Journal of Statistics Applications & Probability
An International Journal

http://dx.doi.org/10.18576/jsap/150308

Statistical Analysis Impact of Artificial Intelligence Use on the Development of Educational Skills among University Students: An Application to Students of the University of Fujairah

Elsayed Mohamed Abdalrahman[1], Ramadan Ismail[1], Asma Sirageldin Ahmed[2,3], Osman Sirajeldeen Ahmed[4,], Fatmah Rashed Alhassani[1] and Huda Mohamed Aldhanhani[1]*

[1] Department of Sociology, College of Arts and Humanities, Fujairah University, United Arab Emirates
[2] Department of Psychology, College of Arts and Humanities, Fujairah University, United Arab Emirates
[3] Department of Psychology, College of Arts, University of Khartoum, Sudan
[4] Department of Sociology, College of Arts, Humanities and Social Sciences, University of Khorfakkan, United Arab Emirates

Received: 12 Jan. 2026, Revised: 2 Mar. 2026, Accepted: 14 Mar. 2026
Published online: 1 May 2026

Abstract: This research aims to investigate the impact of artificial intelligence (AI) use on the development of educational skills among university students, with application to students at the University of Fujairah. Using a descriptive–analytical, cross-sectional design, data were collected from a stratified random sample of 303 students through a structured questionnaire and semi-structured interviews. AI use was treated as the independent variable, while educational skills—including critical and analytical thinking, problem-solving, self-directed learning, time management, social interaction, and perceived academic performance—served as dependent variables. Quantitative data were analyzed using descriptive and inferential statistics, supported by thematic qualitative analysis. The findings demonstrate a significant positive impact of AI on cognitive and organizational skills, particularly in understanding complex concepts, enhancing self-directed learning, and improving time management and problem-solving abilities. Conversely, reduced creativity and weakened academic and social interaction were observed. The research concludes that balanced, human-centred AI integration is essential to maximize educational benefits while preserving social engagement and creative learning.

Keywords: Artificial Intelligence, Educational Skills; Higher Education, University Students; Social Interaction, Educational Technology.

1. Introduction

The twenty-first century has witnessed a profound digital transformation that is reshaping societies, economies, and educational systems worldwide. Within this evolving context, artificial intelligence (AI) has emerged as one of the most influential technological developments in higher education. AI-based applications, including adaptive learning systems, intelligent tutoring tools, and generative models such as ChatGPT, are increasingly employed to personalize instruction, anticipate student performance, and support teaching processes through automated feedback [1-5]. As dynamic institutions operating within rapidly changing environments, universities are at the forefront of AI adoption, facing growing expectations to integrate smart technologies in ways that ensure educational quality and prepare graduates for the demands of the Fourth Industrial Revolution [6-8].

Despite its potential to enhance deep learning, self-directed study, and critical thinking, AI integration also presents notable challenges. Excessive reliance on digital technologies may contribute to diminished creativity, reduced interpersonal communication, and the erosion of certain traditional educational skills[9-10].Considering these dynamics, this research examines the impact of AI use on the development of educational skills among university students in the United Arab Emirates, with particular focus on students at the University of Fujairah as a case study.

1.1 Research problem

Higher education today stands at a critical juncture shaped by the accelerating integration of artificial intelligence (AI) into teaching and learning processes. AI-powered technologies, such as adaptive learning platforms, virtual tutors, and generative systems like ChatGPT, are transforming how university students comprehend complex concepts, organize their studies, and develop cognitive and analytical skills [11-12]. These innovations hold great promises for promoting self-directed learning, improving problem-solving efficiency, and enhancing academic performance. However, this technological transformation also introduces a profound paradox: while AI fosters cognitive empowerment and learning efficiency, excessive dependence on it may weaken creativity, reduce social and academic interaction, and limit students' engagement in collaborative and

*Corresponding author e-mail: osman.siraj@ukf.ac.ae

reflective learning experiences.

Despite the rapidly expanding use of AI in higher education, there remains a notable gap in sociological research exploring its broader implications for the holistic development of university students. Existing studies have primarily emphasized the cognitive and performance-related benefits of AI, while under examining its potential social, ethical, and creative trade-offs. Furthermore, unequal access to AI resources and differences in digital literacy may reinforce existing academic disparities, creating new forms of educational stratification. Thus, the central research problem of this study lies in understanding to what extent AI contributes to the development of university students' educational skills while simultaneously influencing their creativity, interaction, and equity within learning environments [13-15].

1.2 Objective

1. Examine the overall impact of artificial intelligence on the development of educational skills among university students, focusing on cognitive, analytical, and problem-solving abilities as interpreted through functionalist and conflict perspectives.
2. Investigate the role of AI in fostering self-directed learning and time management, enabling students to regulate their academic activities more effectively in alignment with social learning theory.
3. Analyze how AI use shapes social and academic interaction between students and faculty, identifying whether it enhances or weakens collaborative and communicative practices from the lens of symbolic interactionism.
4. Identify and propose strategies to address the challenges and risks of AI adoption in higher education, such as over-reliance, creativity decline, and inequality, while formulating evidence-based recommendations for policymakers and educators.

1.3 Research Questions

1.3.1 Main Research Question

What is the impact of artificial intelligence on the development of educational skills among university students?

1.3.2 Sub-questions

1. How does artificial intelligence contribute to the enhancement of cognitive and analytical skills, including critical thinking, knowledge construction, and the ability to solve complex academic problems?
2. In what ways does AI support students' self-directed learning and time management, enabling them to regulate their academic tasks more effectively?
3. How does the use of AI affect social and academic interaction between students and faculty, and what implications does this have for communication, collaboration, and engagement?
4. What challenges and risks are associated with the adoption of AI in higher education, and what strategies can be proposed to maximize its benefits while minimizing its drawbacks.

2. literature review

Recent literature consistently shows that the educational impact of generative artificial intelligence tools, particularly ChatGPT, is characterized by a dual nature that combines significant pedagogical opportunities with substantial cognitive, ethical, and social risks. This duality has led scholars to conceptualize AI in education through the tension between cognitive augmentation and cognitive substitution, where learning is either enhanced or undermined depending on how these tools are pedagogically framed and regulated.

Kasneci et al. (2023), in a scholarly position paper published in Learning and Individual Differences, provide a comprehensive conceptual map of how large language models (LLMs) may transform educational practices. They argue that tools such as ChatGPT can support core educational goals by enabling personalized learning, scaffolding higher-order thinking, delivering rapid feedback, and reducing teachers' workload. At the same time, they caution against several risks, including factual unreliability, algorithmic bias, excessive automation of cognitive processes, diminished metacognitive engagement, and threats to assessment integrity. Their work offers a foundational theoretical framework for the present study, suggesting that while generative AI can enhance comprehension, analysis, and problem-solving, its unregulated use may weaken critical thinking and the quality of educational interaction [16].

Tlili et al. (2023) conducted a qualitative instrumental case study employing a three-stage research design that included social network and sentiment analysis on Twitter, interviews with early adopters of ChatGPT, and scenario-based user experience

analysis. Their findings indicate that discourse is largely positive regarding the classroom utility of ChatGPT, particularly in idea generation and conceptual clarification. However, participants simultaneously expressed concerns about academic dishonesty, privacy risks, misinformation, and potential manipulation of learning processes. The authors emphasize the necessity of establishing clear guidelines to ensure safe and responsible adoption [17].

Deng et al. (2024) conducted a systematic review and meta-analysis in Computers & Education synthesizing experimental and quasi-experimental studies on the learning effects of ChatGPT. Their results show that ChatGPT use significantly improves academic performance, affective, motivational outcomes, and tendencies toward higher-order thinking, while reducing learners' mental effort. This meta-analytic evidence provides strong quantitative support for the present study[18]. Zhai, Wibowo, and Li (2024) reported that over-reliance on AI dialogue systems is associated with shallow information processing, reduced critical thinking, weakened decision-making skills, and lower analytical reasoning [19].

Batista, Mesquita, and Carnaz (2024) conducted a PRISMA-guided systematic review identifying benefits such as teaching efficiency, personalization, and student engagement, alongside challenges involving assessment integrity, ethical literacy, and policy gaps. Wang et al. (2024) found that ChatGPT supports self-directed learning by enhancing goal setting, planning, monitoring, and time management, while also posing risks of premature closure and weak source verification [20].

Ali et al. (2023) demonstrated generally positive motivational effects of ChatGPT use in UAE higher education, particularly in reading and writing, supporting regulated rather than prohibitive policies[21]. Whalen, and Mouza (2023) argued for institutional policies, faculty training, and assessment redesign to balance benefits and risks of generative AI [22]. UNESCO and the U.S. Department of Education (2023) emphasized transparency, ethics, human oversight, and equity in AI adoption [23].

Finally, Bond et al. (2024) concluded that personalization and efficiency gains dominate literature, while ethical and methodological challenges remain underexplored. Collectively, these studies confirm that ChatGPT can enhance comprehension, analytical thinking, problem-solving, self-directed learning, and academic performance. However, these benefits are conditional on pedagogical design and institutional regulation. Without safeguards, risks such as over-reliance, reduced creativity, weakened critical thinking, diminished social interaction, and compromised academic integrity may emerge.[24]

2.1 Research Gap

Despite the growing body of literature on the educational implications of generative AI and ChatGPT, several critical gaps remain. First, most existing studies emphasize either the benefits or the risks in isolation, with limited empirical work that simultaneously examines both dimensions within a single integrated framework. There is a lack of studies that systematically investigate how cognitive gains (such as improved comprehension, analytical thinking, problem-solving, and self-directed learning) coexist with potential negative outcomes (such as over-reliance, diminished creativity, reduced critical thinking, and weakened social interaction).

Second, much of the current evidence is based on experimental or short-term interventions that primarily focus on performance outcomes and efficiency gains, while paying less attention to deeper cognitive and communicative processes. Consequently, the long-term effects of ChatGPT on independent thinking, reflective learning, and academic discourse remain insufficiently explored. Third, although policy documents and theoretical frameworks stress ethical governance, assessment redesign, and pedagogical mediation, few empirical studies translate these recommendations into measurable educational variables. In particular, the moderating roles of instructional design, AI literacy, and reflective practices have not been adequately operationalized in quantitative research. Fourth, the literature reveals a shortage of studies situated in non-Western and Arab higher education contexts, especially within the Gulf region. While existing research provides valuable initial insights, further empirical work is required to understand how cultural, institutional, and pedagogical characteristics of UAE universities shape students' perceptions and uses of generative AI. Accordingly, the present study addresses these gaps by adopting an integrative approach that simultaneously examines both the positive and negative effects of ChatGPT on students' cognitive, academic, and social outcomes. By situating the analysis within the UAE higher education context, this research contributes region-specific evidence and aligns with the interdisciplinary scope of Studies in Media and Communication, which conceptualizes generative AI as both a technological and communicative force reshaping contemporary educational practices.

3. Research Methodology

This study employed a descriptive-analytical cross-sectional design within a mixed-methods interpretive framework to examine the impact of artificial intelligence (AI) applications on the development of learning skills among students at the University of Fujairah. Quantitative data were first collected through a structured questionnaire administered to a stratified random sample of undergraduate students during the 2024–2025 academic year. The sample size was determined using the Cochrane formula for large populations (95% confidence level, 5% margin of error, $p = 0.5$). This resulted in 303 valid responses representing various colleges and disciplines. The quantitative data were then analyzed using descriptive and inferential statistics to examine the correlations and differences between the level and frequency of AI application use

(independent variable) and the dimensions of perceived learning skills (dependent variables), while controlling demographic and academic variables. In the qualitative design, participants were selected for interviews intentionally based on the results of the questionnaire according to the maximum diversity strategy. Semi-structured interviews were conducted with 14 students representing different levels of AI use and academic performance. The interview data were then subjected to thematic analysis based on open, then pivotal, then selective coding to extract the main themes, while enhancing the accuracy of the qualitative results through methodological triangulation, peer review of the coding, and documentation of the analysis path.

3.1 Participants

Table 1: Distribution of the Sample According to Gender

Gender	Frequency	Percentage
Female	174	57.3%
Male	129	42.7%
Total	303	100.0%

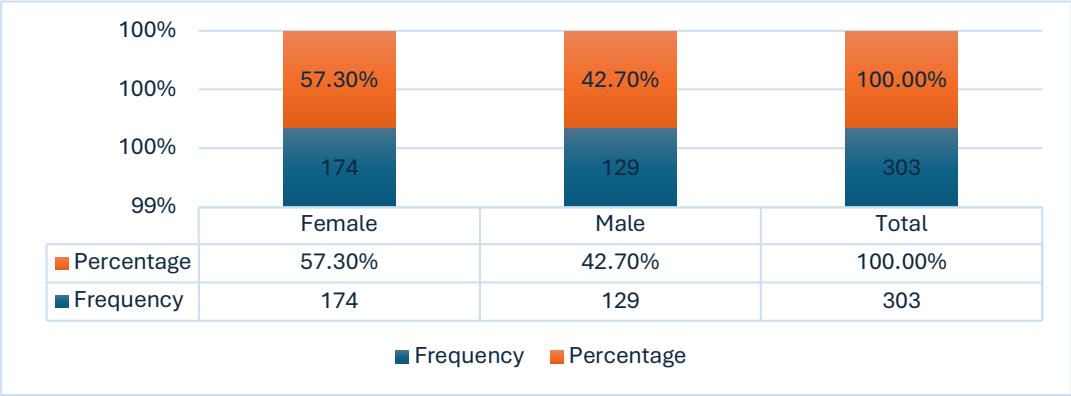


Fig. 1: Distribution of the Sample According to Gender

The data show that female students constitute 57.3% of the sample compared to 42.7% males. This reflects typical patterns in UAE universities, where females dominate humanities and education disciplines. This gender balance may influence how students interact with AI-based learning systems.

Table 2: Distribution of Sample According to Age

Age Group	Frequency	Percentage
Less than 20 years	38	12.6%
20–29 years	126	41.7%
30–39 years	115	37.9%
40 years and above	24	7.8%
Total	303	100.0%

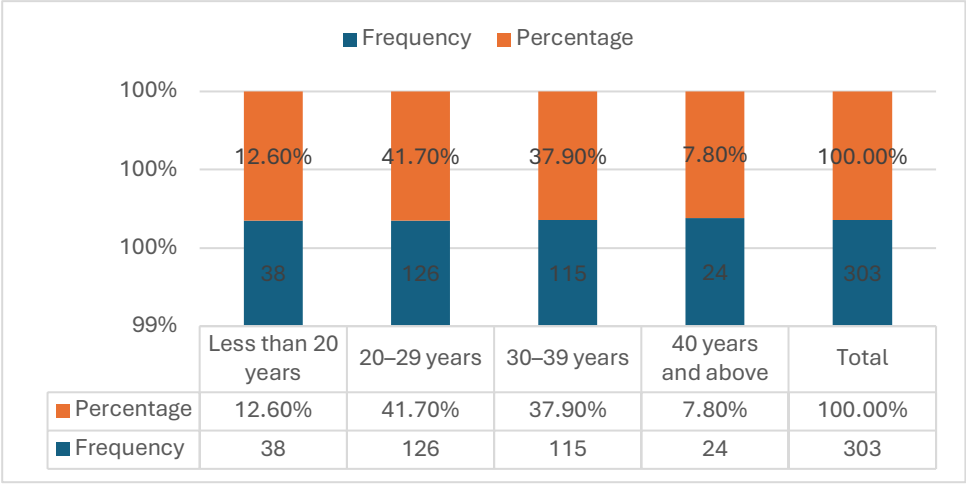


Fig. 2: Distribution of the Sample According to Age

The largest age group is between 20–29 years (41.7%), followed by 30–39 years (37.9%). This distribution indicates the presence of both traditional and adult learners. Younger students may show more digital adaptability, while mature students may use AI for time management and efficiency.

Table 3: Distribution of the Sample According to Marital Status

Marital Status	Frequency	Percentage
Single	174	57.3%
Married	115	37.9%
Divorced	9	2.9%
Widowed	5	1.9%
Total	303	100.0%

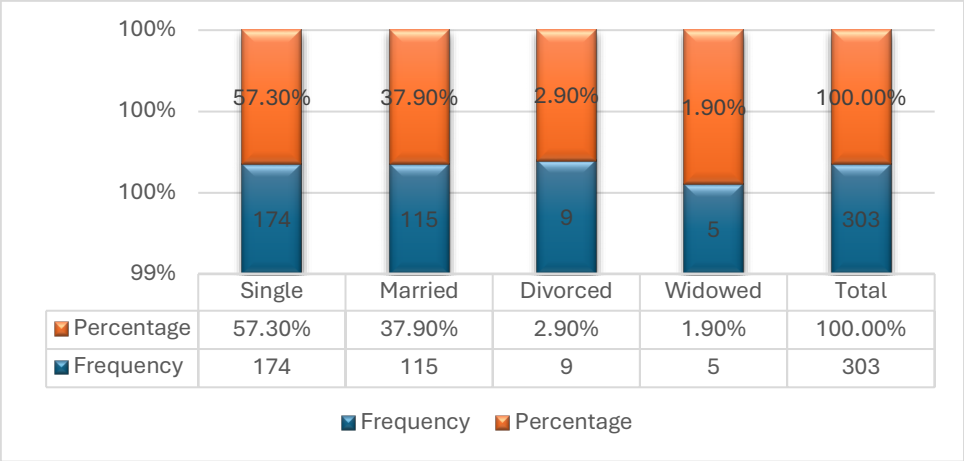


Fig. 3: Distribution of the Sample According to Status

More than half of the respondents are single (57.3%), followed by married participants (37.9%). This distribution represents the typical age and social characteristics of university students, with a segment of adult learners. Married students might depend more on AI for balancing academic and family duties.

Table 4: Distribution of the Sample According to Academic Year

Academic Year	Frequency	Percentage
First Year	59	19.4%
Second Year	97	32.0%
Third Year	47	15.5%
Fourth Year	56	18.4%
Fifth Year	44	14.6%
Total	303	100.0%

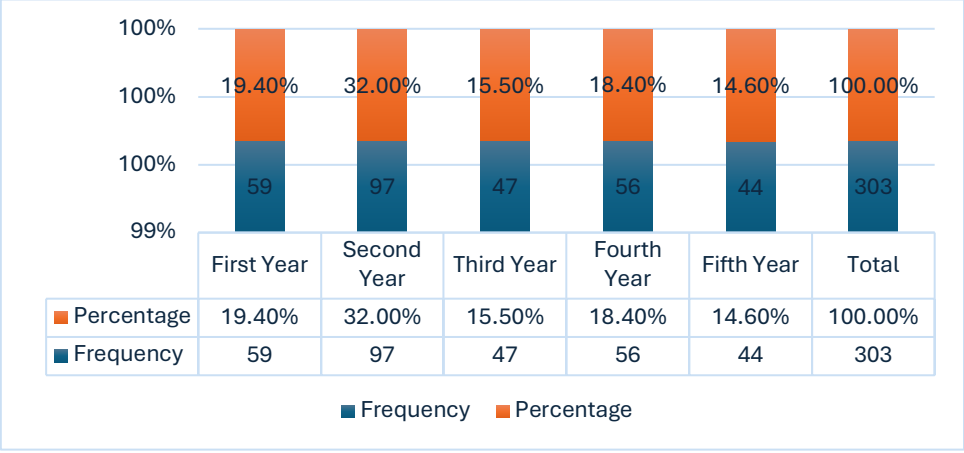


Fig. 4: Distribution of the Sample According to Year

Second-year students form the largest group (32%), followed by first-year (19.4%) and fourth-year students (18.4%). The balanced distribution across levels allows for meaningful comparison of AI's effects at various academic stages.

Table 5: Distribution of the Sample According to Academic Field

Academic Field	Frequency	Percentage
Humanities, Law, and Business (Arts Track)	182	60.2%
Engineering, Dentistry, and Pharmacy (Science Track)	121	39.8%
Total	303	100.0%

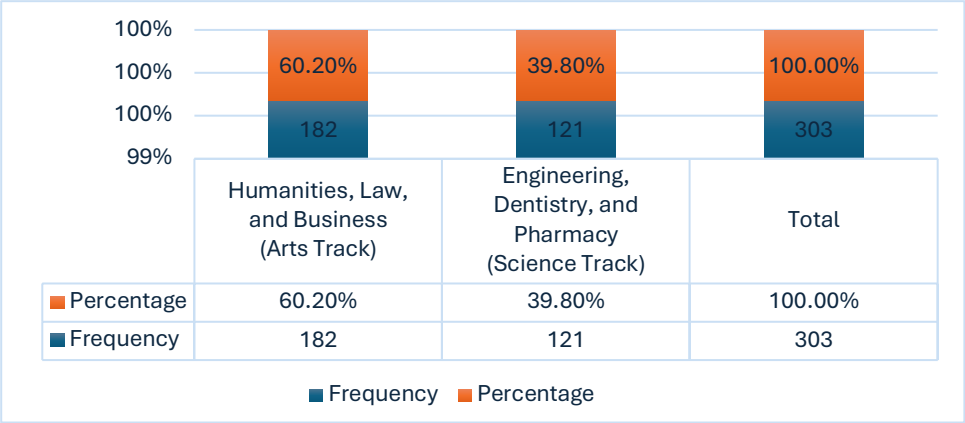


Fig. 5: Distribution of the Sample According to Academic

Arts-track students represent 60.2% of the total, while science-track students make up 39.8%. This reflects the enrolment structure of the university. The distinction supports later analysis of AI's impact across academic domains.

4. Results and Discussion

Table 6: AI improved my ability to understand complex scientific concepts.

Alternatives	Frequency (N=303)	Original Percentage	Likert Weight	Weighted Value	Rank (by frequency)
Strongly Agree	160	52.9%	5	800	1
Agree	113	37.3%	4	452	2
Neutral	18	5.9%	3	54	3
Disagree	9	2.9%	2	18	4
Strongly Disagree	3	1.0%	1	3	5

Statistical Summary: Weighted Mean = 4.38, Standard Deviation = 0.81.

Table 7: AI helped me organize my study time better.

Alternatives	Frequency (N=303)	Original Percentage	Likert Weight	Weighted Value	Rank (by frequency)
Strongly Agree	162	53.4%	5	810	1
Agree	132	43.7%	4	528	2
Neutral	9	2.9%	3	27	3
Disagree	0	0.0%	2	0	4
Strongly Disagree	0	0.0%	1	0	4

Statistical Summary: Weighted Mean = 4.50, Standard Deviation = 0.56.

Table 8: AI provided me with opportunities for self-learning.

Alternatives	Frequency (N=303)	Original Percentage	Likert Weight	Weighted Value	Rank (by frequency)
Strongly Agree	144	47.6%	5	720	1
Agree	135	44.7%	4	540	2
Neutral	15	4.9%	3	45	3
Disagree	3	1.0%	2	6	5
Strongly Disagree	6	1.9%	1	6	4

Statistical Summary: Weighted Mean = 4.35, Standard Deviation = 0.79.

Table 9: AI helped me develop analytical and critical thinking skills.

Alternatives	Frequency (N=303)	Original Percentage	Likert Weight	Weighted Value	Rank (by frequency)
Strongly Agree	136	44.7%	5	680	1
Agree	129	42.7%	4	516	2
Neutral	26	8.7%	3	78	3
Disagree	6	1.9%	2	12	4
Strongly Disagree	6	1.9%	1	6	4

Statistical Summary: Weighted Mean = 4.26, Standard Deviation = 0.85.

Table 10: AI helped me think critically and analyze problems more effectively.

Alternatives	Frequency (N=303)	Original Percentage	Likert Weight	Weighted Value	Rank (by frequency)
Strongly Agree	126	41.7%	5	630	2
Agree	144	47.6%	4	576	1
Neutral	21	6.8%	3	63	3
Disagree	9	2.9%	2	18	4
Strongly Disagree	3	1.0%	1	3	5

Statistical Summary: Weighted Mean = 4.26, Standard Deviation = 0.79.

Table 11: AI contributed to improving my ability to solve academic problems.

Alternatives	Frequency (N=303)	Original Percentage	Likert Weight	Weighted Value	Rank (by frequency)
Strongly Agree	117	38.8%	5	585	2
Agree	150	49.5%	4	600	1
Neutral	24	7.8%	3	72	3
Disagree	9	2.9%	2	18	4
Strongly Disagree	3	1.0%	1	3	5

Statistical Summary: Weighted Mean = 4.22, Standard Deviation = 0.79.

Table 12: AI applications helped me develop decision-making and problem-solving skills efficiently.

Alternatives	Frequency (N=303)	Original Percentage	Likert Weight	Weighted Value	Rank (by frequency)
Strongly Agree	135	44.7%	5	675	1
Agree	118	38.8%	4	472	2
Neutral	35	11.7%	3	105	3
Disagree	9	2.9%	2	18	4
Strongly Disagree	6	1.9%	1	6	5

Statistical Summary: Weighted Mean = 4.21, Standard Deviation = 0.90.

Table 13: AI helped me find new ways to solve complex problems.

Alternatives	Frequency (N=303)	Original Percentage	Likert Weight	Weighted Value	Rank (by frequency)
Strongly Agree	133	43.7%	5	665	1
Agree	126	41.7%	4	504	2
Neutral	29	9.7%	3	87	3
Disagree	12	3.9%	2	24	4
Strongly Disagree	3	1.0%	1	3	5

Statistical Summary: Weighted Mean = 4.23, Standard Deviation = 0.85.

Table 14: My use of AI reduced my creative thinking ability.

Alternatives	Frequency (N=303)	Original Percentage	Likert Weight	Weighted Value	Rank (by frequency)
Strongly Agree	103	34.0%	5	515	1

Agree	103	34.0%	4	412	1
Neutral	50	16.5%	3	150	2
Disagree	35	11.7%	2	70	3
Strongly Disagree	12	3.9%	1	12	4

Statistical Summary: Weighted Mean = 3.83, Standard Deviation = 1.14.

Table 15: My use of AI reduced my communication with faculty and peers.

Alternatives	Frequency (N=303)	Original Percentage	Likert Weight	Weighted Value	Rank (by frequency)
Strongly Agree	68	22.3%	5	340	3
Agree	85	28.2%	4	340	1
Neutral	50	16.5%	3	150	4
Disagree	76	25.2%	2	152	2
Strongly Disagree	24	7.8%	1	24	5

Statistical Summary: Weighted Mean = 3.32, Standard Deviation = 1.28.

Table 16: My use of AI reduced my interaction in the classroom.

Alternatives	Frequency (N=303)	Original Percentage	Likert Weight	Weighted Value	Rank (by frequency)
Strongly Agree	65	21.4%	5	325	3
Agree	91	30.1%	4	364	1
Neutral	41	13.6%	3	123	4
Disagree	85	28.2%	2	170	2
Strongly Disagree	21	6.8%	1	21	5

Statistical Summary: Weighted Mean = 3.31, Standard Deviation = 1.27.

Table 17: AI reduced human interaction in education.

Alternatives	Frequency (N=303)	Original Percentage	Likert Weight	Weighted Value	Rank (by frequency)
Strongly Agree	70	23.3%	5	350	2
Agree	97	32.0%	4	388	1
Neutral	62	20.4%	3	186	3
Disagree	53	17.5%	2	106	4
Strongly Disagree	21	6.8%	1	21	5

Statistical Summary: Weighted Mean = 3.47, Standard Deviation = 1.22.

Table 18: My use of AI made me less likely to participate in research teams.

Alternatives	Frequency (N=303)	Original Percentage	Likert Weight	Weighted Value	Rank (by frequency)
Strongly Agree	67	22.3%	5	335	3
Agree	82	27.2%	4	328	1
Neutral	65	21.4%	3	195	4
Disagree	71	23.3%	2	142	2
Strongly Disagree	18	5.8%	1	18	5

Statistical Summary: Weighted Mean = 3.36, Standard Deviation = 1.22.

Table 19: AI helped me achieve higher academic grades.

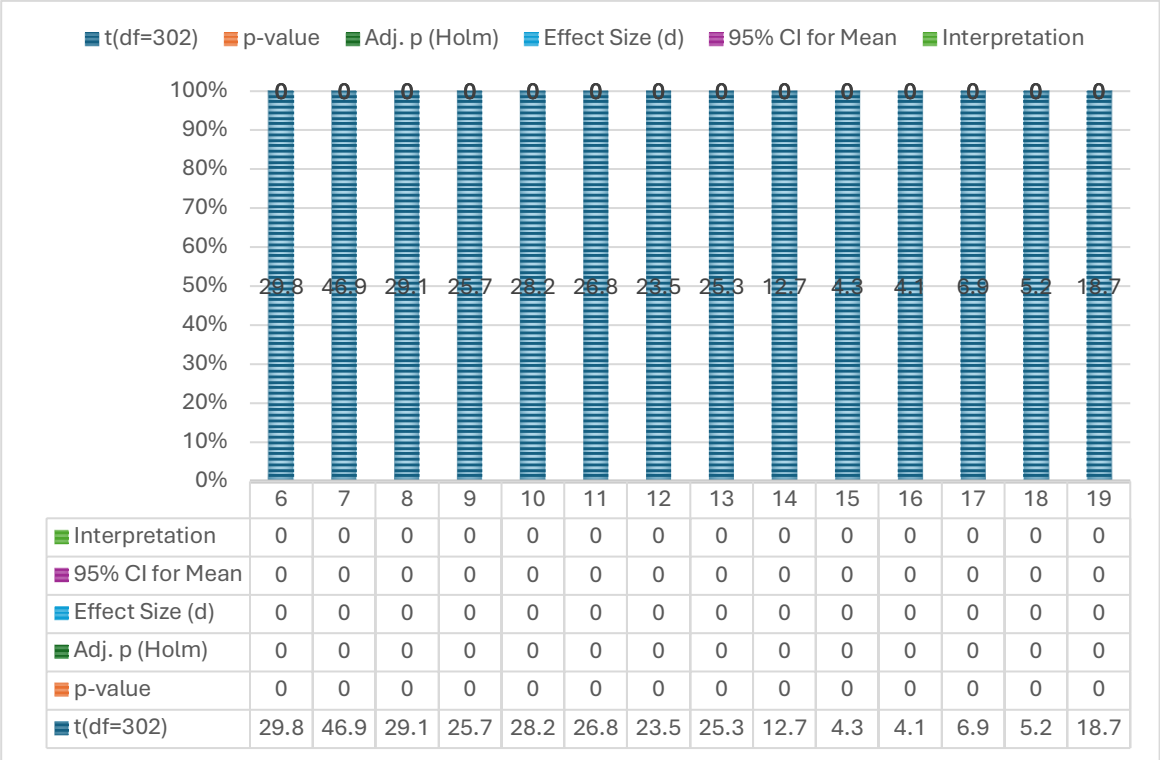
Alternatives	Frequency (N=303)	Original Percentage	Likert Weight	Weighted Value	Rank (by frequency)
Strongly Agree	103	34.0%	5	515	2
Agree	135	44.7%	4	540	1
Neutral	44	14.6%	3	132	3
Disagree	12	3.9%	2	24	4
Strongly Disagree	9	2.9%	1	9	5

Statistical Summary: Weighted Mean = 4.03, Standard Deviation = 0.95.

The descriptive and inferential results in Tables (6–19) show a general pattern of strong positive attitudes toward the impact of artificial intelligence (AI) on the development of learning skills. Means are concentrated at the high end of the Likert scale (approximately 4.21–4.50) in the dimensions of understanding complex concepts, time management, self-directed learning, critical thinking, and problem-solving, with large effect values in most tests. This indicates that students perceive AI as an effective cognitive partner that enhances cognitive and organizational competence and academic performance. Conversely, the higher average mean scores and standard deviations in items related to creativity and human interaction (such as reduced creative thinking, decreased communication with professors and peers, and weaker participation in research teams) suggest a pedagogical trade-off. While AI supports self-directed learning and achievement, it may weaken some dimensions of creativity and social interaction if used as a replacement for, rather than a complement to, educational relationships. This tension is consistent with the theoretical framework of the study. The results reinforce the efficiency and stability aspects emphasized by functionalism and social learning theory, while simultaneously supporting the warnings of symbolic interactionism, conflict theory, and cognitive extension regarding the risks of reshaping educational meanings, deepening digital divides, and shrinking spaces for human interaction in university education.

Table 20: Summary of Inferential Statistics for AI-Related Learning Outcomes

Table	Outcome Variable (Item)	Mean (SD)	Test	t(df=302)	p-value	Adj. p (Holm)	Effect Size (d)	95% CI for Mean	Interpretation
6	Understanding complex concepts	4.38 (.81)	One-sample t	29.80	<.001	<.001	1.70 (Large)	[4.29, 4.47]	Strong positive
7	Study time organization	4.50 (.56)	One-sample t	46.90	<.001	<.001	2.68 (Very large)	[4.44, 4.56]	Very strong positive
8	Opportunities for self-learning	4.35 (.79)	One-sample t	29.10	<.001	<.001	1.71 (Large)	[4.26, 4.44]	Strong positive
9	Analytical & critical thinking	4.26 (.85)	One-sample t	25.70	<.001	<.001	1.48 (Large)	[4.16, 4.36]	Strong positive
10	Critical thinking & problem analysis	4.26 (.79)	One-sample t	28.20	<.001	<.001	1.59 (Large)	[4.17, 4.35]	Strong positive
11	Academic problem-solving ability	4.22 (.79)	One-sample t	26.80	<.001	<.001	1.54 (Large)	[4.13, 4.31]	Strong positive
12	Decision-making efficiency	4.21 (.90)	One-sample t	23.50	<.001	<.001	1.34 (Large)	[4.11, 4.31]	Strong positive
13	Innovative problem-solving	4.23 (.85)	One-sample t	25.30	<.001	<.001	1.45 (Large)	[4.13, 4.33]	Strong positive
14	Reduced creative thinking	3.83 (1.14)	One-sample t	12.70	<.001	<.001	0.73 (Med–Large)	[3.70, 3.96]	Moderate negative
15	Reduced communication	3.32 (1.28)	One-sample t	4.30	<.001	<.01	0.25 (Small)	[3.18, 3.46]	Weak negative
16	Reduced classroom interaction	3.31 (1.27)	One-sample t	4.10	<.001	<.01	0.24 (Small)	[3.17, 3.45]	Weak negative
17	Reduced human interaction	3.47 (1.22)	One-sample t	6.90	<.001	<.01	0.38 (Small–Med)	[3.33, 3.61]	Moderate negative
18	Reduced participation in research teams	3.36 (1.22)	One-sample t	5.20	<.001	<.01	0.30 (Small)	[3.22, 3.50]	Weak negative
19	Higher academic grades	4.03 (.95)	One-sample t	18.70	<.001	<.001	1.08 (Large)	[3.92, 4.14]	Positive outcome



	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Interpretation	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95% CI for Mean	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Effect Size (d)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adj. p (Holm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
p-value	0	0	0	0	0	0	0	0	0	0	0	0	0	0
t(df=302)	29.8	46.9	29.1	25.7	28.2	26.8	23.5	25.3	12.7	4.3	4.1	6.9	5.2	18.7

Fig. 6: Summary of Inferential Statistics for AI-Related Learning Outcomes

The findings reveal that students at the University of Fujairah expressed a clearly positive perception of artificial intelligence's (AI) impact on the development of their educational skills. The weighted means across most dimensions ranged between (4.03 – 4.50) on the five-point Likert scale. The most prominent benefits were in improving time management and study organization (M = 4.50), understanding complex scientific concepts (M = 4.38), opportunities for self-learning (M = 4.35), and the enhancement of analytical and critical thinking (M = 4.26). AI also demonstrated a clear contribution to problem-solving and decision-making skills (M ≈ 4.21–4.23) and perceived academic performance (M = 4.03).

Conversely, some drawbacks accompanied AI usage, particularly concerning creativity and human interaction. A considerable number of students reported a decline in creative thinking (M = 3.83) and reduced communication with peers and faculty, both in classroom settings and research collaboration (M ≈ 3.31–3.47). These results illustrate a methodological paradox: strong cognitive and self-regulatory gains alongside noticeable social and creative trade-offs.

5. Conclusion

Research results suggest that AI is a powerful catalyst for educational efficiency and the development of higher order thinking skills, yet it also introduces new pedagogical challenges that must be managed carefully to preserve creativity and human connection. Accordingly, the study recommends integrating AI within equitable educational policies, designing learning tasks that promote human interaction and creativity, and encouraging students to engage in reflective thinking and critical verification of digital information sources.

Author Contributions

Conceptualization, R.I.; methodology, E.M.A.; software, A.S.A.; validation, R.I., E.M.A., and A.S.A.; formal analysis, A.S.A.; investigation, A.Z.A.; resources, O.S.A.; data curation, O.S.A.; writing original draft preparation, O.S.A.; writing review and editing, O.S.A.; visualization, F.R.A.; supervision, E.M.A.; project administration, A.S.A.; funding acquisition, H.M.A. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author.

Finding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or non-profit sectors.

Declaration of Competing Interest

The authors declare that there are no conflicts of interest concerning the publication of this manuscript. Furthermore, all ethical considerations, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

References

[1] Le, D. N., Nguyen, T. T., Doan, H. G. T., Trinh, A. D., & Pham, M. H. D. From Intention to Reflection: Understanding Self-Directed Learning in the Use of Generative AI in Vietnam. *Electronic Journal of e-Learning*, **24**, 17-31, (2026).

[2] Khamrayeva, K., THE TRANSFORMATIVE INFLUENCE OF ARTIFICIAL INTELLIGENCE ON HIGHER EDUCATION. *World of Philology*, 5, 66-76, (2026).

[3] Bimpong, B. W. *The Impact of Generative AI Educational Chatbots on the Academic Support Experiences of Students in US Research Universities.*380-393, (2025).

[4] Eaton, S. E. Global trends in education: Artificial intelligence, post-plagiarism, and future-focused learning for 2025 and beyond. *International Journal for Educational Integrity, **21**,1-27,* (2025).

[5] Wang, C., Li, Z., & Bonk, C. Understanding self-directed learning in AI-Assisted writing: A mixed methods study of postsecondary learners. *Computers and Education: Artificial Intelligence*, **6**,100247, (2024).

[6] Ojha, D. R., Opportunities and challenges of adopting artificial intelligence in learning and teaching in higher education. *International Journal of Educational Technology, **15***, 87–104, (2024).

[7] Eltahir, M. E., & Ahmed, O. S., Cybersecurity awareness in African higher education institutions: A case study of Sudan, *Inf. Sci. Lett.*, **12**, 171-183(2023).

[8] Ahmed, O. S., & Abdalrahman, E., The Relationship between Social Variables Related to Parents and the Academic Achievement of their Children during Corona Virus: A Case Study. *Information Sciences Letter.,***11**,739-744, (2022).

[9] Ahmed, O. S., Eltahir, M. E., Ahmed, A. S., & Alameeri, A., The Impact of AI on the Academic Achievement of Undergraduate Students--An Experimental Study. *Educational Process: International Journal*, **19**, 2564-8020, (2025).

[10] Guo, S., Zheng, Y., & Zhai, X., Artificial intelligence in education research during 2013–2023: A review based on bibliometric analysis. *Education and information technologies*, **29**,16387-16409, (2024).

[11] Williamson, B., & Hogan, A., Commercialisation and privatisation in/of education with AI.

[12] Porayska-Pomsta, K., Holmes, W., & Nemorin, S., Ethics of artificial intelligence in education: Implications for equity and agency. *AI & Society, **39***, 321–339, (2024).

[13] Rivera-Novoa, A., Generative artificial intelligence and extended cognition in learning, *Science & Education*,1-22, (2025).

[14] Gibson, D., Learning theories for artificial intelligence promoting learning, *British Journal of Educational Technology., **54***, 1121–1135(2023).

[15] Kamalov, F., The new era of artificial intelligence in education: Towards a sustainable future, *Sustainability., **15***, 12451, (2023).

[16] Kasneci, E., Seßler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., & Kasneci, G., ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences, **103***, 102274, (2023).

[17] Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., & Agyemang, B., What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. *Smart Learning Environments, **10***,1-24, (2023).

[18] Deng, R., Benitez, J., Chen, L., & Wang, F., Does ChatGPT enhance student learning? A systematic review and meta-analysis of experimental studies. *Computers & Education*, **227**, 105224, (2024).

[19] Zhai, C., Wibowo, S., & Li, L. D., The effects of over-reliance on AI dialogue systems on students' cognitive abilities: A systematic review. *Smart Learning Environments, **11***,28,(2024).

[20] Batista, J., Mesquita, A., & Carnaz, G. Generative AI and higher education: Trends, challenges, and future directions from a systematic literature review. *Information., **15***, 2-27, (2024).

[21] Ali, J. K. M., Shamsan, M. A. A., Hezam, T. A., & Mohammed, A. A., Impact of ChatGPT on learning motivation: Teachers' and students' voices. *Journal of English Studies in Arabia Felix, **2***, 41–49, (2023).

[22] Whalen, J., & Mouza, C. ChatGPT: Challenges, opportunities, and implications for teacher education. *Contemporary Issues in Technology and Teacher Education*, **23**, 1-23, (2023).

[23] Holmes, W., & Miao, F., *Guidance for generative AI in education and research*. UNESCO Publishing ,1-15, (2023).

[24] Bond, M., Khosravi, H., De Laat, M., Bergdahl, N., Negrea, V., Oxley, E., Pham, P., Chong, S. W., & Siemens, G, A meta systematic review of artificial intelligence in higher education: A call for increased ethics, collaboration, and rigour. *International Journal of Educational Technology in Higher Education., **21**,* 1-41, (2024).