INTERACTIVE LEARNING MEETS AI: ELEVATING STUDENT EXPERIENCES IN FASHION AND CULTURE EDUCATION

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Abstract

This study investigated the integration of artificial intelligence (AI) with interactive learning pedagogies to enhance student experiences in fashion and culture education. By incorporating AI-driven tools and interactive methods, a dynamic learning environment was developed that promoted engagement, peer communication, and a deeper understanding of the subject matter. The study employed a mixed-method approach, combining a one-group pretest–post-test quasi-experiment and qualitative interviews to gather feedback on learning habits and experiences from two cohorts of students participating in an AI-integrated fashion and culture course within the general education curriculum at a university. The pretest–post-test survey assessed the student participants' perspectives on AI literacy and their use of AI in learning. The students were not provided with specific details of how AI would be used in the course to avoid biasing their responses. The post-test survey was conducted after the AI integration. Data were analyzed to assess the enhancement of the students' AI literacy and understanding and use of AI in the course. The survey results showed that the students had a clearer understanding of the technology and how it could support their learning, and enhanced AI literacy. A text-to-image generation tool was used in the course to support storytelling and idea exchange on cultural context from the students' perspectives. Qualitative interviews were conducted to collect insights from the students on how they had experienced AI technology integration in the course, their interaction in class, and their feedback. The findings revealed that AI-integrated interactive learning not only fostered deeper engagement but also encouraged unique insights into the historical, cultural, and creative dimensions of fashion among the students. They highlighted the benefits of interaction with instructors and peers, as well as real-time feedback facilitated by AI technologies. Despite the promising outcomes, challenges must be acknowledged, such as the need for adequate training and the importance of addressing ethical considerations and transparency related to AI use in education. The students were asked to provide appropriate citations with the use of AI tools together with their prompts to ensure acknowledgment and academic honesty. Additionally, the study used pedagogical strategies combining passive lectures, discussion sessions, peer interaction, student-centered idea exchange forums, and interactive gamification, aiming to provide a more enjoyable experience and fulfill students' needs for autonomy and belonging, providing insights into best practices for integrating AI in fashion and culture education. In conclusion, this study demonstrates the potential of AI-powered interactive learning to transform educational experiences and outcomes in the fashion education field. By prioritizing student-centric approaches and the use of AI, educators can create enriching learning environments that prepare students for the complexities of the modern world. Future research should continue to explore the long-term impacts of AI-driven interactive learning and develop strategies to overcome existing challenges and enhance adaptability to technological advancements, ensuring that all students can benefit from these innovative educational practices across disciplines.

Keywords: Interactive learning, artificial intelligence (AI), student-centred approach, learning experience, fashion and culture.

1 INTRODUCTION

The integration of artificial intelligence (AI) into education has revolutionized the way students learn, making interactive learning more personalized, engaging, and effective. AI-driven technologies such as personalized learning algorithms, intelligent tutoring systems, and AI chatbots have transformed traditional learning environments, offering tailored educational experiences that cater to individual student needs [1, 2]. This strand of research explores how AI enhances interactive learning, focusing on personalization, real-time feedback, student engagement, and the challenges associated with its integration in education [3, 4].

AI facilitates interactive learning by enabling real-time interactions between students and the learning system. This approach moves away from passive information consumption and encourages active participation from the learner. Interactive learning, facilitated by AI, involves a back-and-forth exchange

between the learner and the learning system, making the learning experience more enjoyable and effective [5]. The present study discusses the incorporation of AI technology into video learning, which allows for interactive learning experiences whereby children can actively engage with the content rather than passively consuming information. This interaction is facilitated by AI algorithms that evaluate the student's development and provide personalized feedback to enhance their learning. Personalization, a key method highlighted in Ref. [5], involves AI adapting the learning tasks, content, and difficulty levels based on the learner's current knowledge and progress. This tailored approach ensures that each child's learning experience is unique and aligned with their individual needs, promoting a deeper understanding of the material. The AI model demonstrated a remarkable accuracy of 99.04% when tested on a large dataset, indicating its effectiveness in evaluating student development and providing personalized feedback for improved learning outcomes. AI algorithms evaluate student development, identify areas for improvement, and provide personalized feedback to correct errors and advance learning. This interactive approach supports students in developing a deeper understanding of the material and achieving their learning goals. By leveraging AI technology, interactive learning can revolutionize how students acquire knowledge and skills, making learning feel like an engaging activity rather than a chore [6]. That research presents a retrieval-augmented generation (RAG) system that utilizes open-source large language models (LLMs) such as Gemma2, Mistral, and Llama3.2 to deliver personalized educational content tailored to individual learner progress and needs, ensuring transparency and robust data privacy through local hosting within educational institutions. The evaluation results indicated that the Gemma2 model outperformed other LLMs in terms of accuracy, completeness, correctness, and comprehension when generating educational content tailored to individual learner needs.

In terms of students' engagement in interactive learning experiences, it is significantly enhanced by AI models, such as ChatGPT, which facilitates personalized interactions and caters to individual learning needs. This model allows students to engage in in-depth inquiries and receive tailored responses, fostering a sense of ownership and relevance in their learning. By providing 24/7 access to information and enabling self-paced study, AI encourages students to take charge of their education, ultimately boosting their motivation, engagement, and academic performance [7]. It utilized a systematic review methodology, specifically following the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) approach to identify, assess, and synthesize data related to student engagement dimensions within AI (ChatGPT) interactions. The systematic review identified 16 relevant peer-reviewed studies that analyzed measurements of student engagement dimensions within ChatGPT interactions. The majority of these studies (10 out of 16) adopted qualitative methods, and all selected studies were rated as "good" to "very good" in quality, indicating that they provided valid research insights into the complexities of student engagement with ChatGPT. The findings revealed both positive and negative impacts of using ChatGPT for student engagement. Positive aspects included personalized and interactive learning experiences that enhance the learning process, while negative aspects highlightd limitations such as a lack of empathy, limited contextual understanding, and the potential for inaccurate or biased information, which can hinder effective communication and learning. AI enhances interactive learning by personalizing educational experiences through adaptive learning platforms that cater to individual student needs. These technologies facilitate engagement by providing tailored content and feedback, allowing students to learn at their own pace. Additionally, AI-driven chatbots offer instant support, answering queries and guiding learners through challenges. This integration of AI not only streamlines the learning process but also fosters a more inclusive environment, ultimately enhancing overall student learning experiences and outcomes [8]. It examines various applications of Artificial Intelligence in education, including personalized learning pathways that cater to individual student needs, automated grading systems that allow educators to focus more on teaching, and AI-driven chatbots that provide instant support to learners. That study addresses challenges associated with AI adoption, including ethical considerations, data privacy, and the need for ongoing teacher training, emphasizing the importance of these factors in fostering a more inclusive and effective learning environment. Saifullah, Yawan [9] explored the integration of AI chatbots into learning management systems, finding that it significantly enhances student engagement, motivation, and performance. Data was collected through surveys, interviews, and pilot testing to assess the functionality, usability, and learning outcomes of the chatbot, allowing for a comprehensive analysis of its impact on student experiences. In that study, 87% of the students reported improved engagement, while 75% experienced increased self-efficacy. Additionally, 68% of the participants demonstrated enhanced academic performance, with a 15% increase in quiz scores. These findings indicate that well-designed chatbots can foster personalized learning experiences, boost student motivation, and provide essential support, ultimately transforming educational outcomes in university settings. Yu and Yao [10] highlighted that AI-driven personalized learning systems significantly enhance student engagement by providing tailored learning experiences that cater to diverse needs. This personalization fosters increased

motivation and interaction among students, leading to improved academic performance. That study analysis of engagement metrics and surveys indicated that the students had developed a deeper connection with their learning content, ultimately resulting in better educational outcomes. These findings underscore the potential of AI to transform educational environments and optimize student involvement. Renacido and Biray [11] explored the potential benefits of AI-powered gamification and interactive learning tools in enhancing peer engagement and student motivation, highlighting how these tools can be effectively integrated into educational settings. That study addressed the drawbacks of using AI in education, aiming to provide insights that help educators avoid frustration with AI mechanisms, while also discussing the psychology of gamification to understand its psychological implications for students.

Additionally, the integration of AI tools in higher education significantly enhances student engagement, motivation, and performance [12, 13]. AI improves personalized learning and assessments, fostering better communication and interaction among students. It also provides scaffolding that supports learners' performance and boosts their motivation. Furthermore, AI promotes collaborative learning environments by facilitating peer-learning opportunities and cooperative learning support, ultimately leading to improved academic outcomes for students. These findings underscore the positive impact of AI on university study experiences [14].

2 METHODOLOGY

This study encompassed 71 participants, who were students on a 4-year undergraduate program taking a 13-week course in fashion and culture within the general education curriculum running from September to December, with 22 in the 2023 cohort and 49 in the 2024 cohort. They were drawn from across the university and had no previous or foundational knowledge of fashion. In the 2023 cohort, the students ranged from 17 to 24 years of age (M = 19.45, SD = 1.77), 64% were female (N = 14), and 36% were male (N = 8). In the 2024 cohort, they ranged from 18 to 23 years of age (M = 19.58, SD = 1.54), 55% were female (N = 27) and 39% were male (N = 9), and 6% (N = 3) did not indicate their gender. The study employed a mixed-method approach, combining a one-group pretest–post-test quasi-experiment and qualitative interviews to gather feedback on learning habits and experiences from the two cohorts of students participating in the AI-integrated fashion and culture course. Institutional approval of the human-subject ethics for this study was granted for data collection, and all the participants gave their informed consent.

Figure 1. depicts the interactive learning approach integrated into the study. All participants were asked to complete a pre-intervention 6-question survey on their perspectives on AI literacy and their use of AI in prior learning, based on 5-point Likert scale. The students were not provided with specific details of how AI would be used in the course to avoid biasing their responses. The post-test survey was conducted after the intervention. Data were analyzed to assess the enhancement of the students' AI literacy and understanding and use of AI in the course. A paired sample t-test at a 95% confidence limit (level of significance α = .05, two-tailed) of the difference between pre- and post-intervention was conducted.

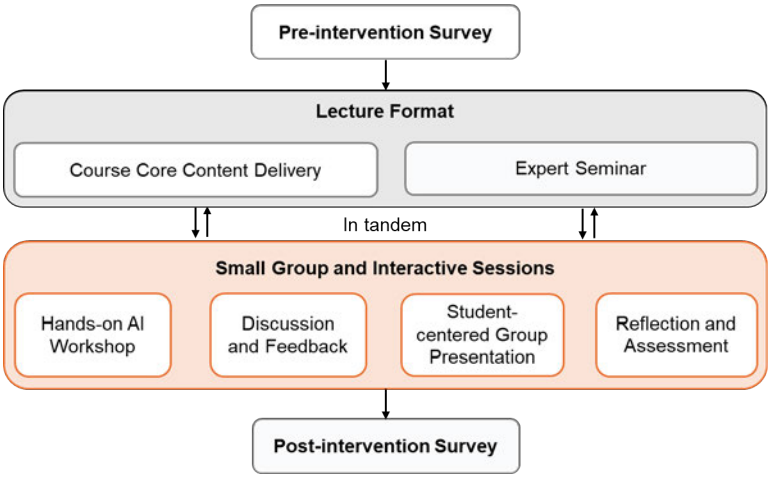

Figure 1. Interactive learning approach for the integration of AI in fashion and culture education

The intervention was conducted in tandem with the lecture format, and small group and interactive sessions, a workshop, feedback, a student-centered group presentation, and assessment sessions were included to provide an active learning environment and guidance for the students' learning journey. The study aimed to explore the potential of AI intervention and evaluate the effectiveness of the framework. It started with course content delivery, including an introduction to AI, its ethics and principles, and applications in the fashion industry. This was followed by hands-on workshop sessions for students to experience the power of AI and first-hand text-to-image generation. It included an introduction to generative AI (GenAI) platforms, how AI is integrated into the learning process (particularly text-to-image generation), and expert seminars in lecture format. The aim was to introduce industry practices in selected topics, allowing students to actively learn from real-life cases. Workshop activities included participants gaining experience on several GenAI platforms. The introduction to the use of GenAI was combined with examples from various platforms and prompt-writing techniques, which provided a guideline for the students' AI generation process. A sharing and discussion session was conducted to encourage interaction among peers with diverse backgrounds and knowledge exchange related to fashion and culture. All the participants were able to learn from others about how they communicated with the tools for specific outputs. The feedback session with participants aimed to ascertain the subject-specific know-how of each student on the course, helping to build a knowledge base of student proficiency in fashion and culture so as to facilitate personalized feedback. The student-centered group presentation session aimed at providing an interactive platform for the students to showcase their learning achievements on the course to their peers. Each participant was invited to reflect on how AI supported their learning on the course. Assessment and a post-intervention survey followed to evaluate the effectiveness of the approach. Data was collected and analyzed between pre- and post-intervention. Qualitative interviews were conducted after the integration to collect insights from the students on how they had experienced AI technology integration in the course, the interaction in class, and their feedback. Thematic analysis was conducted to evaluate the effectiveness of the intervention in the course for the two cohorts.

3 RESULTS

To gauge the participants' understanding of, familiarity with, and attitudes toward AI and GenAI in learning before and after the course, the pre- and post-intervention surveys were analyzed. The paired sample t-test results are given in Table 1 and the mean scores of the participants' responses to statements before and after the intervention are illustrated in Figure 2. All statements by the 2023 cohort yielded significant p-values ($p < 0.05$), underscoring the effectiveness of the intervention. The p-values were extremely small (three were below 0.0001), suggesting very strong statistical significance. In the 2024 cohort, 4 out of 6 statements showed statistically significant p-values. The participants in the 2023 cohort showed more consistent and stronger improvements across all measures compared with the 2024 cohort. However, the 2024 cohort started with slightly higher pre-intervention scores.

In the 2023 cohort, the pre-intervention means ranged from 2.05 to 2.86 while the post-intervention means increased to 3.91–4.14. This cohort started from a lower baseline, and this demonstrates that the students in the 2023 cohort not only gained knowledge about AI and GenAI but also became more confident and habitual in their use of these tools for learning. The largest improvement was observed in the question about using GenAI to support learning (from 2.05 to 3.95), suggesting that the intervention was particularly effective in encouraging practical application.

For the statements about "familiar with AI" and "use GenAI for learning," the participants in the 2024 cohort showed higher initial familiarity levels than the 2023 cohort. This suggests that the students entered the course with existing AI knowledge, which may have limited the potential for further measurable improvement. The lack of significant change in the score for GenAI use in learning suggests that, despite their increased knowledge, the students may not have integrated GenAI tools into their daily learning practices as much as expected. The strongest growth was in "understanding AI in learning process" (from 2.11 to 3.32), which indicates that the students had started to learn more about how AI can support their learning process.

Comparing the two cohorts, the 2023 group demonstrated more uniform and robust gains across all areas, starting from a lower baseline and achieving higher post-test scores. The 2024 cohort, in contrast, started with higher initial familiarity but showed less consistent improvement, particularly in areas where baseline knowledge was already strong or where practical application was required. This suggests that the intervention was most effective for students with less prior experience and that future efforts may need to focus more on encouraging the practical integration of GenAI tools for students who already

possess foundational knowledge. Overall, both cohorts benefited from the intervention, but the magnitude and consistency of improvement were greater in the 2023 cohort.

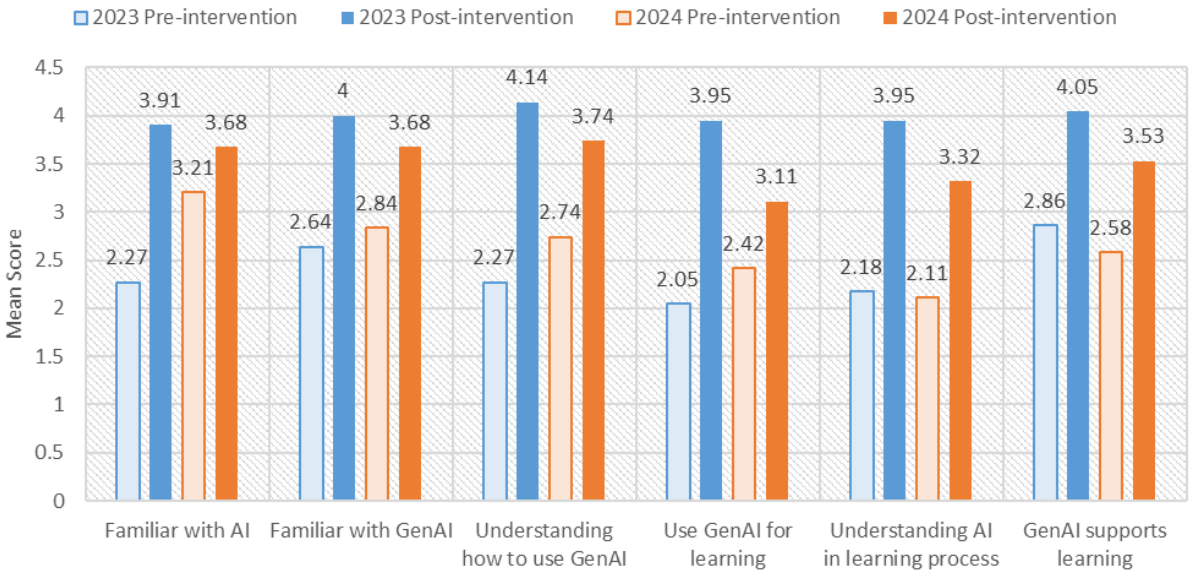

Figure 2. Participants' responses to statements about AI before and after the intervention of AI in learning

Table 1. Paired samples t-tests of the differences between pre- and post-intervention

Cohort	Statement	Pre-Mean (SD)	Post-Mean (SD)	t	p value	Significance
2023	I am generally familiar with AI.	2.27 (0.98)	3.91 (0.97)	-4.58	0.0002	Yes
	I am generally familiar with GenAI.	2.64 (1.14)	4.00 (0.82)	-4.27	0.0003	Yes
	I have a clear understanding on how to use GenAI tool.	2.27 (0.98)	4.14 (0.77)	-6.45	0.0000	Yes
	I routinely use GenAI to support my learning.	2.05 (1)	3.95 (0.79)	-7.27	0.0000	Yes
	I have a clear understanding of using AI in learning process.	2.18 (1.01)	3.95 (0.72)	-6.03	0.0000	Yes
	I think GenAI can support my learning.	2.86 (1.28)	4.05 (0.84)	-3.48	0.0022	Yes
2024	I am generally familiar with AI.	3.21 (1.13)	3.68 (0.95)	-1.49	0.1545	No
	I am generally familiar with GenAI.	2.84 (1.34)	3.68 (0.95)	-2.28	0.0348	Yes
	I have a clear understanding on how to use GenAI tool.	2.74 (1.37)	3.74 (1.05)	-2.62	0.0175	Yes
	I routinely use GenAI to support my learning.	2.42 (1.22)	3.11 (1.29)	-1.79	0.0907	No
	I have a clear understanding of using AI in learning process.	2.11 (1.15)	3.32 (0.89)	-4.01	0.0008	Yes
	I think GenAI can support my learning.	2.58 (1.2)	3.53 (0.9)	-2.61	0.0176	Yes

For the qualitative interview data collected after the intervention, the findings reveal that AI-integrated interactive learning not only fostered deeper engagement but also encouraged unique insights into the historical, cultural, and creative dimensions of fashion among the students. In terms of their feelings toward AI-generated content, many students expressed positive emotions such as admiration, inspiration, and appreciation for the creativity and realism of AI-generated images. Words like "refreshing," "elegant," "playful," and "youthful" were common. Several students valued the convenience and utility of AI, noting that it helps visualize ideas quickly and supports creative brainstorming, especially in fashion and design. Some students raised concerns about the limitations of AI-generated images, mentioning issues like bias, stereotypes, lack of detail, and occasional deviation from their expectations. A few students described negative or mixed feelings, such as finding some images "depressing," "oppressive," or lacking in originality and cultural nuance. Regarding the comments on AI

integration in the course, many students saw AI as a catalyst for innovation, enabling new forms of digital fashion and expanding creative boundaries. They appreciated its ability to generate diverse styles and support experimentation. AI was recognized as a valuable educational and industry tool, helping to visualize concepts, support designers, and enhance understanding in creative fields. Ethical concerns and challenges were noted, including bias, stereotyping, copyright issues, and the need for further development (e.g., improving facial detail and vocabulary comprehension). Some students worried that AI might dilute cultural authenticity or lead to homogenized styles, emphasizing the continued value of handcrafted and personalized designs. The students generally appreciated the creative and practical benefits of AI in generating images, especially for inspiration and visualization. There was a strong awareness of both the potential and the current limitations of AI, with thoughtful comments on its impact on creativity, culture, and authenticity. The integration of AI was seen as promising but requiring careful attention to ethical, cultural, and technical challenges.

Figure 3 illustrates the results of thematic analysis of the students' feedback in the 2023 and 2024 cohorts. In the 2023 cohort, there was a more even distribution across themes (Visual (43.48%); Creative (21.74%); Cultural (21.74%); Emotional (8.70%); and Technical (4.35%)). For the 2024 cohort, technical themes dominated (Visual (51.02%); Technical (32.65%); Cultural (8.16%); Creative (4.08%); and Emotional (4.08%)). The prevalence of the "Visual" theme grew from 43.48% in 2023 to 51.02% in 2024. The "Technical" theme leapt from 4.35% to 32.65%, indicating a major shift toward technical considerations. "Creative" dropped sharply from 21.74% to 4.08%, "Cultural" fell from 21.74% to 8.16%, and "Emotional" declined from 8.70% to 4.08%. While the 2023's cohort reflections were more balanced (with creative and cultural themes each comprising over one fifth), the dominance of visual and technical concerns in the 2024 cohort's responses suggests a shift in focus from imaginative and contextual aspects toward practical, technical engagement. This shift aligns with the cohort analysis showing that the 2024 cohort's higher baseline knowledge led to more technical, critical engagement rather than creative exploration.

Based on the thematic analysis of the students' feedback, in the 2023 cohort, the students displayed more exploratory and creative responses. They focused on visual discoveries ("fearless and adventurous fashion sensibilities" of the AI tool), and showed wonder at its basic capabilities ("imagination from the generated image"). In the 2024 cohort, the students learned more about the tool, and their feedback moved directly to technical analysis ("reflecting on the generated images, images produced by ai exist some problem with 'bias'") and they focused on limitations: "the model has specific training and sometimes cannot exceed its scope."

In summary, the student reflections evolved from an initial focus on the visual and creative possibilities of AI-generated images in 2023 to a more technical and critical engagement in 2024. This suggests that as the students became more familiar with AI tools, their reflections matured, moving from surface-level appreciation to deeper analysis of the technology's strengths and limitations. The 2023 cohort's lower baseline knowledge led to more fundamental discoveries and creative exploration, while the 2024 cohort's higher initial familiarity resulted in more technical and critical engagement with the tools. This suggests that as GenAI becomes more commonplace in education, student engagement may naturally shift from creative exploration to technical analysis and practical application considerations.

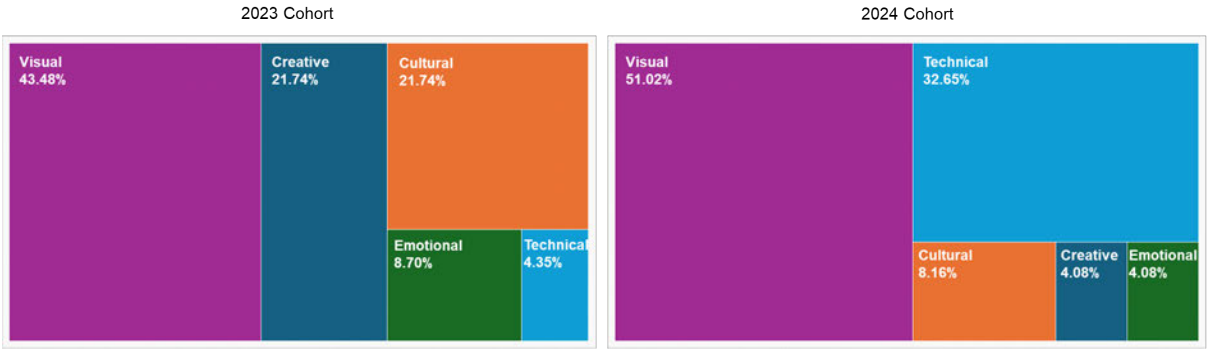

Figure 3 Thematic area distribution of students' feedback in 2023 and 2024 cohort

4 CONCLUSIONS

The intervention explored in this study was found to be most impactful for students with less prior experience (the 2023 cohort), leading to broad and consistent gains. For students with higher baseline knowledge (the 2024 cohort), the intervention still provided value, but future efforts should focus on strategies that encourage the practical application of GenAI tools and address the challenge of moving

from knowledge to routine use. These findings underscore the importance of tailoring educational interventions to students' starting points and ensuring that learning experiences translate into meaningful changes in practice. The students in the 2023 cohort started with a lower baseline but made greater learning gains after the integration of AI into learning, while the students in the 2024 cohort had a better knowledge background regarding the AI intervention, and were able to conduct critical analysis after the use of the technology. This shift reflects the evolution from foundational discovery to advanced technical understanding, with the 2023 cohort showing broader improvements across all areas while the 2024 cohort demonstrated specialized technical growth from an already elevated baseline. Based on these findings, future implementations of GenAI-based interventions should be carefully aligned with students' prior knowledge and experience. For those who are new to AI tools (like our 2023 cohort), continuing to emphasize hands-on tutorials and foundational skill-building will maximize broad learning gains. This includes offering clear, scaffolded resources that guide novices through core concepts and provide frequent opportunities to practice and apply newly acquired knowledge. By fostering a supportive learning environment for beginners, educators can help bridge the initial knowledge gap and spark sustained interest and engagement. For more advanced users (like our 2024 cohort), the focus should shift toward deepening the practical application of AI tools and fostering the ability to integrate these tools routinely and strategically into their work. Strategies might include assigning complex, real-world tasks that push advanced learners to leverage AI tools in innovative ways and encouraging reflective practices that help them assess the value and limitations of these technologies. Tailoring support to these higher achievers will ensure that they continue to grow beyond an already elevated baseline, transitioning from mere familiarity with AI to expert-level, critically informed usage that can adapt to emerging challenges and opportunities.

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