



Experiences With Artificial Intelligence Among Students at the University of Linyi

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Abstract

The rapid integration of artificial intelligence (AI) into higher education has transformed students' learning practices, yet its pedagogical, cognitive, and ethical implications remain insufficiently examined, particularly in Chinese universities. While AI offers substantial potential to enhance learning efficiency and access to information, concerns persist about its impact on students' critical thinking, information accuracy, and the humanistic dimensions of education. This study aims to explore the benefits, challenges, and practical application opportunities of AI use among students at Linyi University, with particular attention to both academic and non-academic contexts. Employing a mixed-methods research design, the study involved 300 undergraduate and graduate students selected through stratified sampling. Quantitative data were collected via structured questionnaires to assess patterns of AI usage and perceived benefits, while qualitative data were obtained through semi-structured interviews to capture students' lived experiences, concerns, and expectations regarding AI integration. The findings reveal that AI significantly enhances learning efficiency, supports academic task completion, and facilitates personalized learning experiences. However, students expressed notable concerns that excessive reliance on AI may weaken critical thinking skills, reduce independent problem-solving, and increase the risk of misinformation. Furthermore, the study finds that AI applications have spontaneously expanded into non-academic areas of students' lives, yet they remain unable to replace the emotional support, moral guidance, and value-based education provided by teachers. Based on these findings, the study highlights the need for a balanced, regulated approach to AI adoption. It proposes a multi-stakeholder governance framework involving universities, educators, policymakers, and technology developers to ensure the sustainable integration of AI that harmonizes technological advancement with humanistic educational values.

Keywords: *Artificial Intelligence Education, Human-Machine Collaboration, Linyi University, Personalized Learning, Student Experience*

A. Introduction

Artificial Intelligence (AI) has rapidly transitioned from a supplementary educational technology to an integral component of students' everyday academic practices in higher education. An empirically striking phenomenon is the spontaneous and extensive adoption of AI tools by students, often occurring faster than institutional regulations or pedagogical frameworks can adapt. Students increasingly rely on AI not only for academic tasks—such as writing assistance, problem-solving, and exam preparation—but also for non-academic purposes, including time management, emotional support, and informal learning. This phenomenon challenges conventional models of educational technology integration, which assume that

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pedagogical planning precedes widespread adoption (Selwyn, 2019). The rapid, largely unregulated use of AI raises concerns about cognitive dependency, the erosion of critical thinking skills, academic integrity, and the reconfiguration of teacher–student relationships (Luckin et al., 2016).

Despite the growing body of research on AI in education, existing literature reveals several notable limitations. Much of the current scholarship focuses on technological capabilities, system efficiency, and learning outcomes, particularly in relation to personalized learning and adaptive instruction (Holmes et al., 2019). While these studies demonstrate AI's capacity to identify learning gaps, provide tailored feedback, and support self-regulated learning, they often adopt a system-centered perspective that overlooks students' lived experiences and subjective interpretations of AI use. Moreover, students are frequently positioned as passive recipients of AI-driven instruction rather than as active agents who strategically appropriate technology across academic and extracurricular domains (Selwyn, 2022). These limitations are further compounded by a lack of empirical research situated in Chinese higher education institutions, especially non-elite universities such as the University of Linyi, where cultural values, institutional conditions, and digital infrastructures may significantly influence AI adoption and outcomes (Zawacki-Richter et al., 2019).

To address these gaps, this study offers a student-centered and context-sensitive examination of AI use in higher education through a mixed-methods research design. By combining quantitative data on usage patterns with qualitative insights into students' perceptions, concerns, and adaptive strategies, this research moves beyond outcome-oriented evaluations toward a socio-pedagogical understanding of AI integration. Such an approach aligns with calls in the literature to foreground human experience, ethical considerations, and contextual factors in AI-enhanced education (Williamson & Eynon, 2020).

Accordingly, this study focuses on how students at the University of Linyi experience, interpret, and use AI technologies in both academic and non-academic contexts. Particular attention is given to the perceived benefits, challenges, and limitations of AI, especially regarding its inability to replace the emotional guidance, moral education, and value formation traditionally provided by teachers. This research is important because it contributes empirically to an underrepresented educational context and theoretically by repositioning students as central actors in AI-mediated learning environments. In practice, the findings offer evidence-based insights for educators, policymakers, and technology developers to design governance frameworks and pedagogical strategies that promote the ethical, sustainable, and human-centered integration of AI in higher education.

B. Literature Review

With the rapid development of technology, Artificial Intelligence (AI) is increasingly used in higher education. From personalized learning to intelligent teaching systems to education management, AI is constantly transforming the education model. However, the application of AI technology is accompanied by several challenges, including ethical issues, unequal resource distribution, and insufficient adaptability. This literature review explores the application of AI in higher education, its advantages and challenges, and analyzes future research directions and knowledge gaps.

AI Innovations and Applications in Higher Education

Chai and Liu (2021) noted in their article, "Application of Artificial Intelligence Technology in College English Teaching Under the Background of Big Data," that big data and

AI technology are becoming an important force in promoting educational reform and development. They discussed the application of AI in English teaching, including listening, speaking, writing, translation, and intelligent management, and concluded that AI technology can enhance teaching effectiveness and enable personalized, intelligent, and interactive learning, thereby cultivating students' critical thinking and cooperative abilities. In the article "Investigating Students' Perceptions Towards Artificial Intelligence In Medical Education", students' acceptance and perceptions of AI in medical education were investigated, and it was found that students generally had a positive attitude toward AI, believing that it could improve learning efficiency, but there were also concerns about AI taking over the role of teachers. This suggests that the introduction of AI technology into medical education should take full account of students' acceptance and the adaptation of educational models (Dankwa & Bickle, 2021).

In the field of educational administration, AI has been widely used to optimize resource allocation and enhance service efficiency. Huang et al. (2020) mentioned that AI can be used for enrollment management and resource optimization to provide customized services to students. Labadze et al. (2023) emphasized that AI Chatbots have significantly improved the student experience and administrative efficiency. Shi (2023) designed a computer-assisted grading system for university English translation exams to reduce instructors' workload in correcting test papers and improve grading accuracy. By leveraging existing research on automatic evaluation of machine translation, the system enables networked, automated grading of university English translation exams. This research demonstrates the potential of AI technologies to improve the efficiency of teaching and learning. An intelligent teaching space for blended learning was designed and implemented, integrating AI technologies such as natural language processing and machine learning to deliver personalized learning resources and feedback. The study demonstrated that this smart teaching space significantly enhances students' learning outcomes and satisfaction (Yang et al., 2023). Zhang and Wang (2020) designed and implemented an intelligent online proctoring system that leverages AI for face recognition and behavioral analysis to detect cheating during online exams. This research demonstrates the application of AI technology in maintaining exam fairness.

Idroes et al. (2023) in "Students' perceptions of the role of artificial intelligence in education: a survey-based analysis" analyzed students' perceptions of AI in education through a questionnaire. The study found that students generally have a positive attitude towards AI, believing it can improve learning efficiency and interest in learning, but they are also concerned that AI will replace teachers' roles. This suggests that students' needs and concerns must be fully considered when promoting AI in educational applications, and that communication and collaboration between teachers and students should be strengthened. Johnston et al. (2024) further explored students' perceptions of the use of generative AI technologies (e.g., ChatGPT) in higher education in their article "Students' Perceptions of the Use of Generative AI Technologies in Higher Education". They found that student acceptance of AI technologies varied by use, supporting its use for grammar checking, conceptual understanding, etc., but opposing its use for core academic tasks such as writing entire essays. This suggests that the scope and boundaries of AI use should be clearly defined when formulating policies for its educational application to maintain academic integrity and educational quality.

Impact of AI Technology on Educators and Learners

Zawacki-Richter et al. (2019) found, through a systematic review, that the use of AI in higher education has had a profound impact on educators' roles. Educators need to adapt to new teaching technologies while utilizing AI tools to enhance teaching and learning. However, the study also noted that there are still differences in educators' acceptance and ability to apply AI technologies.

Shute and Rahimi (2017) reviewed the use of computer-based assessment in learning, noting that AI technologies can provide learners with personalized learning paths and feedback. This personalized learning experience helps to improve learners' motivation and performance.

Wenxu and Shuyi (2021) examined the impact of AI on the development of accounting professionals in a university setting. They argue that as the accounting profession evolves due to technological advances, educational programs must adapt to prepare students for the changing environment. This includes integrating AI into the curriculum to improve students' analytical skills and understanding of data-driven decision-making. The authors present a framework for developing accounting curricula that incorporate AI tools, emphasizing the importance of aligning educational outcomes with industry needs. They emphasize the need for greater collaboration between universities and industry stakeholders to ensure that graduates are equipped with relevant skills. In addition, Wenxu and Shuyi discuss the challenges of implementing AI-focused programs, including faculty training and resource allocation.

Enhanced Learning Outcomes and Personalized Support

The AI Index (2018) highlights the role of artificial intelligence in facilitating personalized learning pathways that lead to improved academic performance. Zhang and Li (2021) investigate human-centered design principles to enhance students' experiences with AI-based information systems. Their study highlights the importance of creating educational tools that prioritize user needs and preferences, especially in creative disciplines such as music. By applying a human-centered design approach, the researchers propose that AI systems can be customized to better support music educators and students, ultimately enriching the learning experience and promoting greater participation in technology.

The real-time interactive nature of AI significantly improves learning. Chatbots can instantly respond to student queries, thus facilitating a more interactive learning experience. This immediacy reduces the time spent waiting for educators' feedback and allows students to continue learning without interruption (Liu & Wang, 2021). By interacting with Chatbots, students can develop key skills such as problem-solving and digital literacy. The conversational nature of Chatbots encourages students to actively engage with the material, enhancing their understanding and retention of knowledge (Marrone et al., 2022). Understanding how different populations interact with Chatbot technology can inform more inclusive designs that meet the needs of diverse students (Liu et al., 2018). For teachers, AI Chatbots can reduce administrative burdens by handling routine queries and providing resources that enable them to focus on more complex teaching tasks (Ng et al., 2023).

Promoting Equity in Education and Optimizing Resources

Safitri (2020) noted that AI technologies can support teachers in responding to the needs of diverse students and promote educational equity. Meanwhile, Leung et al. (2023) noted that AI-powered e-learning platforms significantly enhanced the flexibility of teaching and the coherence of learning during the epidemic, enabling education to overcome the constraints of time and geography. In addition, Ng et al. (2023) emphasized that teachers need to be equipped to use AI tools to enable deeper integration of technology into education and help students develop 21st-century skills. Matthews et al. (2024) showed that AI can significantly reduce teachers' workloads, allowing them to focus on higher-order instructional tasks and scholarly research.

Shi (2023) developed a computer-assisted grading system for university English translation exams, successfully enabling automated grading and improving teaching efficiency. Matthews et al. (2024) further noted that an AI-driven automated grading system can reduce teachers' assessment burden and ensure timely, consistent feedback. In the area of exam management,

Zhang and Wang (2020) focused on the design and implementation of an intelligent online proctoring system for online exams. Their research emphasizes the need to maintain academic integrity in digital assessments, especially as online learning becomes more prevalent. Smart proctoring systems use artificial intelligence techniques to monitor students during exams and ensure a secure exam environment. Pilot applications have shown that such systems can be effective in reducing cheating while providing a user-friendly experience for both educators and students. In the area of music education, Zhang and Wang (2021) further elaborate on the impact of AI on higher education in China, especially in light of innovations such as ChatGPT. They discuss how these technologies are changing teaching methods, course design, and student engagement. The authors argue that integrating AI into higher education will not only improve learning outcomes but also prepare students for a future where digital literacy is crucial. Their analysis emphasizes the need for educational institutions to adapt to these technological changes to remain relevant and effective. Together, these studies illustrate the multifaceted impact of AI on education, highlighting the challenges and opportunities it presents.

Technological Ethics and Privacy Issues

Despite the many advantages AI brings to education, its use faces many ethical challenges. Johnston et al. (2024) emphasize the potential risks of generative AI, including data privacy and algorithmic bias. The use of AI can also raise ethical issues related to data privacy and possible bias in Chatbot responses. Ensuring the responsible use of these technologies is essential to maintaining trust in the education system (Safitri, 2020). Furthermore, Marrone et al. (2022) note that the lack of clear technical specifications may lead to the misuse of AI in education. Therefore, it is particularly important to develop sound ethical and privacy protection policies. There is also a risk that students may become overly reliant on Chatbots for answers rather than developing critical thinking skills. This reliance may hinder their ability to engage deeply with the material (Matthews et al., 2024).

Resource Allocation and Technical Support

Implementing AI technology requires significant financial investment, especially in hardware, software, and teacher training. Huang et al. (2020) note that developing countries and resource-limited regions may face significant barriers to the introduction of AI technology, further exacerbating the problem of unequal distribution of educational resources. Meanwhile, Zhang and Zhao (2022) also pointed out that, in China, AI-assisted multimedia intelligent accounting systems, although capable of improving the quality of accounting education, face the problem of uneven distribution of educational resources. Some districts and schools may not be able to afford the cost of advanced AI equipment and technical support, which also exacerbates educational inequality. In addition, Dankwa and Bickle's (2021) study found that students' and teachers' acceptance of AI technology varies widely depending on its use. For example, despite the popularity of AI for applications such as grammar checking, some students and educators expressed concerns about its potential to replace human roles. This technological resistance may affect the diffusion of AI technology. A study by Zawacki-Richter et al. (2019) also found that many educators face technological barriers to using AI. They may lack the necessary technical training and support to fully leverage AI technology.

Research Priorities and Future Directions for The Integration of Artificial Intelligence and Higher Education

The convergence of artificial intelligence and higher education offers far-reaching opportunities for educational change, from optimizing personalized learning paths to improving administrative efficiency. However, resource constraints and ethical issues remain challenges. Higher education institutions (e.g., Linyi University) should address these barriers through

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strategic planning and resource investment, while future research should assess the long-term impact of AI and explore its innovative applications to address emerging challenges.

Research and development should focus on the following areas: first, exploring the sustainability of AI in personalized learning pathways and long-term learning outcomes; second, examining how AI can reduce educational disparities between regions and groups, especially in resource-poor areas; and third, developing a normative and ethical framework for technology that ensures appropriate use of AI, safeguards data privacy and academic integrity, and circumvents algorithmic bias. In addition, educators' technical capacity should be strengthened, and their AI application capabilities enhanced through efficient training programs.

Promoting interdisciplinary cooperation is key, and integrating education, computer science, and sociology will jointly develop adaptable AI education tools, optimize resource allocation, and deepen the integration of AI and education. This will help enhance the teaching and learning experience and prepare students for the demands of the digital age.

C. Methods

Study Design

This study employs a concurrent triangulation mixed-methods research design, integrating qualitative and quantitative approaches to comprehensively explore the experiences of Linyi University students with artificial intelligence (AI). The qualitative aspect involves conducting interviews and observations to investigate students' perceptions of the benefits and challenges of AI, as well as its role in their academic and personal development. Participants were selected through purposive sampling to ensure a focused exploration of relevant experiences. To address privacy concerns, interviews were conducted remotely, and participants could remain anonymous. These qualitative data aimed to generate rich, descriptive insights into the subjective dimensions of AI use.

For the quantitative component, data were collected through structured questionnaires administered to a random sample of Linyi University students who have engaged with AI-based teaching. The questionnaire was designed to investigate the benefits and challenges of using AI in education, focusing on its impact on learning outcomes, skill development, accessibility, and usability. It was developed by integrating the researchers' objectives with insights from existing literature and validated survey tools. Statistical analyses of the collected data identified both the advantages and potential obstacles of AI integration in academic and extracurricular contexts.

This study adopted a concurrent triangulation mixed-method research design, which aligned effectively with the research objectives by allowing qualitative and quantitative data to be collected and analyzed simultaneously. This approach ensures that qualitative findings contextualize and enrich the quantitative results, providing deeper insights into the benefits and challenges of AI use among Linyi University students. Concurrently, the quantitative data offer empirical validation and generalizability to the qualitative insights. The integration of these methodologies facilitates cross-validation of findings, ensuring a nuanced and comprehensive examination of AI's influence on students' academic and extracurricular experiences.

Population of the Study

This study used a purposive sampling method to collect information through interviews. The researchers selected 20 undergraduate students and 15 graduate students for interviews. This selection was based on the relative proportions of undergraduate and graduate students at Linyi University, with undergraduates outnumbering graduate students. Furthermore, every effort was

made to interview these undergraduate and graduate students, all of whom have experience using AI for teaching. The questionnaire survey used proportional stratified sampling from the College of Logistics (1,900 undergraduates and 400 postgraduates). Using the Slovin formula, the total sample size was determined to be 300, which was proportionally divided into 248 undergraduates (82.61%) and 52 postgraduates (17.39%) to ensure representativeness.

Data Gathering Tools

This study employed mixed-methods to collect qualitative and quantitative data on students' experiences with AI across academic and extracurricular contexts. Qualitative data were gathered through interviews exploring perceived benefits and challenges of AI use, while quantitative data were collected via a questionnaire addressing AI's impact on academic performance, skill development, usability, accessibility, and overall satisfaction. Exploratory factor analysis confirmed good structural validity (factor loadings = 0.753–0.838; cumulative variance explained = 64.53%), and the questionnaire demonstrated high internal consistency (Cronbach's $\alpha = 0.960$), ensuring reliability for subsequent analysis.

Data Gathering Procedures

Prior to data collection, the researcher obtained Institutional Review Board approval at Linyi University to ensure compliance with ethical standards regarding privacy, informed consent, and confidentiality. All participants received an informed consent form outlining the study objectives, the right to voluntarily participate, and the right to withdraw. To ensure participants' privacy, they were allowed to choose whether to remain anonymous. Data was securely stored and accessible only to the research team. At the conclusion of the study, the participants were informed of the results. The researcher took measures to minimize any physical, emotional, or psychological risks. Participants did not incur any costs, as all resources were provided by the researcher. For participant recruitment, interview participants were selected based on their experience with AI learning tools, while quantitative participants were randomly sampled. Invitations were sent via university platforms, email, or WeChat. Interviews will be conducted online or recorded offline, lasting 30–45 minutes each. Surveys will be conducted online or on paper.

Treatment of Data

Qualitative data were analyzed using thematic analysis of interview transcripts. Descriptive statistics were used to analyze the quantitative data collected from the questionnaire, including frequencies, means, and standard deviations. This study will ensure compliance with ethical standards, inform participants of their right to voluntarily participate or withdraw at any time without any consequences, and guarantee the anonymity and confidentiality of data. We will take measures to minimize potential risks to participants, researchers, and staff. Participants will be informed about the study's scope, the nature of the issues, and the protective measures in place to safeguard their rights and well-being. Selection followed non-discriminatory criteria to include individuals from diverse backgrounds, socioeconomic statuses, and disciplines. Study results were shared with student participants in an easily understandable and accessible format. This study prioritized the rights, privacy, and well-being of all participants while maintaining research integrity. At the conclusion of the study, participants were informed of the research findings in an appropriate manner. Safeguards were implemented to prevent long-term physical, emotional, or psychological harm, and risks will be monitored at all stages. Finally, participants incurred no costs, as all research resources were provided by the researcher to protect participants' interests.

D. Results and Discussion

Artificial intelligence is transforming higher education teaching models and learning experiences at an unprecedented pace. From intelligent tutoring systems to adaptive learning platforms, AI technology is continuously enhancing teaching efficiency and the level of personalized services. However, as its application deepens, issues such as technological ethics, resource inequality, and adaptability have gradually come to the fore. To gain a deeper understanding of the impact of AI in educational applications, this paper analyzes the utility of AI across various dimensions of learning using questionnaire data and interview results, and compares these findings with current mainstream research outcomes.

Benefits Faced by Linyi University Students when Using Artificial Intelligence

With the widespread application of artificial intelligence in education, students at Linyi University are experiencing unprecedented changes in learning. Based on questionnaire survey data from 300 students who use AI tools and partial interview questions from 30 students, the main benefits of Linyi University students using artificial intelligence are explained. In the following interview questions, undergraduate perspectives are denoted as “U1” and graduate perspectives as “G1.”

Table 1. Learning enhancement and academic performance

Issues	mean	standard deviations	Interpretation
1.AI tools help me better understand complex learning content.	3.52	0.603	Totally agree
2.AI technology has a positive impact on my learning outcomes (e.g., test scores, homework completion).	3.60	0.561	Totally agree
3.AI tools enable me to access learning resources and information more quickly.	3.55	0.574	Totally agree
4.I feel that AI tools can provide personalized support based on my learning needs.	3.53	0.625	Totally agree
General Mean	3.55		Totally agree

Based on questionnaire data from 300 college students, AI tools significantly improve learning efficiency by helping students understand complex knowledge, enhancing academic performance, and accelerating resource acquisition. Table 1 shows some of the data from the questionnaire.

The average score for the four indicators in Table 1 reached 3.55, indicating that the vast majority of respondents “Totally agree” that AI significantly enhances learning outcomes. This suggests that AI has already demonstrated clear educational benefits in terms of content presentation and immediate feedback. When this quantitative result is placed in the context of the interviews, it becomes evident that students reinforced this conclusion with nearly identical wording. U6 mentioned in Interview Question 2 that “AI can save a lot of time when searching for references and outlining.” U7 reflected that “AI can help me restructure course content into simpler language, making it easier to understand.” Graduate student interviews also revealed the important role AI plays in research and learning. “I use AI to assist with translating English literature, and the accuracy rate is higher than machine translation.” (G8) “When I don't understand something about research design, I first use AI to analyze it and then ask my teacher.” (G9) “Reading literature has become much more efficient because AI can summarize the key points.” (G14) This aligns closely with Chai & Liu (2021)'s conclusion in the context of big data

that “AI enhances teaching effectiveness, enables personalized learning, and facilitates interactive learning.” Additionally, Dankwa & Bickle (2021) noted that students generally acknowledge AI's role in improving learning efficiency, further corroborating this survey's findings. It is evident that the positive role of AI technology in enhancing academic performance has gained widespread recognition among students. However, the difference lies in the fact that Chai et al. emphasize the cultivation of “critical thinking and collaborative skills,” while the interviews highlight ‘efficiency’ and “time compression.” This discrepancy may stem from differing research contexts: Chai's study focuses on long-term instructional design in English classrooms, whereas students at Linyi University primarily view AI as an immediate tool.

Benefits of AI on Cognitive and Skill Development

The impact of artificial intelligence on cognitive and skill development is a focus of modern education. This section explores how artificial intelligence affects cognitive and skill development through questionnaire data and student interviews.

Table 2. Cognitive and skill development

Issues	mean	standard deviations	Interpretation
5.Using AI tools has improved my critical thinking skills.	3.57	0.621	Totally agree
6.Using AI technology has enhanced my creative skills.	3.60	0.573	Totally agree
7.AI tools have helped me improve my language skills (e.g. English writing or listening).	3.49	0.636	Totally agree
8.AI tools have helped me acquire more technical skills (e.g. programming, data analysis).	3.52	0.630	Totally agree
General Mean	3.545		Totally agree

The mean scores for all four skills (3.545) fall within the “Totally agree” range, with a standard deviation of <math><0.64</math>, indicating that AI has a universal impact on enhancing critical thinking, creativity, language, and technical skills. Notably, the mean language skills score is slightly lower (3.49), suggesting that the language scenario model could be optimized in future iterations. G1 mentioned in Interview Question 3, “It can customize content based on my major, such as accounting.” G6 also mentioned, “The personalized materials recommended based on my browsing history are becoming increasingly accurate.” From the graduate students' interview responses, G9 stated, “When writing a literature review, it helped me clarify the structure and different viewpoints.” “AI can provide counterexamples, forcing me to think about the reasons.” (G14) G13 mentioned, “I used AI tools for data analysis preprocessing, which saved me a lot of time.” “AI reminded me to pay attention to data bias, making me aware of statistical pitfalls.” (G10) This is consistent with the findings of Shute and Rahimi (2017), who believe that AI can provide personalized feedback to help stimulate students' motivation to learn, and Wenxu and Shuyi (2021), who point out that integrating AI into accounting education courses can enhance

students' analytical and decision-making abilities, indicating that AI has obvious effectiveness in promoting the comprehensive development of students' abilities.

Additionally, in Interview Question 2, U18 (Fine Arts major) mentioned, "AI can significantly improve learning efficiency, especially in fine arts creation, where it can quickly generate visual materials and save time on conceptualization." In Interview Question 3, they also noted, "AI can dynamically adjust learning content based on my needs." Achieving an A-level portfolio through the combination of "AI sketches + human secondary creation" validates Zhang & Li (2021)'s finding that "human-centered design can enhance the experience in creative disciplines such as music," and extends the application from music to fine arts.

Benefits of AI on Technical Experience and Tool Effectiveness

Artificial intelligence tools are helping students engage with learning tasks. This section explores their impact on technology experience and tool effectiveness through student feedback and data.

Table 3. Technical experience and effectiveness

Issues	mean	standard deviations	Interpretation
10.I find AI tools simple and easy to use.	3.44	0.633	Totally agree
11.I rarely encounter technical problems (e.g., system failures or functional limitations) when using AI tools.	3.41	0.646	Totally agree
12.I think that the content provided by the AI Tool is accurate and reliable.	3.38	0.646	Totally agree
General Mean	3.41		Totally agree

Table 3 shows an overall mean of 3.41, indicating that while slightly lower than other dimensions, it still falls within the "strongly agree" interpretation level. Students also provided positive evaluations of their experience using AI tools. Notably, the mean score for "AI content accuracy" was the lowest (3.38), and feedback on related items involving "technical issues" also showed significant discrepancies. This suggests that while students actively use AI tools, the technical instability, errors in generated content, and unclear logic they experience in actual applications are becoming obstacles to their widespread and in-depth use. This phenomenon aligns with Zawacki-Richter et al. (2019)'s findings on educators' varying degrees of adaptability to AI technology, as well as Johnston et al. (2024)'s perspectives on data bias and trust issues in generative AI, collectively revealing unresolved bottlenecks in integrating AI technology into educational settings.

From undergraduate interviews, it is evident that while they frequently use AI tools, they express significant concerns about their reliability. For example, U6 mentioned, "I use DeepSeek and Xunfei Xinghuo every day, but the generated content sometimes has errors." G3 stated, "I use AI to translate literature, but the translated sentences sometimes sound odd." Regarding content evaluation, U9 pointed out, "ChatGPT is convenient for researching information, but the explanations it provides are sometimes too vague." These phenomena highlight that while students frequently use AI, they are also vigilant about the accuracy and reliability of its output.

More importantly, while students' reliance on AI is increasing, they are acutely aware of its limitations. U9 admitted: "I feel dependent on it, but I do preliminary analysis myself beforehand because AI is sometimes inaccurate." G2 added: "AI is efficient, but occasionally the content is incorrect, so I check it myself after using it." This "use-verify" pattern repeatedly emerged in the responses of multiple interviewed students, indicating that while they accept AI's efficiency,

they do not fully trust its results. Additionally, they consistently mentioned in their suggestions: “AI can be used for grading, but teaching guidance should still rely on teachers, as AI has limitations.” (U6)

Overall, undergraduates and graduate students alike exhibit a “rational use, cautious trust” attitude toward AI use. AI tools provide students with means to enhance efficiency, but due to their technical limitations and logical flaws, students experience “uncertainty behind efficiency” in actual use. This not only validates the concerns in current literature about the AI trust dilemma but also provides clear guidance for the future iteration direction of AI educational tools, which must focus on optimizing and standardizing core issues such as “content reliability,” “system stability,” and “information security protection.”

Benefits of AI on Value Recognition and Future Expectations

At the intersection of education and career development, the impact of AI on perceptions of value and future expectations has also attracted significant attention. This section uses student feedback and data to analyze how AI affects students' value judgments and future vision.

Table 4. Value recognition and future expectations

Issues	mean	standard deviations	Interpretation
9.AI technology makes me more confident about my future career development.	3.40	0.649	Totally agree
13.I think that the AI tool is cost-effective and worth the investment.	3.47	0.619	Totally agree
14.I think that the potential of AI technology in the future of education is very high.	3.54	0.608	Totally agree
15.I am satisfied with the overall experience of AI technology in education.	3.50	0.631	Totally agree
General Mean	3.478		Totally agree

Table 4 shows that students have a generally positive attitude toward artificial intelligence (AI) technology, with an overall mean score of 3.478, further demonstrating their high expectations and recognition of AI technology. In particular, the highest score was given in the “future educational potential” category (3.54), reflecting students' widespread belief that AI will have a profound impact on teaching methods, resource access, and learning approaches. However, the score for the “Career Confidence” dimension is relatively low (3.40), revealing that while students anticipate AI-driven educational reforms, they also harbor concerns about potential job role displacement and skill devaluation. This phenomenon aligns with Dankwa and Bickle's (2021) view that “AI may replace the role of teachers” and Zhang and Wang's (2021) research findings on how student participation patterns are transforming under the influence of AI.

In Interview Question 3, several undergraduates expressed the immense potential of AI in education. For example, U16 noted: “AI can help us analyze learning data and accurately track our progress...customize learning resources.” U13 added: “It can adjust difficulty levels based on my study duration, such as the accuracy of my vocabulary answers, and create a personalized study plan.” U20 even anticipated its integration with future technologies: “It could be combined with VR technology in the future to enhance practical experience through voice-based virtual dialogues.” Similar views are also common among graduate students, such as: “It can provide more comprehensive technical services based on my usual search content and habits.” (G10) and “AI has enormous potential in terms of knowledge dissemination and can serve as a helpful tool

for expanding knowledge.” (G11) These interview excerpts reflect students' high expectations for AI's potential in future education.

However, while they rely on AI, they also recognize that AI-generated information can be inaccurate and cannot completely replace human judgment. G7 expressed concerns: “We shouldn't rely on AI as the first choice; we need to maintain independent thinking.” G11 believes, “We should promptly correct areas where AI cannot provide solutions to avoid developing a mindset of dependency.” G9 candidly stated, “I may become an educator in the future. Seeing some teachers use Deepseek to create PowerPoint presentations, while convenient, is also concerning.”

In summary, while students generally hold an open and optimistic attitude toward AI and anticipate its deeper application in education, they remain highly sensitive to the potential risks AI may pose in the professional domain, such as role replacement and diminished value. This “embracing with caution” mindset aligns with Zhang and Wang (2021)'s observation that “students may undergo complex transformations in their participation methods and learning motivation mechanisms.” Therefore, while promoting AI educational technologies in the future, it is imperative to concurrently establish mechanisms for career adaptation and digital literacy education for both teachers and students to collectively address the structural challenges posed by the technological revolution.

Challenges Faced by Linyi University Students in Using Artificial Intelligence

With the rapid development of artificial intelligence (AI) technology, its application in higher education is deepening. From intelligent teaching systems and personalized learning paths to optimized educational management, AI is gradually transforming traditional teaching models. However, this has also sparked extensive discussion on learning methods, educational equity, and the teacher-student relationship. Numerous studies have focused on the systematic applications and challenges of AI in education. However, these studies tend to be theoretical, with less attention paid to individual students' actual attitudes toward AI, their usage strategies, and their future expectations during the learning process. To address this research gap, this section, based on interviews with 200 undergraduates and 15 graduate students at Linyi University, compares and analyzes the interview data with existing literature to reveal students' real-world experiences and attitudes toward AI. Question 6 in Table 5 addresses students' “Concerns that artificial intelligence weakens critical thinking skills,” while question 7 focuses on the “Technical obstacles in artificial intelligence-assisted learning.” (Refer to Table 5 in the appendix.)

AI Weakens Critical Thinking Skills

When discussing whether artificial intelligence weakens students' critical thinking abilities, students' responses to this issue showed a clear polarization: some students (such as U17, U19, G11, and G12) expressed deep concerns that AI might weaken their independent thinking abilities and actively adopted the strategy of “thinking independently first and then using AI.” As G14 stated: “I'm worried it might affect my independent thinking, so in my daily use, I use AI to analyze basic content and then use the framework it provides to organize and optimize it independently.”

This finding aligns closely with the perspective proposed by Zawacki-Richter et al. (2019) in the literature review, which states that “students' acceptance of AI is influenced by how they use it,” and also resonates with the view highlighted by Matthews et al. (2024) that overuse of AI may lead to a decline in students' critical thinking abilities. However, another group of students (such as U20, U16, G2, and G4) expressed no concerns, viewing AI merely as an auxiliary tool that would not impact their critical thinking abilities. This aligns with Johnston et

al.'s (2024) finding that “students hold reservations about the use of AI in core academic tasks” and Marrone et al.'s (2022) conclusion that “reasonable, interactive use of AI tools can enhance digital literacy and problem-solving skills.” Most students mentioned “first thinking independently and then verifying AI answers,” indicating that students have developed proactive cognitive regulation strategies. However, the literature primarily warns about the risks of systematic use, highlighting the complementary perspectives between researchers and students.

Technical Barriers: Deficiencies in Information Accuracy

Under the theme of “technical barriers,” Table 5 shows that students reported issues with AI, such as inaccurate information and illogical reasoning. For example, U12 mentioned: “The material isn't very accurate, the logic isn't coherent, and it simply can't withstand in-depth scrutiny. Some information might be generated by its own algorithms, and when you actually search, it might not necessarily be what it actually is.” G13 stated: “I have doubts about the accuracy of the AI results, as they only reference certain literature but don't specify the specific sources. Some content may be sourced from unofficial websites, raising questions about their credibility.” This aligns with the research findings in Safitri's (2020) literature review on the lack of transparency and accuracy in AI systems. Additionally, Marrone et al. (2022) emphasize that AI lacks sensitivity to context and academic norms, leading to generated outputs that are often superficial or logically fragmented. This aligns with students' experience with AI tools, which, though convenient and efficient, still fall short in precision, citation authority, and logical coherence.

Technical Barriers: Complex Tools/Difficult-To-Refine Instructions.

On the other hand, most students in the interviews also identified “complex tools/difficult-to-specify instructions” as the primary factor hindering AI learning effectiveness. U5 noted: “For example, there's the issue of AI accuracy. Sometimes it's not rigorous enough or contains errors, which require careful identification. There are also some questions where the answers are too simple.” This experience was amplified in G6's description: “I want it to describe the problem more clearly so it can give me a more satisfying answer, but oftentimes, it's difficult to break down the instructions, and to achieve clearer instructions, it can take a lot of time to master.” Marrone et al. (2022) noted in their study that users interacting with AI require strong information literacy and organizational skills for instruction; otherwise, they are prone to frustration. The student challenges highlighted in the interview results are highly aligned with the “educator technical barriers” conclusion in Zawacki-Richter et al. (2019)'s literature review. Both point out that AI systems' “black-box interaction” and “high-dimensional parameters” make it difficult for non-professional users to precisely translate their objectives into effective prompts, leading to underutilized features or distorted results.

Opportunities for Practical Applications of Artificial Intelligence

To identify potential opportunities for artificial intelligence in educational settings, this section distills three key issues from interviews with 20 undergraduates and 15 graduate students at Linyi University. Question 4 focuses on “Self-development applications of AI beyond learning”, This theme includes three sub-themes: career planning, time management, and mental health; Question 8 addresses “Expectations for future improvements in AI functionality, This theme includes three sub-themes: Improvement of information credibility and accuracy. Deepen personalized and scenario-based services, expand industry and social applications; and Question 9 explores “the role of AI in teaching: assistant or replacement.” This theme includes two sub-themes: Irreplaceable emotions and humanities, and Replaceable tasks. Multiple responses under each sub-theme collectively highlight the opportunities AI offers to enhance education. (Refer to Table 6 in the appendix.)

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Self-Development Applications of AI Beyond Learning

According to the interview responses on "Self-development applications of AI beyond learning", students mainly apply AI to three major personal growth areas: career planning, time management, and mental health.

Career Planning

Some students (such as U1, U6, G1, G4, and G7) commonly use AI for career planning, with the most representative response coming from G7: "For example, in terms of career planning, I studied accounting in my undergraduate studies, but I'm a bit vague about my future career path. So, I'll refer to the AI tool's analysis of potential career paths in accounting. Based on the insights it provides, I'll customize my future work and career plans." This approach aligns closely with the "curriculum-industry alignment" concept advocated by Wenxu & Shuyi (2021) in their research, highlighting the bridging role that artificial intelligence plays between "informal learning" and "career development." The integration of AI can enhance students' data analysis capabilities and career adaptability, particularly in professional education fields such as finance and engineering. Schools should encourage students to use AI technology for career planning and cultivate their ability to make data-driven decisions.

Time Management

In terms of time management, AI can dynamically generate an optimal time allocation plan based on schedules and focus rhythms, enabling seamless integration of learning, rest, and social interaction, and significantly improving efficiency. Zhang & Li (2021) proposed the concept of "human-centered design," advocating that artificial intelligence should transcend the mere function of knowledge transfer and instead focus on and serve the overall growth and development of students. This concept is also reflected in students' actual use of AI. For example, G8 mentioned: "In terms of time management, it's more about building a plan and setting short-term and long-term goals." U15 shared: "It's widely used in time management. For example, when using an AI-integrated office platform (like DingTalk), the system automatically converts customer requests in emails into to-do items and generates an execution timeline diagram based on urgency, collaborating parties' time zones, and so on." These cases demonstrate that students not only use AI for academic support but also widely apply it to time management and daily life.

Mental Health

In terms of mental health, AI can monitor students' physical condition in real time, provide immediate intervention, and also chat with students. Liu et al. (2018) noted that different users' interactions with chatbots significantly impact their psychological support experiences, suggesting that AI design should consider diversity and inclusion. Based on this, Zhang & Li (2021) proposed a "human-centered design" framework, advocating that AI should go beyond the classroom and support students' overall career development. Within this framework, students further expanded AI psychological support scenarios into their daily lives: U9 mentioned, "For mental health, a smartwatch can check my heart rate and whether I'm experiencing any stress from doing something today."; G6 commented, "Regarding mental health, I'd use AI as a chatbot, sharing my concerns with it. It can then provide timely emotional support and initial advice. I think this helps alleviate my negative emotions." These differing user experiences not only validate Liu et al.'s "diversity-inclusion" design principles but also broaden the applicable scenarios for AI psychological support, truly moving holistic care from concept to practice.

Expectations for Future Improvements in AI Functionality

According to the collected interview responses, most students hope that AI will improve the credibility and accuracy of information in the future, provide deeply personalized, scenario-

based services tailored to individual characteristics, and expand its applications across industries and society.

Improvement of Information Credibility and Accuracy

G6 stated, “I hope AI can further enhance its depth of professional knowledge and provide more accurate interpretations of cutting-edge research in specialized fields. And in terms of integrating learning resources, it can more comprehensively aggregate a wider range of high-quality learning materials.” U5 also noted, “I hope that in the future, AI will be able to more accurately understand complex problems and scenarios. For example, when writing a guide or narrating something, it can consider historical context and cultural background to provide more realistic answers.” These feedback points align with Johnston et al. (2024)'s call for the establishment of a trustworthy, unbiased, and verifiable generative AI system, emphasizing that AI in academic environments must ensure the authenticity, consistency, and traceability of information sources to prevent algorithmic misinformation and the spread of false content. They also reflect that AI educational tools still require ongoing optimization in terms of “content authenticity” and “academic credibility.”

Deepen Personalized and Scenario-Based Services

Zhang & Wang (2021) emphasize that for AI to truly support complex cognition, it must integrate multimedia resources such as text, images, speech, and 3D models to achieve “deep personalization—multimodal interaction.” Students' expectations align precisely with this technical approach: U15 hopes that in the future, it can automatically convert textbooks into multimodal knowledge graphs (e.g., linking historical events to geographic coordinates, or 3D models of cultural relics); U17 further proposes that, “I hope that in the future, it can more accurately understand questions and provide detailed and authoritative answers, reducing the cost of self-verification for users. AI has great potential in areas such as intelligent tutoring and virtual experiments (e.g., allowing users to visually observe experimental processes and results).” G8 noted, “I think it can integrate multiple modalities. Currently, it still presents information through text. We could add scenario-based demonstrations or allow manual entry of formulas. Another issue is ethics and safety. We should add academic integrity detection features to automatically identify whether content has been ghostwritten by AI. When writing papers, we may need to check for plagiarism, so we should be guided to use it appropriately.” In summary, students' forward-looking needs not only validate Zhang & Wang's (2021) advocacy for multimodal integration but also integrate deep personalization, scenario-based demonstrations, and ethical compliance into a cohesive framework, providing a concrete and comprehensive roadmap for the design of next-generation educational AI.

Expanding Industry and Social Applications

Leung et al. (2023) noted that AI-driven online platforms can effectively overcome time and geographical constraints to deliver high-quality educational resources to traditionally neglected groups and regions, such as rural areas, remote regions, and the elderly population. This perspective was clearly reflected in student interviews. For example, G7 mentioned: “In terms of future applications of AI technology, I think it could be applied more to areas we overlook, such as the elderly and rural areas.” This indicates that students have recognized AI's potential to enhance educational accessibility and serve vulnerable groups. Additionally, Zhang and Wang (2021) emphasize that the introduction of AI (such as ChatGPT) is profoundly influencing Chinese higher education, transforming teaching methods, course design, and student engagement. Although this study focuses on classroom-based teaching reforms, this trend can also be interpreted as AI driving the digitization of educational resources and the intelligentization of professional content services. As U12 suggested: “The best approach would

be to integrate with academic journals on CNKI to extract more pure and authentic content. I think it's playing a significant role in smart transportation and smart elderly care.”

Additionally, students are expanding the application of AI to broader social domains. G10 noted: “I think it currently has great potential in agriculture. For example, it can perform soil analysis, environmental analysis, weather forecasts, and other analyses, and then analyze crop planting.” This reflects students' heightened sensitivity to the future prospects of AI applications, highlighting the transformative power of AI as it moves beyond education into broader societal structures.

The Role of AI in Teaching: Assistant or Replacement

Based on the interview results, it can be concluded that students generally believe that AI can only serve as a “replaceable” assistant for repetitive tasks such as grading assignments and creating PowerPoint presentations, but cannot replace the ‘irreplaceable’ role of teachers in on-site emotional communication and humanistic care. They emphasize that teaching is not only about knowledge transfer but also about guiding values and emotions, and that AI lacks human warmth. Therefore, whether in the short term or long term, AI should be positioned as a “highly efficient assistant” to teachers rather than a “complete replacement.”

Irreplaceable Emotions and Humanities

AI can mimic emotional expressions, but it cannot possess subjective experiences or genuinely empathize with humans. The core of emotional communication lies in the mutual exchange of life experiences and shared values, which occurs through heartbeats, eye contact, hesitation, and silence—not through algorithmically generated responses. Idroes et al. (2023) noted that students generally support AI taking on low-level tasks, such as grading assignments and organizing materials, but strongly oppose its replacement of teachers in providing humanistic care and guidance on values. Zawacki-Richter et al. (2019) also expressed similar views, arguing that while AI plays an increasingly important role as a technical support tool in teaching, teachers remain irreplaceable for their emotional connection and the essential functions of education. Student interviews further corroborate this consensus. U1 stated: “Interpersonal interactions, especially the teaching process, are extremely complex and cannot be replaced by AI. The interaction between teachers and students is highly variable, and students can raise different questions at any time. AI doesn't fully understand human emotions.” U3 emphasized from the perspective of the essence of education: “AI lacks human emotions, while teachers need to invest their emotions in imparting knowledge to students. Teaching isn't simply about imparting knowledge; it's more about educating students about how to be human, and learning isn't their sole focus.” G1 offered a more comprehensive perspective: “While AI is more efficient in conveying knowledge and can provide personalized learning resources, humans have emotions and values. Teachers can adjust their teaching methods to students' emotions and provide caring support when students're experiencing emotional challenges. I think these are difficult for AI to achieve.” These perspectives collectively indicate that AI is currently better suited as a teaching tool and an educational assistant rather than as a substitute for values and emotions. The design and deployment of future AI systems should clearly define technological boundaries, respect teachers' unique roles in the educational process, and promote the synergistic development of “technology + humanities” rather than replacing them.

Replaceable Tasks

Many students believe that artificial intelligence can serve as a “substitute” for repetitive, tool-based tasks. U15 noted: “AI can efficiently handle routine tasks like grading homework and marking exams.” This aligns with the AI automatic grading system developed by Shi (2023), which significantly reduces teachers' workloads and improves grading efficiency. Graduate

students G7 and G13 noted that AI is more efficient and logical in creating PowerPoint presentations, explaining course materials, and organizing teaching resources, thereby saving teachers significant time. G13 stated: “It could potentially replace manual labor for instrumental tasks (such as creating PowerPoint presentations and manuscripts) because it saves time and enhances logic. “These student feedback indicate that while they generally believe AI cannot replace teachers' roles in emotional and value guidance, AI's auxiliary or even replacement functions in “administrative tasks” during teaching have been widely recognized.

E. Conclusion

Survey results indicate that students at Linyi University generally recognize that AI can enhance learning efficiency, critical thinking, creativity, language, and technical skills, particularly in simplifying content, personalizing learning, and supporting research. However, concerns remain about language improvement and the accuracy of the results. At the cognitive level, some students worry that AI may weaken independent thinking, adopting a “think first, then use” strategy, yet lacking systematic training. At the technical level, inaccurate information and complex instructions lead to output deviations. Students overall exhibit “skill anxiety + technical anxiety.” Meanwhile, AI has spontaneously expanded into self-development areas such as career planning, time management, and mental health, and students anticipate its continued optimization in information reliability, deep personalization, and remote educational settings. Students support AI replacing repetitive tasks such as grading and creating PowerPoint presentations, but emphasize that it should serve only as an efficient teaching assistant and cannot replace teachers' emotional and value-based guidance.

Incorporate information literacy and data verification as required components of higher education curricula to help students develop the ability to discern the authenticity of information and evaluate its quality. At the same time, establish a “teacher + AI” dual-mentor system, where AI handles administrative tasks such as grading and creating PowerPoint presentations, while teachers focus on emotional interaction and value guidance. Collaborate with AI platforms to co-build a “trusted resource pool” and a “multi-modal scenario laboratory.” Students should proactively enhance their digital literacy and prompt word skills, extending AI applications to areas such as career planning, time management, and mental health. Cross-disciplinary workshops should be utilized to strengthen collaboration and knowledge sharing. Enterprises should improve content authenticity, logical rigor, and academic standards; integrate authoritative databases; establish traceability and integrity verification mechanisms; optimize visual interactions; and expand applications to remote areas, the elderly, and agriculture. Through multi-party collaboration, sustainable, people-centered smart higher education can be achieved.

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