UC Journal, e-ISSN 2774-9401, Vol. 6, No. 1, May 2025, pp. 1-21

UC Journal: ELT, Linguistics and Literature Journal
http://e-journal.usd.ac.id/index.php/UC
Sanata Dharma University, Yogyakarta, Indonesia

ARTIFICIAL INTELLIGENCE TOOLS EFFECTIVELY DEVELOPING SELF-DIRECTED LEARNING, INCREASING STUDENTS' AUTONOMY AND MOTIVATION IN UZBEKISTAN

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https://doi.org/10.24071/uc.v6i1.11182
received 3 January 2025; accepted 4 May 2025

Abstract
This article aims to explore the ability of AI tools to enhance SDL skills and identify the associated changes in learners' sovereignty and enthusiasm in learners in Uzbekistan. However, much research has been conducted on the use of AI in education at a global level, but few studies have looked at the intervention efficacy of AI in the Uzbek education system. Using an online questionnaire with a quantitative method, the survey samples were sent to 27 undergraduate and graduate students to capture their experiences of AI tools. Quantitative data analysis was employed, with the results showing an influence of the designed AI, reporting greater levels of self-directed learning practices and self-regulation among engaged student groups. The results imply that AI applications can contribute to the development of the educational process in Uzbekistan and other countries, promoting the transition to a more learner-centered learning environment. Hence, this research provides useful information to educators and policymakers interested in the right way to adopt technology in education processes.

Keywords: artificial intelligence (AI), motivation, self-directed learning, student autonomy

Introduction
Self-directed learning (SDL) is a critical pedagogy approach that promotes learner autonomy over their learning undertakings, goal setting, and self-directed engagement with content, concepts, and ideas. This method enhances higher-order thinking skills, innovation, and learning for a lifetime, which are skills needed now in the changing and dynamic world. As the focus in the delivery of education processes has been moving toward Personal Learning Environments (PLEs) and other related nontraditional models, the use of AI tools has become one of the most promising directions in the educational field. In the worldwide context, AI is playing a very significant role in changing the nature of education by delivering individualized learning, instant feedback, and better access to materials. The increasing use of AI for education purposes in Uzbekistan can still prove a desire of the country to follow the innovations in education strategy and to develop

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successful approaches for improving students' motivation and participation, as well as taking advantage of new technologies in the field of education.

This is the case even though technology, especially AI tools, seems to hold a lot of potential for enabling SDL. In this regard, there is a dearth of information as to whether the two are helpful in the promotion of independence and motivation among the students in this particular education system in Uzbekistan. Although there is an increasing trend in using AI to refine learning, there is still relatively limited understanding of how these applications will help hone self-directed learning skills among students. It is important to fill this gap in research to enhance education for students in Uzbekistan and to increase their learning independence and readiness for forthcoming tasks. These findings will go beyond providing an understanding of the individual learning experiences and effectively push for educational reform and advancement in the country.

The purpose of this paper is to determine how AI tools help Uzbek students develop self-directed learning skills and differences in the extent of supported Self-Directed Learning Skills based on the type of student population and the type of AI applications used. The research aims to understand the effectiveness of AI tool use in students' learning and consequently guide practitioners on the application of AI tools and technology policy recommendations. The practical significance consists in the capacity of the current research to contribute to the elucidation of the value of AI as a tool for education about the development of more learner-focused educational environments. In conclusion, this research aims at enriching the educational processes and fostering self- and motivation learners in Uzbekistan is in correspondence with the world trends in innovative learning.

Theoretical construct

Lashari and Umrani (2023, p.94) in their study targeted a group of this study is educators & researchers who are concerned with the second language (L2) Self-learning through emerging AI technologies; that is, ChatGPT. The main discoveries show that although ChatGPT has a huge prospect as a writing aid and language database, as well as an improvement of instruction methodology in the L2 writing training context, there are pitfalls in terms of academic integrity and the credibility of its results. The systematic literature review conducted in this study uses PRISMA criteria to review the literature from peer-reviewed journals and identified that the human-like response generation ability that differentiates ChatGPT from other chatbots has been pointed out. At the same time, the problems of reliability and the validity of provided information in dynamic changing fields are still crucial (Lashari & Umrani, 2023, pp.106-107).

In his recent study, Baharuddin involved 15 Participant students selected from SMK Reformasi Makassar who volunteered in the study, collecting quantitative research data on the satisfaction level of the participants regarding the technology used in teaching English during the early outbreak of the COVID-19 pandemic in the year (2024, pp.98-99). About the findings, 60 % of 9 out of 15 students stated that they were very unprepared or unprepared to learn through e-learning. This study also revealed several factors that have hindered such a level of readiness, which include: low technological literacy levels among the users, lack of technological resources, which include the internet, and lack of adequate technological resources such as computers or the common portable device

commonly known as smartphones. These findings form the rationale for teachers to uphold students' technological literacy for improved adjustment to e-learning (Baharuddin, 2024, pp. 99-101).

In the context of Uzbekistan, Aleksandrovna (2024, p.335) assessed 13 learners in the context of the English Practical Course Department at Fergana State University, 92.3% were female and 7.7% male in gender distribution, and the learners' average age was twenty-one years. The results indicated that 53.8% of the participants in the study stated that better mastery of the content of the units taught covered through online learning is associated with higher levels of engagement in this mode of delivery while 23.1% stated that it results in absenteeism and 15.4% associated is with demotivation suggesting that in essence this high level of engagement may lead to burn out or fatigue. However, the respondents pointed out the availability and flexibility of online platforms as being a major strength, citing flexible learning paths, 76.9% of the students let their concerns fear a decreased interaction with teachers, 15.4%, and distractions, 7.7%. These findings therefore speak to the argument that the ptimality of learning activities in an online environment depends upon interactivity, structure, and support, and that for academic achievement optimum balance of these factors needs to be employed (Aleksandrovna, 2024b, pp.335-339).

The systematic review by Younas, El-Dakhs, and Jiang (2025, pp. 38397-38402) builds upon the findings of Lashari and Umrani (2023) by further substantiating the role of AI in self-directed learning (SDL). While Lashari and Umrani focused on ChatGPT's limitations in academic integrity, Younas et al. highlight how AI tools—including intelligent tutoring systems and conversational agents—consistently enhance learner autonomy and motivation. Their analysis reveals that AI-driven tools, such as Alexa for language learning and adaptive tutoring apps, empower students to control their learning pace, thereby improving cognitive development and skill acquisition. This aligns with Aleksandrovna's (2024) findings on flexible online learning in Uzbekistan, where 53.8% of students reported higher engagement due to personalized pathways. However, Younas et al. also emphasize that prior knowledge and Self-Determination Theory (SDT) principles—autonomy, competence, and relatedness—are critical for AI's effectiveness, a nuance not fully explored in earlier studies.

Similarly, Maphalala, Mkhasibe, and Mncube (2025, pp. 11-12) reinforce the potential of AI in SDL but introduce crucial caveats regarding equity and ethics issues only briefly touched upon by Baharuddin (2024). While Baharuddin identified technological literacy gaps in Indonesian students, Maphalala et al. argue that infrastructural inequalities, data privacy risks, and algorithmic bias could undermine AI's benefits in personalized feedback and adaptive content. These concerns are particularly relevant for Uzbekistan, where Aleksandrovna (2024) noted disparities in student engagement with online platforms. Maphalala et al. advocate for blended models where AI supplements (rather than replaces) human instruction, echoing Baharuddin's call for teacher-led technological upskilling.

Mohebbi (2025, p. 13) narrows the focus to language education, directly addressing Lashari and Umrani's (2023) exploration of ChatGPT in L2 writing. Mohebbi corroborates AI's role in fostering self-regulation through adaptive feedback but warns against overreliance, which could diminish human interaction—a concern mirrored in Aleksandrovna's (2024) findings about student

fears of reduced teacher engagement (76.9%). Mohebbi's recommendations for culturally sensitive AI design and teacher training resonate with the Uzbek context, where student motivation fluctuated based on platform interactivity (Aleksandrovna, 2024).

The study by Esiyok, Gokcearslan, and Kucukergin (2025, pp. 645-647) introduces a technological acceptance lens, bridging Baharuddin's (2024) observations on e-learning readiness with Younas et al.'s (2025) SDL framework. Their findings reveal that students' ICT self-efficacy predicts AI chatbot adoption, emphasizing the need for institutional support to cultivate digital confidence—a gap evident in Baharuddin's study, where 60% of participants felt unprepared for e-learning. This aligns with Maphalala et al.'s (2025) call for skill development, suggesting that Uzbekistan's AI integration must prioritize both infrastructure and learner training.

Zhukevych (2025, pp. 280-282) expands the discussion to immersive technologies, proposing AI-VR integration to deepen autonomy through multisensory learning. This innovation could address Aleksandrovna's (2024) reported challenges of online demotivation (15.4%) by enhancing engagement. However, Zhukevych stresses inclusivity—a concern absent in earlier studies—urging Universal Design for Learning (UDL) principles to ensure equitable access, a critical consideration for Uzbekistan's diverse learner populations.

Finally, Al-Mamary and Abubakar (2025) and Aladini et al. (2025, pp. 10-11) ground AI's role in SDL within theoretical frameworks. Al-Mamary & Abubakar link ChatGPT adoption to SDT's autonomy and relatedness, validating Younas et al.'s (2025) emphasis on psychological needs. Aladini et al. demonstrate AI's efficacy in second-language writing, echoing Lashari and Umrani's (2023) findings while highlighting metacognitive growth—a dimension overlooked in earlier studies. Their results, tied to Vygotsky's scaffolding theory, suggest AI's potential to bridge the gap between autonomy and collaborative learning, addressing Uzbek students' dual needs for flexibility and teacher interaction (Aleksandrovna, 2024).

Collectively, these studies underscore AI's transformative potential in SDL but highlight context-dependent challenges: infrastructure (Baharuddin, 2024; Maphalala et al., 2025), ethical risks (Mohebbi, 2025), and the need for balanced human-AI interaction (Aladini et al., 2025; Aleksandrovna, 2024). For Uzbekistan, successful implementation requires addressing technological readiness, fostering digital literacy, and designing inclusive, culturally adapted AI tools that align with SDT principles.

Method

Research objectives

This study has three key objectives: First, to evaluate the effectiveness of AI-powered tools in fostering self-directed learning (SDL) skills among university students in Uzbekistan, with a focus on their ability to promote independent study habits and metacognitive growth. Second, to assess the impact of AI technologies on learner autonomy and motivation, examining whether tools like intelligent tutoring systems, chatbots, and adaptive platforms empower students to take ownership of their educational journeys. Third, to identify the challenges and perceived barriers—such as technological literacy, accessibility, or cultural

relevance—that may hinder the successful integration of AI in Uzbekistan's educational context. While addressing these objectives, the study aims to provide actionable insights for educators and policymakers seeking to leverage AI as a catalyst for student-centered learning.

The findings of this research will contribute to the broader discourse on AI in education, particularly in Central Asian settings where empirical studies remain limited. Having analysed student perceptions, tool effectiveness and contextual challenges, this study will enable the development of AI-enabled learning environments that meet the educational goals of Uzbekistan. Additionally, the results may guide institutional strategies for teacher training, digital infrastructure development, and ethical AI implementation—ensuring that technological advancements enhance, rather than undermine, equitable and autonomous learning experiences.

Research questions

This study is guided by the following central research questions aimed at exploring the effectiveness of AI tools in the context of self-directed learning among students in Uzbekistan:

1. How effective are technologies that incorporate AI in the development of students' self-learning skills in Uzbekistan?
2. What does the influence of the AI-based tools mean to learners' autonomy and engagement in the Uzbek learning context?

To further investigate these overarching questions, the study will also address several sub-questions, including:

1. Which of the tools under the AI umbrella are most useful for promoting the ability to learn independently?
2. What student associations do students have with the existence of AI in their learning system?
3. How difficult is self-directed learning through the use of AI tools for students?

Hypothesis

The study tests the following hypotheses:

- Hypothesis 1: Students who use AI-powered learning tools will demonstrate significantly higher self-directed learning skills compared to students who use traditional learning methods.
- Hypothesis 2: The use of AI-powered tools will positively influence student autonomy and motivation levels in their learning process.

Research design

The current research adopts an online questionnaire through Google Forms as a quantitative research method. This design is useful because it keeps the data collection process efficient and makes it easy to reach participants from different areas in Uzbekistan. The specification of the online method allows an increased number of respondents to participate in the study and collect the data not only from undergraduate but also from graduate students. The quantitative approach helps in making various statistical descriptions of the relationships between the level of

incorporating AI tools in the classroom, the skills in self-learning, as well as students' motivation.

Ethical considerations

This online questionnaire was conducted in full compliance with research ethics. The Google form contained a clear statement guaranteeing the anonymity of all participants and explaining that the data collected would be used solely for research purposes. Participants had to give informed permission to be included in the study, agreeing to proceed with the survey after reading the information provided. When deciding to complete the questionnaire, they expressed their awareness and voluntary consent for their data to be used in this study. All data was collected anonymously and processed with strict confidentiality. The study conformed to all relevant ethical guidelines and principles for researching human subjects, as well as best practice standards for ethical issues, ensuring that the privacy and rights of participants were fully protected throughout the study.

Participants demographic

According to the data presented in Table 1 the majority of the participants 66.67% were female (18), while 29.63% were male (8), and the rest 3.7% chose another option (1). The age distribution shows that the 21-23 year group was the largest with 14 participants (51.85 %), 33.33% female, and 14.81% male. Instead, 24-26 participants constituted 11.11% of all participants enrolled in this study, and all were female, 16-20 enrolled 25.93% of the participants, 27+ enrolled 11.11% of the participants, and hence indicating that female young adults dominated the study.

Table 1. Correlation between participants' age and gender

Gender		female		male		other		Total	
		n	%	n	%	n	%	n	%
Age range	21-23	9	33.33%	4	14.81%	1	3.7%	14	51.85%
	24-26	3	11.11%	0	0%	0	0%	3	11.11%
	16-20	4	14.81%	3	11.11%	0	0%	7	25.93%
	27+	2	7.41%	1	3.7%	0	0%	3	11.11%
	Total	18	66.67%	8	29.63%	1	3.7%	27	100%

Figure 1 demonstrates the current location data that Pot 23 of 15 participants were identified as Uzbek, two of them were Tajik, and 1- participant was Kyrgyz. Additionally, 8.7% identified as being from Uzbekistan (2), and 4.35% each identified as "I don't identify myself to any" (1) and in the Uzbek language (Узбек) (1). This means that all participants were from Uzbekistan regardless of their age level.

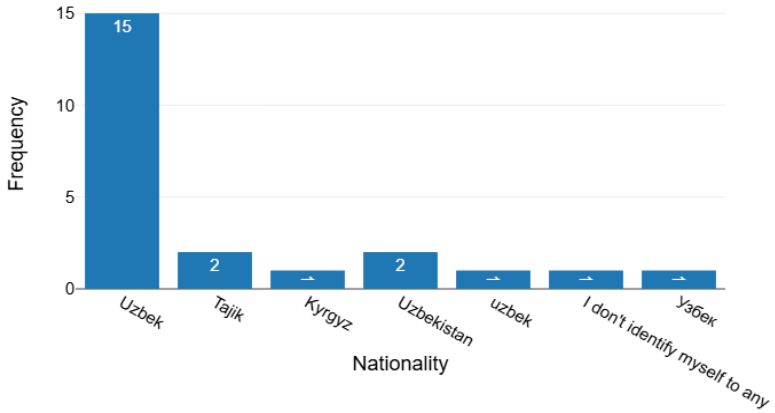


Figure 1. Nationality distribution of participants

In the second figure, one sees a focus on English and Linguistics, on the part of the participants, evident by multiple entries in the subcategories. Specifically, English language and Linguistics appear prominently, with various combinations such as "Linguistics: English language," "Philology and teaching languages: English," and "Teacher of English language," indicating a focus on both the study and teaching of English. Other fields such as software engineering, data science, and fine arts are also present, but the majority of participants show concern about languages hence English and linguistics.

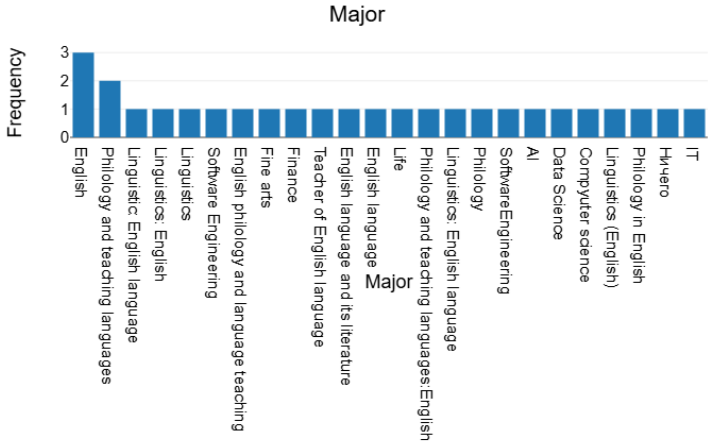


Figure 2. Distribution of academic majors among participants

Data collection instruments

The online questionnaire incorporated the Academic Self-Efficacy and AI Dependency Assessment Scale (ASAIDAS), a tool developed through a comprehensive review of literature on AI's role in education (Zhang et al., 2024). ASAIDAS measures key factors influencing AI dependency, including academic self-efficacy, critical thinking, and performance expectations, while also accounting for potential stressors unique to AI-assisted learning. To ensure cultural and contextual relevance for Uzbek students, the scale was adapted from validated instruments on AI attitudes in education (Tulasi & Ahamed, 2024).

The questionnaire was pilot-tested with a small group of Fergana State University students to confirm clarity and reliability. Quantitative items used Likert

scales to assess AI tool effectiveness (e.g., "AI helps me learn independently"), while open-ended questions captured qualitative insights on perceived barriers (e.g., "Describe challenges when using AI for self-study"). This mixed-method approach aligned with the study's hypotheses, enabling statistical analysis of AI's impact on autonomy (H1, H2) while contextualizing results through student voices.

The online questionnaire was administered mainly to Fergana State University students including under and postgraduates. The link reached the wider public through Telegram channels to cover the whole territory of Uzbekistan. Questions addressing topical issues were used in the questionnaire as well as questions that required respondents' indecipherable explanations as to how they arrived at their responses. The validity of the instruments was established through pilot testing that reaffirmed the ability of the questions to measure the intended construct.

Data analysis

Data analysis used both quantitative and qualitative methods of analysis. The quantitative data was analyzed using descriptive statistics which helped to give more details about the findings as well as the patterns of the effects of the AI tools on self-directed learning skills and motivation. All the calculations were made and the analysis was performed with the help of the statistical application Statisty. The open-ended response data were analyzed using thematic analysis, which aimed at extracting themes and perceptions students had for AI tools. The use of these different data sources enabled the study questions to be answered fully by providing statistical results as well as supporting qualitative information that complemented the findings from the statistical tests.

Findings and Discussion

The breakdown of proficiency in using AI technologies shows that most of the participants found their proficiency to be intermediate with only a few percent identified as beginner and a few as advanced. To this end, it is worthy of note that 85.19% of participants confirmed the perceived effects of AI usage on their studies as remarkable while pointing out that perceived proficiency in AI predicted their potential benefits. Further, 14.81% of the respondents were undecided about it, meaning while most of the respondents see the pride of AI, there is a credit percentage that may require help or understanding regarding the effects of AI on their classes as proven in Table 2.

Table 2. Proficiency in AI technologies and its impact on academic performance

How would you rate your proficiency in using AI technologies?					
		Intermediate	Beginner	Advanced	Total
Have you noticed any impact of AI on your academic performance?	Yes	59.26%	22.22%	3.7%	85.19%
	Not sure	7.41%	7.41%	0%	14.81%
	Total	66.67%	29.63%	3.7%	100%

A Spearman correlation was performed to determine if there is a correlation between variables How would you rate your proficiency in using AI technologies? and Have you noticed any impact of AI on your academic performance?. There is a low, positive correlation between variables How would you rate your proficiency in using AI technologies? and Have you noticed any impact of AI on your academic performance? with r= 0.13. Thus, there is a low, positive association between How would you rate your proficiency in using AI technologies? and Have you noticed any impact of AI on your academic performance? in this sample.

The result of the Spearman correlation showed that there was no significant correlation between How would you rate your proficiency in using AI technologies? and Have you noticed any impact of AI on your academic performance?, r(25) = 0.13, p = .518.

Table 3. Strength of correlation

Amount of r	Strength of the correlation
0,0 < 0,1	no correlation
0,1 < 0,3	low correlation
0,3 < 0,5	medium correlation
0,5 < 0,7	high correlation
0,7 < 1	very high correlation

Several points that have been highlighted a response to the question relate to how AI can be used to enhance academic performance; it will involve AI as a data gatherer, text booster, and summarizer. Most participants pointed out that, through the use of AI, research processes may be eased since information can be accessed more often and faster, besides it helps in the arrangement of important points which when taken, shorten the time taken in understanding topics. Moreover, the feedback feature of the AI on the writing samples, the help that AI extends in the formation of the writing ideas, and the generation of quizzes that have been often mentioned suggest that it would help in the promotion of creativity and better results of learning across different subject areas which may include art and writing in particular. In total, the findings indicate that AI is understood as a multi-purpose resource the richest applications of which include self-learning, research increase, and effective studying.

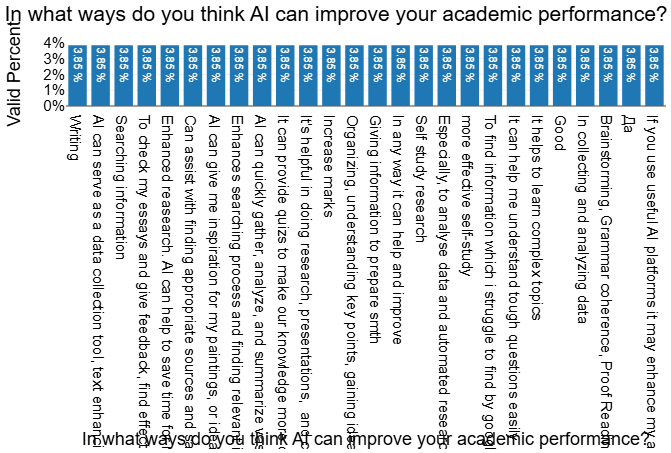


Figure 3. Perceived benefits of AI in enhancing academic performance

From the rating analysis presented in Table 4 concerning the extent to which helpful AI tools were in managing study time, the majority of the respondents were found to have benefited from the tools, with 44.44% rating it as Helpful while 51.85% rated it as Very Helpful. Regarding usage, 59.26% of participants use AI-based educational tools for 1-3 hours a week, meaning that moderate use of tools has a positive attitude towards them. On the other hand, only 18.52% spent more than 5 hours per week and 11.11% spent less than an hour which means that even minimal use of the textbook can provide humongous returns in terms of better study time management. In general, the results indicate a positive correlation between the time students interact with AI tools and the level of their estimation of the usefulness of AI tools in increasing their productivity in studying.

Table 4. Effectiveness of AI tools in managing study time

How helpful was the AI tool in managing your study time?					
		Helpful	Very helpful	Not very helpful	Total
How much time do you spend using AI-based educational tools per week?	1-3 hours	33.33%	25.93%	0%	59.26%
	More than 5 hours	3.7%	14.81%	0%	18.52%
	3-5 hours	7.41%	0%	3.7%	11.11%
	Less than 1 hour	0%	11.11%	0%	11.11%
	Total	44.44%	51.85%	3.7%	100%

The analysis of the answers to the question about the difficulties met when using AI-based tools for studies shows that students have positive and negative experiences using them. Concurring with the above findings, many respondents

affirmed that they rarely or did not encounter any problems, as seen from those who responded with "No" Others responded with specific difficulties. Some of the shared issues described were due to the delivery of incorrect or outdated information, especially when using applications such as ChatGPT where individuals felt that it does not comprehensively understand tasks. Also, several participants observed that there is sometimes a lack of knowledge or experience in how to use AI tools properly, and this made the start problematic. Other apprehensions that were included were that of the cost of these tools, and that there are limitations on their usage, a good sign that even though AI aids in learning, users may come across barriers when employing them in their study schedules that ought to be given attention. The feedback underlines the need for user education and proposing reliable information by AI devices.

In the above table 4, the areas that the respondents have observed that AI can improve their studies revealed that research and data analysis scored the highest with 33.33% of the participants feeling that this area needed improvement. Next, 22.22% of respondents cited both research and data analysis in addition to flexible and personalized learning and recommendations. From the responses above it can be deduced that there is general agreement on what AI can offer in the form of automated grading and feedback, whereby 11.11% of the participants appreciated its importance besides research. However, the observed probabilities for some of the categories like automated grading and feedback, and others like adaptive learning were lower than the perceived valid probabilities which only points towards the fact that while these areas are acknowledged, maybe they are not as prominently well-renowned as expected. Summing up, it is possible to mention that data has strengthend the general interest in AI applications as an advanced tool for improving the research and learning processes while revealing some shortages in awareness of other potentials.

Table 5. Potential enhancements of AI in academic studies

	Category	N	Observed Probability	Expected valid Probability
Which areas of your studies do you think AI can potentially enhance?	Automated grading and feedback	1	3.7%	5%
	Research and data analysis, Adaptive learning and personalized recommendations	6	22.22%	20%
	Research and data analysis	9	33.33%	20%
	Research and data analysis, Automated grading and feedback	3	11.11%	10%
	Automated grading and feedback, Adaptive learning and personalized recommendations, Other	1	3.7%	5%

	Category	N	Observed Probability	Expected valid Probability
	Research and data analysis, Automated grading and feedback, Adaptive learning and personalized recommendations	3	11.11%	10%
	Research and data analysis, Automated grading and feedback, Adaptive learning and personalized recommendations, Other	2	7.41%	20%
	Adaptive learning and personalized recommendations	1	3.7%	10%
	Research and data analysis, Automated grading and feedback, Other	1	3.7%	
Valid Total	27	100%		

The evaluation of the results showing how easy it is for the users to set their own learning goals using the AI tool also encourages a positive peer review; as observed from Figure 4, 70.37% of the respondents selected Easy or Very Easy. Specifically, 33.33% said they could sometimes select the desired learning activities, and 14.81% said they could always select the desired learning activities. Further, 18.52% said they could mostly choose their activities, which indicates high tendency of user authority in choosing goals. Still, 3.7% said that they never had this capability. This suggests that there is still a subset of users who may have difficulty using the tool, which continues to show the growth and scale of the AI tool while reinforcing the users' learning goals, which is beneficial.

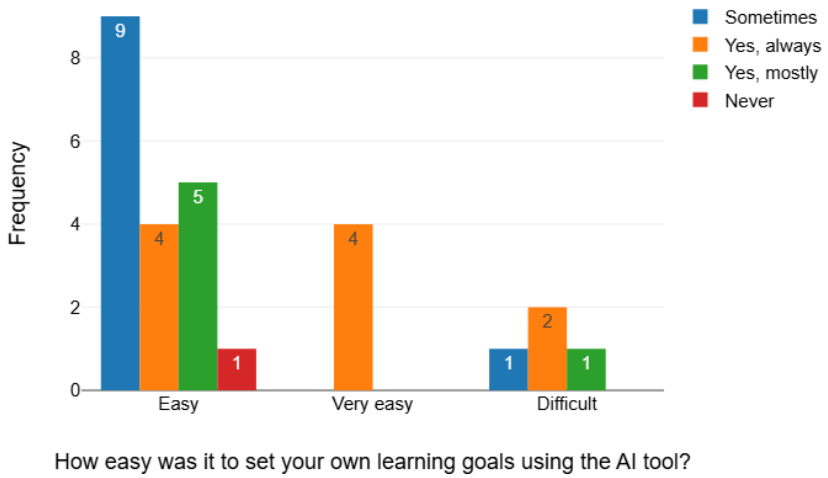


Figure 4. User experience in setting learning goals with AI tools

The nature of culture impacting the use of Artificial Intelligence tools appears to be somewhat multifaceted to the respondents' attitudes and instructional patterns:

Slightly more than half of the respondents noticed that culture influenced the utilization of AI, and some of them stated that AI is used in Uzbekistan for cheating and plagiarism. One user also confirmed engaging in this kind of behavior and other students have this attitude because of a pathetic study culture that is prevailing in our institution. The same feelings were expressed by other people commenting, some of them complaining about the conservatory view of some educators on the problem stating that due to such attitudes, students do not develop critical thinking skills and prefer to use AI to find the shortcuts to pass the exams instead of mastering the material.

On the other hand, several of the respondents reported experiencing cultural differences as they bear on specific questions asked and general learning processes. For example, the participants also pointed out that a difference in theoretical approaches used in cultural settings influences students' inputs and hence impacts the AI tools. This is likely to mean that while some students may use the AI system to help them get facts, other students may use the system to help them complete 'artistic' tasks, a strong indication that there are diverse experiences and expectations in the education system.

Participants' opinions fluctuated when it came to the effectiveness of AI tools for students in the respondent's country. The same few respondents took a rather negative tone, stating that AI will make people lazy and decrease the amount of critical thinking. Some people, however, saw the positive outcomes of AI in learning with individual attention along with the gap filling in education, especially in the areas where such opportunities are scarce, and teachers' qualifications are insufficient. In general, the trends unveiled suggest that AI tools can hold considerable benefits, but their usefulness seems primarily contingent upon how students employ them and the ethos within which they are integrated. Hence the necessity to adopt AI in moderation and on top of that to understand all the goals of applying this technology in education.

The survey of the students about the extent to which their teachers encourage the use of AI tools in Table 6 shows that 40.74% of the students reported that their teachers encourage the use of AI. Standing in stark contrast with this position is a large share of students – 37.04% – who described themselves as neutral, meaning that they do not believe they feel pressured into using AI but are not receiving explicit encouragement either. On the other hand, a considerably smaller group of students, accounting for 14.81%, No pressure or even disapproved, 7.41% of the students said they are not pressured at all, while 7.41% of the students said that their teachers do not push for AI.

Table 6. Teacher encouragement of AI tool usage among students

Do your teachers encourage you to use AI?	Frequency	%
Not very pressured	2	7.41%
Not pressured at all	2	7.41%
Neutral	10	37.04%
No	2	7.41%
Yes	11	40.74%

Do your teachers encourage you to use AI?	Frequency	%
Total	27	100%
Invalid	0	0%
Total	27	100%

Regarding the question about what people like most about using the AI tool, the mentioned results indicate a near-consensus on the time-saving role of the tool, as different users pointed out that it helped them to save time. Free features again included time savers where users mentioned" saves my time", time-saving, and fast response demonstrating their satisfaction with the time taken to use the tool for research and writing. Further, some of the respondents also pointed out that the tool enables one to be explained in detail, helps with analysis, and produces items like pictures, ideas, and the like, which makes learning even more effective. Due to their accessibility and the presence of numerous resources the mentioned tool proves to be efficient in different aspects of academic and professional work.

Additionally, the feedback shows a positive attitude towards the use of the AI tool as a useful tool to help with work and to make studying more fun. The users stated that AI facilitates a more engaging learning experience, as the learner can easily engage with content, drill down on subjects of interest, and quickly get answers to comprehensive queries. The findings indicate that the tool is acknowledged as an important educational resource that can enhance the learning process throughout different disciplines.

When trying to analyze the results of this question to define which directions can be considered to improve the efficiency of the chosen AI tool, it is possible to identify several essential issues among the users. Many respondents clearly stated that the language skills of the AI should be improved specifically for those users whose native language is not English, as many of them felt that the answers were very formal and hard to understand. People also want to get more simple and less professional information from the AI and it works less effectively in languages like Uzbek. Also, the participants were urged to provide the latest information because many AI users stated that they received old or even wrong information, especially about events.

Some of the other recommended innovations were to increase the credibility of information collected on a site, the option of minimizing adverts while researching, and the addition of features such as mind maps to help develop and formulate ideas. Privacy and security issues were also mentioned which proved that users want to get more specific instructions and better guidance. In general, people realized the possibility of using AI which could lead to making it more oriented, culturally sensitive, and able to deliver relevant information to improve its applicability in different scenarios.

Discussion

The study on the effectiveness of AI in developing self-directed learning (SDL) skills among students in Uzbekistan found that 85.19% of respondents believed AI positively impacted their academic performance, indicating its potential to foster independence in learning. This aligns with findings from a

Korean study, where students shifted from negative to more favorable perceptions of AI, reflecting a transformation in their learning experience (Lee et al., 2021, pp. 488-489). In contrast, the Vietnamese study highlighted significant concerns about AI dependency, with 83% of students feeling that reliance on tools like ChatGPT hindered their problem-solving abilities, and 76% believing that misuse of AI stifled critical thinking and communication skills (Nguyen et al., 2024, p.113). This concern is echoed in an international study warning that AI can promote laziness and reduce motivation for independent problem-solving (Aleksandrovna, 2024a, p.281).

The findings on human-computer interaction indicate that students' experiences with AI significantly enhance learning effectiveness through perceived usefulness and usability (Chou et al., 2022, p.8739). This is supported by a study showing that students using AI-driven tools in an Educational Technology course scored significantly higher ($M = 18.32$, $SD = 1.21$) than those in traditional settings ($M = 15.31$, $SD = 1.53$), with a p-value of 0.000 indicating a statistically significant difference (Eltahir & Babiker, 2024, p.103). These results highlight the positive impact of AI on academic performance and suggest that effective integration of AI tools can lead to improved educational outcomes.

In contrast, another study explores the factors influencing students' intentions to participate in AI-related product development, emphasizing the roles of self-efficacy, AI literacy, and course satisfaction. The findings indicate that AI programming self-efficacy and AI literacy directly affect students' intentions to engage in AI software development, with course playfulness significantly impacting course satisfaction and AI literacy (Chen, Su, Ku, Lai, & Hsiao, 2022). This suggests that while AI tools can enhance learning outcomes, as noted in previous studies, the design and delivery of AI-related courses are crucial for fostering student engagement and confidence in using AI technologies.

The findings on self-directed learning (SDL) and the role of AI in education emphasize the importance of autonomy in fostering learner motivation and engagement. The positive attitudes towards AI tools support existing literature that advocates for AI as a means for individualized learning. However, skepticism regarding AI fostering laziness highlights a gap in the literature that calls for responsible AI use, particularly in traditional educational contexts like Uzbekistan.

The findings regarding AI as a direct mediator in education highlight its potential to enhance interaction efficiency among educational participants, allowing them to focus on higher-order thinking (Hwang et al., 2020; Xu & Ouyang, 2021, pp. 4209-4210), aligning with the broader literature that emphasizes the importance of autonomy in learning, as both studies advocate for students and instructors to take agency in their use of AI technologies. However, concerns about over-dependence on AI echo skepticism found in previous studies, raising questions about the long-term implications of relying heavily on technology for learning.

In contrast, the study analyzing the effect sizes of AI chatbots on various learning outcomes reveals statistically significant improvements across multiple dimensions, including overall learning outcomes ($ES=0.964$) and self-efficacy ($ES=1.206$). These findings suggest that AI chatbots can effectively enhance learning performance, motivation, and perceived value of learning, while also alleviating anxiety ($ES=-0.715$) (Wu & Yu, 2023, p.19). This supports the notion that AI can play a beneficial role in education. Still, it also raises similar concerns

about dependency, as the significant positive effects may lead educators and students to rely too heavily on these technologies.

The findings on the perceived usefulness of ChatGPT among university students highlight its value for academic tasks, supporting the Technology Acceptance Model (TAM) that emphasizes the importance of perceived usefulness in technology adoption. This aligns with the study on nursing students in Gyeonggido, Korea, which found significant correlations between self-efficacy ($r = 0.51$) and positive attitudes toward AI ($r = -0.62$), suggesting that students who feel competent are more likely to embrace AI tools. However, both studies caution against over-reliance on technology, which could diminish independent thought and engagement, as noted by Al-Abdullatif and Alsubaie (2024, p.11). In contrast, the study on radiology students reveals a more cautious perspective, where only 29.3% believed AI would replace radiologists, yet 67.7% agreed it would reduce demand for their profession. Notably, 48.6% of students considering radiology as their first choice expressed anxiety about AI's impact on the field. This anxiety reflects a broader concern about the implications of AI in specialized fields, contrasting with the generally positive attitudes observed in the previous studies (Gong et al., 2018b, p.571).

The findings regarding students' ambiguous attitudes toward AI reveal significant concerns about the potential for AI to encourage shortcuts in learning, reflecting cultural perceptions that may view AI as a means to bypass traditional coursework. This aligns with the study on the impact of AI and VR training, which found that while these technologies can enhance creativity and reduce anxiety ($p < 0.05$), they also require careful integration into learning environments to avoid fostering dependency or superficial engagement. Additionally, the challenges faced by non-native speakers with AI-generated content highlight the need for improved language processing capabilities, resonating with the AI and VR study's findings that effective technology application can enhance concentration and creativity (Rong et al., 2022, p.6).

In comparison, the research exploring the influence of ChatGPT on students' learning outcomes in Morocco emphasizes the importance of output quality, perceived usefulness, and user satisfaction. The study found that higher-quality outputs from ChatGPT lead to increased perceived usefulness and satisfaction among students, reinforcing the idea that effective AI tools can enhance learning experiences (Boubker, 2023, pp.7-8). This is consistent with previous studies that indicate perceived usefulness significantly impacts technology use and satisfaction (Chen, 2010; Wang & Wang, 2009).

The findings regarding the practical implications of AI in education highlight the necessity for training educators and students in the appropriate use of AI tools in Uzbekistan. This aligns with the broader literature advocating for the promotion of intellectualism and diversification in learning, rather than merely relying on technology for assistance. The emphasis on developing AI tools that cater to specific linguistic needs further supports the idea that tailored educational resources can enhance comprehension and usage.

The findings from the study on educators' perceptions at Fergana State University and TUIT University regarding AI's impact on EFL learners' self-esteem reveal a complex relationship between technology and student confidence. While some educators noted that AI tools provide instant feedback and personalized

learning pathways that can enhance self-esteem, others raised concerns about the lack of human interaction and the potential for social isolation (Kabilovna & Aleksandrovna, 2024, pp.41-45). This duality emphasizes the need for a balanced approach to integrating AI into education.

In comparison, the path analysis results indicate significant relationships between factors influencing attitudes towards AI (AIO) among university students, with perceived ease of use (PE) and social influence (SI) significantly affecting AIO (β=0.274 and β=0.335, respectively), and self-efficacy in learning AI (SL) also significantly influencing AIO (β=0.431) (Acosta-Enriquez et al., 2025, pp.9-10). These findings suggest that students' confidence in using AI tools is shaped by their perceptions of the technology and the social context in which they learn.

Further, the study on ethical awareness and AI ethical anxiety reveals that these factors significantly impact university students' behavior towards generative AI products, with ethical anxiety negatively affecting their engagement (Zhu et al., 2024, pp.13-14). This finding highlights the importance of addressing ethical considerations alongside self-esteem in shaping students' interactions with AI technologies.

In comparison, the research analyzing the use of AI tools in students' learning processes indicates that students tend to favor "mindless" AI tools that provide straightforward functionalities, such as translations and summaries, over more complex, mindful tools. The study emphasizes that students' attitudes towards AI technology, including curiosity and openness, significantly influence their intention to use these tools (Delcker, Heil, Ifenthaler, Seufert, & Spirgi, 2024, p.8; Flores et al., 2020; Medland, 2016). Interestingly, while students may lack theoretical knowledge about AI systems, this does not hinder their intention to use these tools, suggesting that perceived ease of use and functionality are more critical factors.

However, it is important not to overlook certain methodological limitations in the present study. Although sufficient enough to serve the purpose of preliminary results, the sample size does not capture a rich demographic of students in Uzbekistan. Firstly, the presented specific AI tools may not be exhaustive, and thus the results might be bounded while discussing its generalization. Thus, cultural context too has a direct influence on the perception of AI and more studies should be conducted to understand these factors in more detail. The research should incorporate a wider sample of students and employ different types of AI applications to increase the amount of knowledge about the role of Artificial Intelligence in cultivating SDL competencies, in various learning environments.

Conclusion

This research has given some understanding regarding the use of AI in the enhancement of self-directed learning skills among students of Uzbekistan. In this regard, the overall perception about the AI tools is positive as 85.19% of the respondents agreed and confirmed that the utilization of AI tools is helpful in terms of enhancing academic performance. The data here reveals that AI technologies enhance student independence and motivation by mainly eliminating the time it takes to do different tasks and by personalizing the learning process. Although there may be some concern about the use of AI for creating shortcuts that speed up the learning process, the general mood indicates the ability of AI as a tool to enhance students' autonomy and raise the learning process with more interest.

Even though this study has brought some light into the application of AI in education, the following may have limitations that may require further studies. The possible limitation arising from the present study is the limited number of participants in the study and the specific tools confirmed to be AI-based may limit the transfer of the results to other education settings in Uzbekistan. Further research in the area should seek to sample a large and more diverse clientèle to increase the reliability of the study. Furthermore, research that examines the more extended impacts of AI integration on SDL skills and student learners' motivation seems more valuable. Examples of specific research questions may include; comparing and contrasting the existing cultural perspectives towards the use of AI in education or evaluating the efficiency of particular AI interventions on critical thinking and creativity.

In conclusion, this study shows vast possibilities in the use of AI tools to promote educational practices in Uzbekistan as the factors contributing to the development of students' independence and self-directed learning proficiency. In today's educational structures that support and incorporate technological features, the incorporation of AI can help students help themselves as well as encourage bias thinking. The study shows the need for educators and policymakers to understand cultural attitudes and perceived technological support to enable proper use of AI. In conclusion, this research supports the need for more investigatory work concerning the function of AI in learning environments, specifically, calling for the appropriate application of technology that allows learners to drive alterations in the system.

Acknowledgment

I would like to express my heartfelt gratitude to all the participants who contributed to this study. Their willingness to share their experiences made this research possible, and I assure that all responses were collected anonymously, with no personal information disclosed. I also extend my sincere thanks to Fergana State University for facilitating my research and to everyone who assisted me throughout the writing process. Your support has been invaluable in bringing this work to fruition.

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