



Artificial Intelligence Tools and Student Learning in Higher Education: Opportunities, Challenges, and Strategic Integration in Mogadishu, Somalia

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Abstract

Generative artificial intelligence (AI) tools are increasingly used by university students, yet evidence from Somali higher education remains limited. This study describes students' use of generative AI, perceived learning benefits, challenges, satisfaction, and future preferences, and considers the institutional strategies needed for responsible integration. A quantitative cross-sectional survey collected 442 valid responses from undergraduate students at five Somali universities through convenience sampling. A structured online questionnaire was adapted from previous studies, and the data were analyzed in SPSS using frequencies and percentages. Most respondents (96.2%) reported using generative AI for learning. ChatGPT was the most frequently selected tool, followed by Gemini and Canva AI. Students commonly used AI for academic writing, assignments, presentations, and exam preparation. Positive responses emphasized accessibility, engagement, creativity, organization of study materials, and language support. Reported concerns included inaccurate or irrelevant output, distraction, difficulty integrating AI into study routines, privacy and security, limited training, and uncertainty about reliability. Students also supported greater curricular integration and personalized AI-supported learning. Because the design was descriptive, cross-sectional, and based on convenience sampling, the findings reflect perceptions within the sample and do not establish that AI caused changes in learning or academic performance. Universities should combine AI access with faculty development, student AI literacy, academic-integrity guidance, privacy safeguards, and clear governance.

Keywords: Generative artificial intelligence, Student learning, Higher education, AI literacy, Somalia

1. Introduction

The emergence of Artificial Intelligence (AI) has become one of the most significant technological developments influencing higher education in the twenty-first century. AI technologies—including machine learning, natural language processing, intelligent tutoring systems, learning analytics, adaptive learning platforms, and generative AI tools—are transforming the ways universities deliver education, support students, conduct research, and manage institutional operations. The rapid advancement and accessibility of generative AI applications such as ChatGPT, Microsoft Copilot, Gemini, and AI-supported educational platforms have accelerated digital transformation in higher education by enabling personalized learning, improving academic productivity, enhancing student engagement, and supporting

data-driven decision-making (Madanchian et al., 2025; Ng et al., 2025; Rasool et al., 2025). Furthermore, AI integration provides opportunities for adaptive learning experiences and innovative pedagogical approaches; however, effective implementation requires strategic planning, institutional readiness, AI literacy development, and ethical governance frameworks (Li et al., 2025; Tbaishat et al., 2025; Zaim et al., 2025).

Higher education institutions are increasingly expected to prepare graduates with digital competencies, critical thinking abilities, creativity, and lifelong learning skills required for participation in an AI-driven economy. At the same time, universities face complex challenges, including increasing student enrollment, diverse learner needs, limited resources, rapid technological transformation, and growing demands for educational quality and accountability. Traditional teaching approaches often face difficulties in addressing these challenges due to limited capacity for personalized instruction, immediate feedback, and adaptive learning experiences. Therefore, higher education institutions are increasingly adopting artificial intelligence technologies to enhance teaching and learning effectiveness, improve student engagement, support academic decision-making, and strengthen institutional performance. Recent studies indicate that strategic AI integration can facilitate personalized learning, improve academic productivity, and support innovative pedagogical practices; however, successful implementation requires institutional readiness, technological infrastructure, AI competencies, and appropriate governance frameworks (Madanchian et al., 2025; Ng et al., 2025; Rasool et al., 2025; Tbaishat et al., 2025).

Artificial intelligence offers substantial opportunities to enhance student learning by enabling personalized educational experiences, intelligent tutoring support, automated feedback, adaptive learning environments, and data-driven academic assistance. AI technologies can analyze students' learning behaviors, identify knowledge gaps, provide timely feedback, and support personalized learning strategies that improve engagement, academic performance, and learner satisfaction. Furthermore, generative AI tools facilitate self-directed learning by providing students with flexible access to academic resources, supporting independent inquiry, and enabling continuous learning beyond traditional classroom boundaries. However, effective utilization of AI requires appropriate pedagogical integration, AI literacy development, and institutional support to ensure that students use these technologies critically and responsibly (Madanchian et al., 2025; Rasool et al., 2025; Tbaishat et al., 2025; Wang & Liu, 2025).

Despite these advantages, the successful integration of artificial intelligence into higher education depends not only on technological adoption but also on effective strategic management and institutional readiness. Strategic management provides universities with a framework for aligning AI initiatives with institutional vision, mission, strategic objectives, governance structures, organizational culture, technological infrastructure, human resource development, and quality assurance mechanisms. Through systematic planning and leadership, universities can ensure that AI investments contribute to improved teaching and learning outcomes, operational efficiency, innovation capacity, and long-term institutional sustainability. Furthermore, strategic leadership plays a critical role in establishing AI governance policies, developing staff and student AI competencies, allocating technological resources, managing organizational change, and promoting ethical and responsible AI use within academic environments (Li et al., 2025; Ng et al., 2025; Rasool et al., 2025; Schmidt et al., 2025; Zaim et al., 2025).

One major challenge is that AI implementation is frequently approached as a technological initiative rather than as a comprehensive strategic organizational transformation. In many higher education institutions, AI adoption occurs without well-defined strategic planning, institutional leadership, governance frameworks, faculty capacity-building initiatives, or comprehensive implementation policies. As a result, AI integration often remains

fragmented, inconsistently applied across academic programs, and insufficiently aligned with institutional goals, thereby limiting its potential to improve teaching, learning, and organizational performance (Funa & Gabay, 2025; Ng et al., 2025; Schmidt et al., 2025; Wu, 2023).

Existing studies have focused primarily on students' perceptions, satisfaction, engagement, and learning outcomes associated with generative AI tools (Albadarin et al., 2024; Lo et al., 2025; Wang & Liu, 2025). Less attention has been given to the institutional conditions that support effective integration, including strategic leadership, organizational readiness, governance, infrastructure, faculty capability, and policy. Evidence from low-resource higher-education systems is especially limited.

The research gap is particularly evident in developing countries, where higher education institutions face additional challenges such as limited financial resources, inadequate digital infrastructure, insufficient faculty training, weak governance frameworks, and evolving regulatory environments. These contextual factors may significantly affect universities' ability to strategically integrate AI technologies into teaching and learning.

This study therefore examines how undergraduate students in five Somali universities use generative AI tools, how they perceive the tools' influence on learning and academic performance, what challenges they encounter, how satisfied they are, and what they expect from future institutional integration. The study also develops management recommendations for responsible and sustainable adoption. Its contribution is descriptive: it documents student perceptions and use patterns rather than testing causal effects.

2. Data and Methods

The study used a quantitative cross-sectional survey to describe students' use and perceptions of generative AI in higher education. Questionnaire items were adapted from prior studies (Rasool et al., 2025; Tbaishat et al., 2025). The design captures responses at one point in time and cannot establish whether AI use caused changes in learning or performance.

The study involved undergraduate students from Hormuud University, Jamhuriya University of Science and Technology, Somali National University, SIMAD University, and Banadir University. These institutions provided variation in university affiliation and field of study, but the convenience sample should not be treated as statistically representative of all Somali university students.

A total of 442 students provided valid responses. Participants were recruited through convenience sampling based on accessibility and willingness to participate. This nonprobability method supported timely data collection but limits population-level generalization. Data were collected through a structured online questionnaire with two sections. The first captured gender, university, field of study, and year of study. The second examined AI-tool use, learning behavior, perceived academic performance, challenges, future expectations, and satisfaction. The study reports aggregated response counts and percentages; where questions allowed multiple responses, percentages represent shares of all selections rather than percentages of individual students.

The questionnaire was distributed electronically. Participation was voluntary, and respondents received information about the study purpose before completing the survey. Only complete responses were analyzed. Data were coded, cleaned, and analyzed in SPSS. Frequencies and percentages summarized respondent characteristics, AI-use patterns, perceptions, challenges, expectations, and satisfaction. No inferential statistical test was reported; accordingly, the results are interpreted descriptively and do not support claims of statistical significance or causal influence.

3. Results

3.1 Demographic Information

Table 1 summarizes the 442 valid responses by gender, university, field of study, and year of study. Regarding gender, the findings indicate that the majority of the respondents were male, accounting for 274 students (62.0%), while 168 respondents (38.0%) were female. With respect to university affiliation, the respondents were drawn from five universities across Somalia. Hormuud University contributed the largest proportion of participants with 124 students (28.1%), followed closely by Jamhuriya University of Science and Technology with 120 students (27.1%). Somali National University accounted for 89 respondents (20.1%), while SIMAD University and Banadir University contributed 59 (13.3%) and 50 (11.3%) respondents, respectively. Regarding the field of study, the largest group of respondents came from Business and Economics, representing 144 students (32.6%), followed by Information Technology and Computer Science with 120 students (27.1%) and Engineering and Architecture with 98 students (22.2%). Smaller proportions were drawn from Medicine (8.8%), Sharia and Law (4.3%), Arts and Social Sciences (2.5%), Geoscience and Environmental Science (1.4%), and Agriculture (1.1%).

Concerning the year of study, the largest proportion of respondents were fourth-year students, comprising 190 students (43.0%), followed by third-year students with 134 respondents (30.3%). First-year and second-year students represented 61 (13.8%) and 57 (12.9%) respondents, respectively.

Table 1: Demographic Characteristics of the Respondents (n = 442)		
Demographic factors		
Gender	Frequency	Percent
Female	168	38.0
Male	274	62.0
University		
Hormuud University	124	28.1
Jamhuriya University of Science and Technology	120	27.1
Somali National University	89	20.1
SIMAD University	59	13.3
Banadir University	50	11.3
Field of study		
Engineering and Architecture	98	22.2
Information technology (IT) and computer science	120	27.1
Medicine	39	8.8
Agriculture	5	1.1
Sharia and law	19	4.3
Geoscience and Environmental Science	6	1.4
Business and Economics	144	32.6
Arts and Social Sciences	11	2.5
Year of study		
First Year	61	13.8
Second Year	57	12.9
Third Year	134	30.3
Fourth Year	190	43.0

3.2 Frequency Analysis

Table 2 summarizes reported use of generative AI. Of the 442 respondents, 425 (96.2%) reported using generative AI for learning. In the multiple-response question on tools, ChatGPT accounted for 42.8% of all tool selections, followed by Gemini (29.8%) and Canva AI (12.6%). More than half of respondents reported discovering AI independently through research or media. Frequent or very frequent use was reported by 48.9% of respondents. Common motivations included project development, technical and creative skill development, academic support, and better research or assignment results. In the multiple-response question on academic activities, writing, assignments, and presentations generated the largest shares of

selections. These percentages should not be interpreted as the proportion of all students choosing only one option.

Table 2: Students' actual usage of Generative AI		
1. Have you ever used generative AI tools in your studies (learning)?		
Yes	425	96.2
No	17	3.8
2. If you use generative AI tools, which of the following do you use? Select all that apply		
ChatGPT	414	42.8%
Gemini	288	29.8%
Jasper	11	1.1%
Grammarly	34	3.5%
CopyAI	15	1.6%
QuillBot	36	3.7%
Zotero	19	2.0%
EndNote	18	1.9%
AI_Dungeon	10	1.0%
AI_Canva	122	12.6%
Total	967	100.0%
3. How did you first learn about generative AI tools?		
I was introduced to it by my classmates	109	24.7
I learned about it through peers & friends	97	21.9
I discovered it on my own through research & media	235	53.2
Total	441	99.8
4. Frequency of Use: Please indicate how frequently you use generative AI to support your learning and academic activities.		
Very Frequently	75	17.0
Frequently	141	31.9
Occasionally	117	26.5
Rarely	79	17.9
Never	30	6.8
Total	442	100.0

Table 2: Students' actual usage of Generative AI		
5. What motivated you to use generative AI?		
Interested after hearing about it in the media.	114	9.9%
To develop practical projects and innovative solutions.	191	16.5%
To enhance and develop my technical and creative skills.	190	16.5%
To use it effectively in my studies.	183	15.8%
To learn how to use AI better.	121	10.5%
To enjoy exploring new technologies.	125	10.8%
To achieve better results in research and assignments.	172	14.9%
To streamline daily routine tasks.	59	5.1%
Total	1155	100.0%
6. For which types of academic activities do you primarily use generative AI?		
Writing essays, reports, and research.	281	24.6%
Solving assignments or exercises	247	21.6%
Creating presentations	219	19.1%
Preparing for exams	189	16.5%
Collaborating on group projects	104	9.1%
Communication (e.g., writing emails)	104	9.1%
Total	1144	100.0%

Table 3 summarizes affirmative responses to statements about learning behavior. Accessibility and ease of use accounted for the largest share of affirmative responses, followed by engagement and perceived understanding of course material. Guidance or training and confidence in AI accuracy accounted for smaller shares. Because the table reports the distribution of affirmative selections across items rather than Likert means or agreement rates, it does not establish the strength of each perception among all respondents.

Table 3. Student Perceptions of Generative AI and Learning Behavior

Students' perceptions on impact of generative AI tools on learning behavior.		
1. I find AI tools to be user-friendly and accessible for my studies.	246	14.2%
2. AI tools make learning more enjoyable and engaging for me.	219	12.7%
3. I believe AI tools enhance my understanding of course materials.	215	12.4%
4. AI tools support to meet my learning needs and abilities.	174	10.1%
5. AI tools boost my confidence in addressing academic challenges	118	6.8%

Students' perceptions on impact of generative AI tools on learning behavior.		
6. AI tools improve my productivity in studying.	179	10.4%
7. I have received sufficient guidance/training on utilizing AI tools effectively.	93	5.4%
8. I feel proficient in using various AI tools to support my learning process.	100	5.8%
9. I am confident in the accuracy and reliability of AI tools for academic work.	94	5.4%
10. AI tools assist in identifying and addressing learning areas where I need improvement.	149	8.6%
11. I perceive AI tools are beneficial for my overall learning	142	8.2%
Total	1729	100.0%

Table 4 summarizes affirmative responses about perceived academic performance. Creativity, organization of study materials, and language or communication support accounted for the largest shares of selections. The item on grades received a smaller share, suggesting that respondents more often associated AI with learning support than with direct grade improvement. The descriptive results do not demonstrate an objective change in academic performance.

Table 4. Student Perceptions of Generative AI and Academic Performance

Students' perceptions on the impact of generative AI tools on academic performance.		
12. AI tools help foster my creativity and innovation in learning process.	223	13.7%
13. AI tools assist me in enhancing my ability to remember and retrieve information more effectively.	187	11.5%
14. AI tools help me in better organizing and managing my study materials.	207	12.8%
15. AI tools enhance my language skills and communication skills.	207	12.8%
16. AI tools help me complete academic assignments and tasks.	185	11.4%
17. AI tools improve my grammatical proficiency and vocabulary knowledge.	167	10.3%
18. AI tools assist me in evaluating and providing feedback on my performance.	150	9.2%
19. Using AI tools affect my grades or academic performance.	129	8.0%
20. AI tools help me engage in learning activities and tasks effectively.	167	10.3%
Total	1622	100.0%

Table 5 summarizes reported challenges. Inaccurate or irrelevant output accounted for the largest share of selections, followed by distraction, difficulty integrating AI into academic

routines, and privacy or security concerns. These findings support the need for source verification, responsible-use guidance, and privacy safeguards.

Table 5. Challenges and Limitations of Generative AI Use

challenges and limitations students face in using generative AI tools.		
21. I find it challenging to integrate AI tools effectively into my academic routine.	167	13.9%
22. AI tools occasionally provide inaccurate or irrelevant information for my studies.	190	15.8%
23. AI tools can sometimes distract me from focusing on academic tasks.	170	14.1%
24. I have concerns about the privacy and security of my academic data when using AI tools	163	13.6%
25. AI tools occasionally demotivate me in my academic pursuits.	100	8.3%
26. AI tools disrupt collaborative learning among peers at times.	112	9.3%
27. I believe AI tools limit my creativity in the learning process.	155	12.9%
28. The presence of AI tools reduces my independence in the learning process.	145	12.1%
Total	1202	100.0%

Table 6 summarizes future expectations. Curricular integration, personalized learning, and support for different learning styles accounted for the largest shares of affirmative selections. Respondents also indicated willingness to spend time learning new AI tools, suggesting interest in further AI-related training.

Table 6. Future Expectations and Preferences for Generative AI

Future expectations and preferences on generative AI tools.		
29. I wish to see more AI tools integrated into my academic curriculum.	221	18.2%
30. I prefer AI tools that offer personalized learning experiences.	219	18.0%
31. AI tools that encourage teamwork among students are valuable to me.	177	14.5%
32. AI tools that address different learning styles are important in education.	217	17.8%
33. I would recommend AI tools to other students for improving academic performance.	186	15.3%
34. I am willing to invest time in learning how to use new AI tools to improve my academic performance.	197	16.2%
Total	1217	100.0%

Table 7 summarizes satisfaction-related responses. Managing study pressure, speed and efficiency, and perceived instructional value accounted for the largest shares of affirmative selections. Because the table does not report response distributions for each item, the findings

should be described as patterns of affirmative responses rather than a validated overall satisfaction level.

Table 7. Student Satisfaction with Generative AI

Student Satisfaction		
35. Having used GenAI tools, I am quite pleased with my academic performance.	194	17.7%
36. Having used GenAI tools, I am in the mood to study.	174	15.9%
37. Having used GenAI tools, I tend to overindulge when studying.	132	12.0%
38. Having used GenAI tools, I can handle the pressure of studying.	200	18.2%
39. I feel that GenAI technologies are valuable instructional tools for my educational resources and information.	197	18.0%
40. I am satisfied with the speed and efficiency of the GenAI tools available to me.	200	18.2%
Total	1097	100.0%

4. Discussion

Generative AI was widely used within the sample: 96.2% of respondents reported using it for learning. This result is consistent with research showing rapid student uptake of generative AI for accessing resources, supporting personalized learning, and improving engagement (Lo et al., 2025; Rasool et al., 2025). Because respondents were recruited through convenience sampling and the survey was conducted online, the percentage should not be generalized to all Somali university students.

ChatGPT accounted for the largest share of tool selections, followed by Gemini and Canva AI. Many respondents discovered these tools independently rather than through formal university initiatives. This pattern suggests that student adoption may be developing faster than institutional guidance and supports calls for formal AI-literacy programs, academic-integrity policies, and responsible-use training (Schmidt et al., 2025).

Students' affirmative responses emphasized accessibility, engagement, and perceived support for understanding course material. Training and confidence in accuracy received smaller shares, indicating a gap between frequent use and institutional preparation. This pattern is compatible with the Technology Acceptance Model's emphasis on perceived usefulness and ease of use, but the descriptive design does not test that model or quantify relationships among its constructs (Tbaishat et al., 2025).

Respondents associated AI with creativity, organization, language support, assignment completion, and engagement more often than with higher grades. This distinction is important: the survey measures perceptions, not objective academic outcomes. Future research should link AI-use measures to verified performance indicators while controlling for prior achievement, field of study, year level, and access to digital resources.

Students also identified inaccurate output, distraction, integration difficulties, privacy concerns, and limited training. Universities should therefore combine access with critical evaluation skills, transparent assessment rules, data-protection guidance, and faculty support (Stratton-Maher & Kelly, 2025). The study is limited by convenience sampling, self-reported data, online recruitment, cross-sectional measurement, and percentage calculations based on

multiple-response selections. These limitations restrict causal inference and population-level generalization.

5. Conclusion and Policy Implications

This descriptive survey examined generative AI use among 442 undergraduate students at five Somali universities. Most respondents reported using generative AI, especially ChatGPT, for academic writing, assignments, presentations, and other learning tasks. Their responses emphasized accessibility, engagement, creativity, organization, and language support, while also identifying inaccurate output, distraction, privacy concerns, and limited training. The findings show substantial interest in institutional AI integration, particularly curricular use, personalized learning, and training. They do not demonstrate that AI caused improvements in learning or academic performance. Universities should establish clear governance and academic-integrity policies, train faculty and students in responsible AI use, protect personal and institutional data, and monitor whether AI-supported practices improve verified learning outcomes.

Future studies should use probability-based or stratified sampling, report item-level response distributions, test measurement reliability and validity, and combine student perceptions with objective academic-performance data. Longitudinal or experimental designs would provide stronger evidence about the educational effects of generative AI.

Ethics Approval and Informed Consent

This study was approved by the Institutional Review Board of Hormuud University. Written informed consent was obtained from all participants.

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None

Conflict of Interest

The author confirms that there is no conflict of interest related to the manuscript.

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