage with AI ethically and ensure future success (Rütti-Joy 2023; Relmasira, 2023; Yetişensoy & Rapoport, 2023). AI literacy is the comprehension of AI concepts, principles, and applications coupled with the ability to critically assess and apply AI technologies (Ng et al., 2021; Ng, 2023).

Research has indicated that the integration of proficiency in AI into educational curricula, spanning from primary education to higher learning institutions, can more effectively equip learners for the strains of the future workforce (Zhou & Lin, 2020; Zhao et al., 2022; Otero et al., 2023). By promoting AI literacy, students can cultivate the important skills and knowledge required to navigate the transforming job market, in which AI is anticipated to assume an increasingly vital role. Furthermore, scholars have underscored the significance of AI literacy across diverse fields, including healthcare, engineering, and social sciences (Stewart, 2023; Chetty, 2023; Mazarakis, 2023). As AI technologies gain greater prevalence within these sectors, individuals possessing a robust understanding of AI will be more adept at leveraging these technologies, enhancing their productivity, and contributing to the formulation of innovative solutions (Chetty, 2023; Mazarakis, 2023).

Moreover, AI literacy is not only limited to the technical aspects of AI but also the ethical considerations and societal implications of its use (Ng et al., 2021; Mazarakis, 2023). By fostering a thorough comprehension of AI, individuals are empowered to make informed decisions, advocate for responsible AI practices, and add to the ethical advancement and implementation of AI systems (Larsson, 2023; Meyer, 2023). Researchers have proposed various frameworks and analysis methods to effectively integrate knowledge of AI concepts into educational and professional settings (Ng, 2023; Chiu et al., 2022; Laupichler, 2023). These include the development of AI literacy curricula, teacher training programs, and validated instruments to measure individuals' AI-related knowledge, skills, and attitudes.

## **2.2. Syllabus Design in the Digital Era**

### **2.2.1. Trends in Syllabus Adaptation to Meet Technological Advancements**

The rapid advance in digital technologies has significantly influenced the education sector, prompting a thorough reassessment and modification of curriculum and syllabus design (Qureshi et al. 2021). Researchers have emphasized the importance of incorporating digital competencies, literacy, and technology-enhanced learning into the curriculum to adequately equip learners for the demands of the modern, technology-driven world (Parveen, 2024; Ibrahim et al., 2023; Adipat, 2024; Sholjakova, 2019).

Several studies have explored the incorporation of various digital instruments and technologies, including machine learning, AR, virtual reality, and adaptive learning systems, into different subject areas and educational levels (Singh, Hiran, 2022; Adipat, 2024; Sholjakova, 2019). These inquiries elucidate the prospective advantages of harnessing innovation to enhance the efficacy of teaching and learning, elevate student engagement, and foster personalized and inclusive educational experiences (Mayes et al., 2015; Sumarno, 2023; Zhang, 2022). Additionally, studies have investigated the integration of digital tools and technologies into various subject areas, such as civic education (Halimi et al., 2022), problem-based learning (Murad, 2023), and dance education (Sun, 2018). These studies emphasize the necessity for innovative pedagogical methodologies and the efficient utilization of digital resources to augment student learning and engagement (Chin et al., 2018; Birla, 2023). In conclusion, the literature highlights the critical role of syllabus adaptation in the digital era, as educational institutions strive to prepare students for the demands of the digital age and harness the potential of technological advancements to enhance the quality and accessibility of education.

### **2.2.2. Benefits of Student-Centered Curriculum Design**

Student-centered curriculum design has increasingly been recognized as a more effective approach compared to traditional teacher-centered models (McLaughlin et al., 2019). By placing the student at the core of the educational process, student-centered curricula offer various advantages that strengthen the educational value and applicability of education. One of the key benefits of student-centered curriculum

design is the improvement in learning outcomes. Research has demonstrated that problem-based and inquiry-based learning approaches result in enhanced academic performance and a deeper understanding of the subject matter (Zheng et al., 2021; Putri et al., 2023; Bruehl et al., 2014). These strategies involve students in active problem-solving and critical thinking, enabling them to apply their knowledge in real world scenarios and develop a more profound grasp of the material.

Student-centered curricula offer significant advantages, including increased engagement and motivation among students. By promoting active learning and involving students directly in the learning process these curricula increase students' engagement and motivation and a sense of ownership over their learning, which enhances their intrinsic motivation to succeed (Kohli & Dhaliwal, 2013; Qi et al., 2021; Baron, 2017). Furthermore, another significant benefit of student-centered design is its ability to provide individual and adaptive learning experiences. By tailoring the curriculum and instructional strategies to encounter the various needs, interests, and learning styles of individual students, student-centered approaches encourage inclusive and equitable educational experiences (Mnguni, 2019; Lee et al., 2023).

Moreover, student-centered approaches are instrumental in cultivating analytical reasoning and solution-finding skills by encouraging the practical application of knowledge and the exploration of real-world issues. These curricula help students develop essential digital-age skills like critical thinking, problem-solving, and creativity (Pattacini, 2018). These skills are increasingly vital in today's dynamic environment, where students must think independently and tackle complex challenges.

### 3. RESEARCH METHODS

This study utilized a qualitative case study. Case studies are particularly useful for examining contemporary phenomena within their real-life settings, enabling a thorough understanding of the perspectives and experiences of individuals or groups. In this instance, the research aimed to understand students' perceptions of syllabus adoption and the integration of artificial intelligence (AI) in higher education.

#### 3.1. Participants

Participants comprised ten undergraduate and postgraduate students from various academic disciplines within a single higher education institution. The researcher employed purposeful sampling to identify participants for the investigation concerning syllabus adoption in higher education. Purposive sampling refers to the selection of a sample that is abundant in relevant data for the research (Buyukozturk, Cakmak, Akgun, Karadeniz & Demirel, 2018). These participants were intentionally chosen based on their academic backgrounds and their utilization of AI tools in their educational pursuits. The selection criteria included familiarity with AI tools, active involvement in academic programs, and a readiness to share their experiences. The objective of the sample was to encompass a variety of perspectives, with participants representing disciplines such as engineering, liberal arts, and business studies. This approach entails selecting a sample that is rich in data.

#### 3.2. Data Collection and Analysis

Data were gathered through semi-structured interviews carried out in person. Each interview took roughly 10-15 minutes and adhered to a flexible interview guide to enable participants to expand upon their answers. The inquiries directed at the participants included;

*What do students believe should be added to the higher education syllabus to prepare them for the Age of AI?*

*What AI tools do students feel are essential for their academic growth?*

*What challenges do students anticipate in incorporating AI content into the syllabus?*

According to Creswell (2008), qualitative data analysis is a process that involves categorizing, describing, and synthesizing data. The data analysis procedure utilized thematic analysis. Interview transcripts were examined and coded manually to uncover consistent themes and patterns. The analysis

adhered to Braun and Clarke's six-phase framework: becoming acquainted with the data, creating initial codes, identifying themes, evaluating themes, specifying themes, and compiling the final report. This methodology guaranteed a methodical and thorough interpretation of the data.

### 3.2.1. Instruments

An interview guide was utilized throughout the data collection phase, comprising open-ended questions designed to meet the research aims. This guide underwent pilot testing with two participants to enhance the precision and pertinence of the questions. The instrument used was Otter AI. The instrument featured prompts concerning students' viewpoints on modifications to the syllabus, particular AI tools they employ, and the obstacles they anticipate in the incorporation of AI.

### 3.2.2. Research Biases

To reduce research biases, various strategies were utilized. Peer debriefing sessions took place with scholarly colleagues to assess the coding procedure and interpretations. Member checking was additionally employed, permitting participants to examine and confirm the precision of their transcribed responses. These actions strengthened the credibility and reliability of the findings.

## 4. RESULTS

The study was founded on the research questions.

**Research question 1-** *What do students believe should be added to higher education syllabus to prepare them for the Age of AI?*

The study revealed that students believe higher education syllabi should include AI literacy in artificial intelligence to prepare them for an AI-driven future adequately. Most responses were similar in all participants.

**Students 1, 6, and 7 echoed;** *"I feel like teachers should teach us how to use AI efficiently, we should learn its basics"*

**Student 3 resonated;** *"AI project-based learning should be highlighted in the syllabus so that students can apply AI solutions to problems in real life"*

**Student 4 emphasized,** *"I think AI should be added to the syllabus but should be taught properly."*

Students demonstrated a significant agreement on the necessity of incorporating AI literacy and project-based learning into the syllabus of higher education. A substantial portion of participants underlined the importance of grasping the fundamentals of AI for students to maintain their competitiveness in a workforce increasingly influenced by AI technologies. This essential knowledge would not only orient students to AI tools but also empower them to evaluate and utilize these instruments proficiently. These findings suggest that students perceive AI literacy and its practical applications as vital for their career readiness, mirroring a larger call for educational programs that align academic instruction with industry requirements. By embedding these elements into their syllabus, educational institutions can more effectively equip graduates to tackle the evolving challenges posed by the era of AI.

**Research Question 2 -** *What AI tools do students feel are essential for their academic growth?*

The study identified several tools and technologies that students believe should be integrated into higher education syllabi to align with the demands of the AI era.

**Student 2;** *"AI tools that I think are essential are Grammarly because it helps with grammar some other tools help break down complex texts into simpler terms."*

**Students 3 and 4;** *"I feel like mind mapping tools are essential and programming skills"*

**Student 6;** *“I think essay writing AI like Jenni.ai helps in wording ideas properly but as an engineer, AUTOCAD ai and CODE ai help a lot in my assignment”*

**Student 7;** *“I think ChatGPT is the most usual tool, Jenni ai, coding platforms for engineers and programming platforms”*

Students recognized a wide array of AI tools that they consider vital for their academic and professional growth. Frequently cited tools included Grammarly, ChatGPT, and Jenni. ai, and mind-mapping applications. These tools were valued for their capacity to simplify difficult tasks, enhance academic efficiency, and facilitate effective communication. The interest in these tools highlights their perceived importance in enriching students’ educational experiences. Integrating these tools into higher education syllabi would be consistent with the increasing reliance on AI technologies in various professional environments. Moreover, the variety of tools referenced indicates that students view AI as a resource to augment their learning across different fields, spanning from humanities to engineering.

**Research question 3-** *What challenges do students anticipate in incorporating AI content into the syllabus?*

The study identified several challenges that hinder the incorporation of AI content into existing higher education syllabi. One key issue raised by participants is the risk of over-dependence on AI tools.

**Students 5 and 7;** *“The only challenge that I see is the dependency on AI answers even when it gives wrong answers, you won’t be able to recognize it”*

**Students 9, and 10;** *“I think students will be lazy.”*

**Student 8;** *“I feel like introducing AI into the syllabus might diminish critical thinking unless it is introduced properly.”*

Students highlighted various obstacles related to the integration of AI within higher education syllabi, with the most prominent issue being an excessive reliance on AI tools. Participants voiced apprehensions that an over-dependence on AI could impair critical thinking and creativity, as students might resort to automated solutions instead of actively engaging in problem-solving endeavors. Some participants expressed concern that students could utilize AI tools to fulfill assignments with minimal effort, consequently hindering the acquisition of vital skills. Furthermore, students emphasized the necessity of instructing AI integration systematically and thoughtfully to prevent these adverse effects.

These challenges reflect broader discussions within AI ethics, particularly concerning the equilibrium between utilizing technology and safeguarding human intellectual faculties. The results imply that curriculum developers must meticulously contemplate the introduction of AI, ensuring that students learn to use these tools with a critical and responsible approach. By addressing these issues, higher education institutions can establish an environment in which AI serves as an enhancement rather than a detriment to the educational experience.

**Table 1.** Key Themes and Findings from Student Perspectives on AI Syllabus Integration

Objectives	Themes	Codes
What should be added to higher education syllabi to prepare students for the Age of AI?	Syllabus Additions	AI literacy, project-based learning, practical applications
What AI tools are essential for students’ future academic growth?	Essential Skills and Tools	Grammarly, ChatGPT, coding platforms, Jenni.ai, data analysis tools
What challenges do students anticipate in incorporating AI content into existing syllabi?	Challenges in Integration	Overdependence, laziness, reduced creativity

The integration of AI literacy, project-based learning, and practical applications surfaced as significant themes. This indicates students' recognition of the necessity of foundational AI knowledge and its real-world applications. Importantly, the continual focus on project-based learning illustrates a preference for experiential learning rather than theoretical education. This is per educational research that supports active learning methodologies designed to equip students for real-world problem-solving. Furthermore, Grammarly, ChatGPT, and coding platforms were identified as essential resources. Grammarly and ChatGPT were recognized for their ease of use and immediate contribution to productivity. Conversely, technical resources like coding platforms were primarily valued by students in engineering disciplines, highlighting specific disciplinary requirements. The frequent reference to generative AI tools indicates a rising dependence on these platforms for academic achievement. Finally, the excessive reliance on AI tools was found to diminish critical thinking, with student lethargy being cited as a significant obstacle. The concern regarding overdependence mirrors a broader societal unease about technology misuse, reflecting ongoing discussions in the literature about balancing AI integration with maintaining intellectual rigor.

## 5. FINDINGS AND THEORETICAL CONTEXT

The results of this investigation closely correlate with previous studies on the incorporation of AI in educational settings, emphasizing the significance of AI literacy (Rütti-Joy 2023; Relmasira, 2023; Yetişensoy & Rapoport, 2023) as well as the evident benefits of experiential learning frameworks (Pattacini, 2018). Participants in this study consistently underscored the necessity for skills and knowledge related to AI, stressing both fundamental comprehension and practical application. This demonstrates an increasing recognition among students regarding the imperative of preparing themselves for an AI-oriented labor market.

The students' interest in tools such as Grammarly, ChatGPT, and coding platforms substantiates previous findings that emphasize the function of AI tools in enhancing academic efficiency and enabling personalized learning experiences (Gligorea et al., 2023). Instruments like Grammarly and ChatGPT, which were frequently cited by respondents, are consistent with results from Gligorea et al. (2023) and Er-Rafyq et al. (2024), highlighting the critical role of accessible AI technologies in fostering academic development. Furthermore, engineering-specific tools like AUTOCAD AI and various coding platforms illustrate the specialized characteristics of AI implementation within different disciplines.

Nonetheless, this research also offers distinct insights that go beyond the current literature. A notable concern raised by students was the potential for excessive reliance on AI tools, which could lead to a decrease in critical thinking and creativity. While earlier studies have generally addressed the ethical dilemmas associated with AI in education (Popenici & Kerr, 2017; Akgun & Greenhow, 2021), this study specifically highlights students' fears regarding the erosion of vital cognitive abilities. These apprehensions resonate with broader discussions about the need to balance the adoption of AI technologies with the maintenance of human-centered educational principles.

By relating these findings to established educational models, such as student-centered curriculum development (McLaughlin et al., 2019), this investigation emphasizes the dual imperative of fostering technical skills while simultaneously encouraging creativity, critical analysis, and ethical considerations. Student-centered curricula prioritize active participation and adaptability, and the incorporation of project-based learning. In conclusion, while this study affirms existing research regarding the advantages of AI integration, it also brings to light important gaps, such as the dangers of overreliance and diminished creativity, that warrant further investigation. These findings accentuate the significance of developing curricula that not only provide students with technical skills but also prepare them to critically assess and ethically employ AI technologies across various contexts.

## 6. DISCUSSIONS AND CONCLUSION

The findings reveal a clear student viewpoint on AI's role in higher education. Students recognize the transformative potential of AI tools but also point to critical challenges that must be addressed for effective syllabus integration. Students' recommendations for including AI basics and project-based

learning align with literature emphasizing the importance of experiential learning in technical education. The emphasis on tools like Grammarly and ChatGPT underscores the need for practical, user-friendly platforms that enhance productivity and learning outcomes. Concerns about overdependence and diminished critical thinking resonate with broader debates about balancing technology with traditional educational values.

In conclusion, this research emphasizes the transformative capacity of artificial intelligence in higher education while also drawing attention to notable challenges that need to be tackled. Students call for extensive revisions of the syllabus to include AI literacy and its practical applications. By confronting issues like excessive reliance, complacency, and reduced critical thinking, educators can create a curriculum that leverages the advantages of AI while alleviating its disadvantages. It will be crucial to incorporate project-based learning, instructional AI tools, and AI training to prepare students for an AI-oriented workforce.

Educators ought to emphasize the incorporation of project-based learning frameworks that motivate students to utilize AI tools in addressing real-world challenges. For example, integrating tasks that necessitate students to critically assess the results produced by AI tools can aid in reducing excessive reliance. Additionally, faculty development programs should concentrate on providing educators with the competencies needed to mentor students in the ethical and proficient application of AI. This might include workshops on the employment of generative AI tools or case studies that showcase ethical quandaries. Finally, institutions could formulate policies governing the ethical application of AI in educational contexts, fostering an understanding of potential risks such as intellectual lethargy and ethical breaches. Policies should also promote the use of AI tools to enhance, rather than supplant, traditional pedagogical approaches.

## **7. LIMITATIONS**

This study is subject to several limitations that may affect the generalizability and applicability of its findings.

### **7.1. Sample Size and Diversity**

First, the participant cohort of 10 individuals, although adequate for thematic analysis, constrains the applicability of the results to larger populations. Concentrating on a single institution additionally restricts the breadth of the investigation, potentially disregarding differences in viewpoints across diverse geographic or cultural settings.

### **7.2. Geographic Focus**

The study was carried out within a singular institution situated in a defined geographic context. This concentrated emphasis might not sufficiently represent the disparities in educational practices, resources, and perspectives that are present in other areas or nations. For example, institutions that possess varying degrees of technological accessibility or prioritize AI literacy may produce distinct outcomes. Subsequent research could broaden the geographic range to encompass a more diverse assortment of educational environments.

### **7.3. Dynamic Nature of AI Advancements**

The swift advancement of artificial intelligence constitutes an additional limitation. The instruments and technologies referenced in this research, including Grammarly and ChatGPT, reflect the prevailing setting of AI at the point of data collection. Nevertheless, as AI progresses, novel tools and applications may arise, which could potentially invalidate some conclusions. Furthermore, the evolving characteristics of AI functionalities and ethical dilemmas might necessitate ongoing modifications to syllabus design and pedagogical approaches. Longitudinal research could mitigate this limitation by monitoring the evolution of AI integration and its effects over time.

### **7.4. Broader Contextual Factors**

The research centered mainly on the viewpoints of students and did not incorporate feedback from faculty, administrators, or policymakers. These stakeholders possess the potential to offer significant insights regarding the practicality and wider ramifications of incorporating AI into higher education

curricula. Investigating the perspectives of various stakeholders in subsequent studies could yield a more comprehensive understanding of the challenges and opportunities linked to AI in the field of education.

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**Research Ethics:** The research committee approved the protocol for this study. Before participating, all participants were fully informed of their rights and responsibilities. Furthermore, the study was conducted in accordance with the guidelines regulating research involving human participants, as established by the research committee. It was approved on the 24<sup>th</sup> of August, 2024.

**Data Availability Statement:** The datasets analysed in this study are not publicly available due to institutional policies; however, they can be obtained from the corresponding author upon reasonable request.

**Conflicts of Interest:** The authors declare no conflict of Interest

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## REFERENCES

- Akgun, S., & Greenhow, C. (2021). Artificial intelligence in education: Addressing ethical challenges in K-12 settings. *AI and Ethics*, 2, 431-440. <https://doi.org/10.1007/s43681-021-00096-7>
- Adipat, S. (2024). Advancing higher education with the transition to smart universities: a focus on technology. *Shanlax International Journal of Education*, 12(3), 29-36. <https://doi.org/10.34293/education.v12i3.7635>
- Cui, W., Xue, Z., & Thai, K. P. (2019). Performance Comparison of an AI-Based Adaptive Learning System in China. *Proceedings 2018 Chinese Automation Congress, CAC 2018*.
- Crompton, H., Burke, D. (2023). Artificial intelligence in higher education: the state of the field. *International Journal of Educational Technology in Higher Education*, 20, 22. <https://doi.org/10.1186/s41239-023-00392-8>
- Baron, K. (2017). Changing to concept-based curricula: the process for nurse educators. *The Open Nursing Journal*, 11(1), 277-287. <https://doi.org/10.2174/1874434601711010277>
- Birla, R. (2023). The challenges of media education in the digital era. *Journal of Communication and Management*, 2(4), 281-288. <https://doi.org/10.58966/jcm20232411>
- Bruehl, M., Pan, D., & Ferrer-Vinent, I. (2014). Demystifying the chemistry literature: building information literacy in first-year chemistry students through student-centered learning and experiment design. *Journal of Chemical Education*, 92(1), 52-57. <https://doi.org/10.1021/ed500412z>
- Chan, C., & Hu, W. (2023). Students' voices on generative AI: perceptions, benefits, and challenges in higher education. *International Journal of Educational Technology in Higher Education*, 20.
- Chetty, K. (2023). AI literacy for an ageing workforce: leveraging the experience of older workers. *Obm Geriatrics*, 7(3), 1-17. <https://doi.org/10.21926/obm.geriatr.2303243>
- Chiu, T., Meng, H., Chai, C., King, I., Wong, S., & Yam, Y. (2022). Creation and evaluation of a pretertiary artificial intelligence (AI) curriculum. *IEEE Transactions on Education*, 65(1), 30-39. <https://doi.org/10.1109/te.2021.3085878>
- Chin, C., Munip, H., Miyadera, R., Thoe, N., Ch'ng, Y., & Promsing, N. (2018). Promoting education for sustainable development in teacher education integrating blended learning and digital tools: an evaluation with exemplary cases. *Eurasia Journal of Mathematics Science and Technology Education*, 15(1). <https://doi.org/10.29333/ejmste/99513>
- Dishon, G. (2017). *New data, old tensions: Big data, personalized learning, and the challenges of progressive education*. Theory and Research in Education
- Gligorea, I., Cioca, M., Oancea, R., Gorski, A.-T., Gorski, H., & Tudorache, P. (2023). Adaptive Learning Using Artificial Intelligence in e-Learning: A Literature Review. *Education Sciences*, 13(12), 1216.

- Halimi, M., Rahmat, R., Nugraha, R., & Pratiwi, E. (2022). Young digital citizen answers: can online learning improve the quality of civic education learning?. *Jurnal Civics Media Kajian Kewarganegaraan*, 19(1), 99-109. <https://doi.org/10.21831/jc.v19i1.40140>
- Huang, J., Saleh, S., & Liu, Y. (2021). A review on artificial intelligence in education. *Academic Journal of Interdisciplinary Studies*, 10(3), 206-214. <https://doi.org/10.36941/ajis-2021-0077>
- Iberahim, A., Yunus, M., & Sulaiman, N. (2023). A review on technology-enhanced language learning (tell). *International Journal of Academic Research in Business and Social Sciences*, 13(2). <https://doi.org/10.6007/ijarbss/v13-i2/16496>
- Kohli, V. & Dhaliwal, U. (2013). Medical students' perception of the educational environment in a medical college in India: a cross-sectional study using the Dundee ready education environment questionnaire. *Journal of Educational Evaluation for Health Professions*, 10, 5. <https://doi.org/10.3352/jeehp.2013.10.5>
- Kakish, K., & Pollacia, L. (2018). Adaptive learning to improve student success and instructor efficiency in introductory computing courses. *Proceedings of the 34th Information Systems Education Conference, ISECON 2018*.
- Kalnina, D., Namante, D., Baranova, S. (2024). Artificial Intelligence for higher education benefits and challenges for preservice teachers. <https://doi.org/10.3389/feduc.2024.1501819>
- Koval, K. (2023). Competencies and technologies for improving distance professional education: a modern perspective and approach. *Sciencise Pedagogical Education*, 3(54), 27-31. <https://doi.org/10.15587/2519-4984.2023.282682>
- Kulik, J. & Fletcher, J. (2016). Effectiveness of Intelligent Tutoring Systems: A Meta-Analytic Review. *Review of Educational Research*, 86(1) 42-78
- Larsson, S. (2023). Four facets of AI transparency., 445-455. <https://doi.org/10.4337/9781803928562.00047>
- Laupichler, M. (2023). Evaluating AI courses: a valid and reliable instrument for assessing artificial-intelligence learning through comparative self-assessment. *Education Sciences*, 13(10), 978. <https://doi.org/10.3390/educsci13100978>
- Lee, H., Kang, Y., Lee, S., Lin, Y., Kim, D., & Ihm, J. (2023). Relationship matters: a qualitative study of medical students' experiences in a learner-driven research program in South Korea. *BMC Medical Education*, 23(1). <https://doi.org/10.1186/s12909-023-04337-7>
- Mayes, R., Natividad, G., & Spector, J. (2015). Challenges for educational technologists in the 21st century. *Education Sciences*, 5(3), 221-237. <https://doi.org/10.3390/educsci5030221>
- Mazarakis, A. (2023). What is critical for human-centered AI at work? – toward an interdisciplinary theory. *Frontiers in Artificial Intelligence*, 6. <https://doi.org/10.3389/frai.2023.1257057>
- Meyer, K. (2023). How to explain AI in an understandable way? citizen scientists, AI experts, and artists find answers together. <https://doi.org/10.22323/1.442.0010>
- McLaughlin, J., Wolcott, M., Hubbard, D., Umstead, K., & Rider, T. (2019). A qualitative review of the design thinking framework in health professions education. *BMC Medical Education*, 19(1). <https://doi.org/10.1186/s12909-019-1528-8>
- Mnguni, L. (2019). Exploring the student and social accountability of the life sciences curriculum: a case of HIV/aids. *Problems of Education in the 21st Century*, 77(3), 410-423. <https://doi.org/10.33225/pec/19.77.410>
- Murad, H. (2023). Implementation of problem-based learning (pbl) in the digital era in higher education of Iraq. *International Journal of Information Technology and Computer Engineering*, 35, 1-12. <https://doi.org/10.55529/ijitc.35.1.12>
- Nye, B. D. (2015). Intelligent tutoring systems by and for the developing world: a review of trends and approaches for educational technology in a global context. *International Journal of Artificial Intelligence in Education*, 25(2), 177-203.
- Ng, D. (2023). Design and validation of the AI literacy questionnaire: the affective, behavioral, cognitive and ethical approach. *British Journal of Educational Technology*, 55(3), 1082-1104. <https://doi.org/10.1111/bjet.13411>
- Ng, D., Leung, J., Chu, K., & Qiao, M. (2021). ai literacy: definition, teaching, evaluation, and ethical issues. *Proceedings of the Association for Information Science and Technology*, 58(1), 504-509. <https://doi.org/10.1002/pra2.487>
- Otero, L., Catalá, A., Morante, M., Taboada, M., López, B., & Barro, S. (2023). Ai literacy in k-12: a systematic literature review. *International Journal of Stem Education*, 10(1). <https://doi.org/10.1186/s40594-023-00418-7>

- Parveen, D. (2024). The role of digital technologies in education: benefits and challenges. *Int Res J Adv Engg Mgt*, 2(06), 2029-2037. <https://doi.org/10.47392/irjaem.2024.0299>
- Pattacini, L. (2018). Experiential learning: the field study trip, a student-centered curriculum. *Compass Journal of Learning and Teaching*, 11(2). <https://doi.org/10.21100/compass.v11i2.815>
- Popenici, S. A., & Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and Practice in Technology Enhanced Learning*, 12(1), 22. <https://doi.org/10.1186/s41039-017-0062-8>
- Putri, R., Gusnedi, G., Desnita, D., & Dewi, W. (2023). Effect of the problem-based learning model with concept map on physics students achievement. *Department of Physics Universitas Negeri Padang*, 1(1), 36-42. <https://doi.org/10.24036/ple.v1i1.13>
- Qureshi, M., Khan, N., Raza, H., Imran, A., & Ismail, F. (2021). Digital technologies in education 4.0. Does it enhance the effectiveness of learning? a systematic literature review. *International Journal of Interactive Mobile Technologies*, 15(4), 31. <https://doi.org/10.3991/ijim.v15i04.20291>
- Qi, S., Li, S., & Zhang, J. (2021). Designing a teaching assistant system for physical education using web technology. *Mobile Information Systems*, 1-11. <https://doi.org/10.1155/2021/2301411>
- Relmasira, S. (2023). Fostering AI literacy in elementary science, technology, engineering, art, and mathematics (steam) education in the age of generative AI. *Sustainability*, 15(18), 13595. <https://doi.org/10.3390/su151813595>
- Rützi-Joy, O. (2023). Building AI literacy for sustainable teacher education. *Zeitschrift Für Hochschulentwicklung*, 18(4), 175-189. <https://doi.org/10.21240/zfhe/18-04/10>
- Sit, C., Srinivasan, R., Amlani, A., Muthuswamy, K., Azam, A., Monzon, L., ... & Poon, D. (2020). Attitudes and perceptions of UK medical students towards artificial intelligence and radiology: a multicentre survey. *Insights Into Imaging*, 11(1). <https://doi.org/10.1186/s13244-019-0830>
- Singh, V., Hiran, K, K. (2022). The impact of AI on teaching and learning in higher education technology. *Journal of Higher Education Theory and Practice*, 22(13). <https://doi.org/10.33423/jhetp.v22i13.5514>
- Sun, J. (2018). Development strategy of dance education in a digital era. *Educational Sciences Theory & Practice*. <https://doi.org/10.12738/estp.2018.6.255>
- Stewart, J. (2023). Western Australian medical students' attitudes towards artificial intelligence in healthcare. *Plos One*, 18(8), e0290642. <https://doi.org/10.1371/journal.pone.0290642>
- Sholjakova, M. (2019). Technological advances in medical education in intensive care. *Anaesthesia Pain & Intensive Care*, 119-123. <https://doi.org/10.35975/apic.v23i2.1054>
- Sumarno, S. (2023). Integration of digital technology in public management transformation:. *International Journal of Asian Education*, 4(2), 115-120. <https://doi.org/10.46966/ijae.v4i2.348>
- Wang, S., Wang, F, Zhu, Z., Wang, J., Tran, T., Du, Z (2024). Artificial intelligence in education: A systematic literature review. *Expert Systems with Applications*
- Yetişensoy, O. & Rapoport, A. (2023). Artificial intelligence literacy teaching in social studies education. *Journal of Pedagogical Research*. <https://doi.org/10.33902/jpr.202320866>
- Zaman, B. (2023). Transforming Education Through AI, Benefits, Risks, and Ethical Considerations.
- Zhai, X., ChatGPT User Experience: Implications for Education (December 27, 2022). Available at SSRN: <https://ssrn.com/abstract=4312418> or <http://dx.doi.org/10.2139/ssrn.4312418>
- Zhao, L., Wu, X., & Luo, H. (2022). Developing ai literacy for primary and middle school teachers in china: based on a structural equation modeling analysis. *Sustainability*, 14(21), 14549. <https://doi.org/10.3390/su142114549>
- Zhang, H., Lee, I., Ali, S., DiPaola, D., Cheng, Y., & Breazeal, C. (2022). Integrating ethics and career futures with technical learning to promote ai literacy for middle school students: an exploratory study. *International Journal of Artificial Intelligence in Education*, 33(2), 290-324. <https://doi.org/10.1007/s40593-022-00293->
- Zhang, Y. (2022). Developing efl teachers' technological pedagogical knowledge through practices in virtual platform. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.916060>
- Zheng, J., Williams-Livingston, A., Danavall, N., Ervin, C., & McCray, G. (2021). Online high school community health worker curriculum: key strategies of transforming, engagement, and implementation. *Frontiers in Public Health*, 9. <https://doi.org/10.3389/fpubh.2021.667840>

- Zhou, X. & Lin, P. (2020). Designing ai learning experiences for k-12: emerging works, future opportunities and a design framework. <https://doi.org/10.48550/arxiv.2009.10228>
- Zhou, J. & Zhao, Z. (2018). Research on e-commerce curriculum reform in the age of mobile internet. <https://doi.org/10.25236/icepms.2018.099>