

Generative AI Adoption among University Students in Libya: Usage Patterns, Perceived Benefits, and Barriers

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Abstract: Generative Artificial Intelligence (GenAI) is transforming higher education around the world by providing opportunities to improve the entire teaching and learning process and institutional administration. The main objective of this study is to investigate the utilization, perceived benefits and challenges in using GenAI tools by Libyan students' at Elmergib University. The data were collected through a questionnaire based on task-technology fit (TTF) and the technology acceptance model (TAM) distributed to 162 undergraduate and postgraduate students from various disciplines. The findings show that over 85% of students used GenAI for study-related tasks. They reveal that ChatGPT emerged as the most widely used GenAI tool, utilized by 87.68% of students. Students primarily use these tools for defining or clarifying topics, translating, searching for academic literature assisting in completing home exams, and generating ideas. The study revealed that students hold generally positive attitudes toward the role of GenAI tools in the high education. High mean scores across most perception improve learning engagement, easy to access and use, and enhance academic performance. However, the students encounter several challenges in utilizing GenAI tools in the educational process, including practical barriers, privacy, learning autonomy, and human interaction, unreliable information, plagiarism, and inaccurate references, and use of GenAI tools on the long-term impact on learning. The practical obstacles related to internet speed and subscription costs were identified as the most critical barriers.

Keywords: Generative Artificial Intelligence (GenAI); Elmergib University, Higher education, Students' perceptions.

1. Introduction

Modern education is undergoing significant changes due to advances in information technologies, particularly in artificial intelligence (henceforth AI). By integrating AI algorithms and teaching robots into learning management system, educators can support a more expansive variety of instructional and developmental [1,2]. Generative Artificial Intelligence (GenAI) is a potential technique within the vast area of AI, encompassing systems that can generate different material including literature, graphics, computer code and other complicated and creative products. The most common platforms that are widely used are Gemini, ChatGPT, Midjourney for image generation, Copilot for text, and other platforms [3]. This accelerated development of GenAI platforms has opened a discussion about the possibility of using these platforms in higher education [4]. Recent studies have identified many benefits of integrating the GenAI tools in educational settings.

Wang et al. [5] mentioned that the adoption of AI platforms in higher education may encourage high institutions to customize learning experiences which will consequently improve their academic performance and the entire educational process. Moreover, Mhlanga et al. [6] stated that the GenAI tools can offer a great opportunity for students to have a private tutors, as it simplifies theoretical

questions along with providing a complete answers to such questions. It also summarizes difficult research papers and gives an informative conclusion, and encourages students' critical thinking. Moreover, Michel-Villarreal et al. [7] indicated that GenAI tools can assist low proficient students in editing their works. Therefore, students highly encouraged to learn how to use these tools in order to perform their task efficiently [8].

Despite its advantages, the use of GenAI platforms and tool in high education face various problems. One of the most serious problems that arise from using GenAI tools in high education is the honesty, known as academic integrity, along with embedded biases and labour displacement [9]. Moreover, Nguyen [10] pointed out that students at universities could overly on the use of GenAI tools, which could negatively affect students' creativity, critical thinking and other academic skills. Overreliance on online tools many reduce the social interaction among the students which lead to standardized experiences that cannot identify the students' different needs. Other serious academic issues, such as plagiarism, may appear. It was indicated that GenAI tools and application sometimes bypass the conventional academic procedures which may weaken the integrity of assessments, encouraging the academic institutions to change and modify their strategies [11].

Therefore, this study aims to investigate this issue and provide an educational guide to integrate the GenAI tools in educational setting in Libyan universities. This goal is guided by the fact that the use of the GenAI tools in developing countries, such as Libya, is still new and thus there is no a complete clear guideline to these tools in educational process. In order to develop any framework related to an educational system, perceptions of stakeholders must be taken into consideration. In this context, students' perception towards the use of GenAI tools in their learning process is very important as it helps to identify the most effective strategies to implement these tools successfully [12]. Despite the massive quantity of studies related to studnets' adoption of online tools in higher education context [13-15], however, most of these studies concluded significant findings from high income settings.

Moreover, the studies that focused on the students' perception towards the integration of GenAI tools and their advantages in Libyan universities are still limited. this gap in local studies impedes the decision-makers to develop effective policies to adapt GenAI tools in higher education successfully. Therefore, this study aims to investigate Libyan university students' perception towards the use of online tools to perform their academic tasks. Specifically, this study highlights the students' awareness of AI tools, their benefits and obstacles they face such as accessibility and ethical consideration. The study presents a significant contribution as it enrich the available studies in this area by providing practical results about the use of AI tools in Libyan high education setting. As this study focused on students' perceptions, decision makers and educational stakeholders may use the results to develop a strategic plan and frameworks that are essential in ensuring the effective integration of AI tools in Libyan high education institutions. Accordingly, the main goal of this study is to answer the following research questions:

RQ1: To what degree do Libyan undergraduate and postgraduate students use GenAI platforms?

RQ2. What are the benefits and obstacles that Libyan undergraduate and postgraduate students experience when using GenAI platforms?

2.Litreatur Review

2.1. GenAI Tools in Higher Education

This section presents the previous studies that are conducted on the use of GenAI tools by students in higher education institutions. Sousa and Cardoso [16] investigated the perceptions and challenges in the use of AI tools among 132 students from different departments in Portal. The results revealed that most of the Portugese students (98%) use GenAI tools, particularly, ChatGPT. It was found that these tools are used to perform some academic tasks, such as identifying some concept and generating ideas. An increasing number of students were found to use these tools in analyzing, refining and evaluating their works in order to improve the quality of their academic assignments. These differences in the use

of such tools highlight the growing role that the tools play in the educational process as the students use them in generating and analyzing the required essays.

Alshamy et al., [17] surveyed the students' perspectives at Sultan Qaboos University (SQU) about the generative artificial intelligence (GenAI) tools, such as ChatGPT. The sample consisted of 555 students and 168 instructors. The findings demonstrated that the students use AI tools frequently in their learning, such as academic assignments, brainstorming, and self-directed learning. On the other hand, the academics confirmed the efficiency of such tools in enhancing lesson plans and learning materials. It was concluded that the students and academics realize the significance of GenAI tools in developing the academic process.

Almassaad et al., [18] conducted a large scale quantitative study to identify the students' perception at King Saud University towards the use of GenAI. The results demonstrated that were in favor of using such tools in their education, particularly Gemini, CoPilot, and Socratic. The students mentioned that they use online platforms or tools to help them in completing the academic tasks such as generating new ideas, translation, defining new concepts, or summarizing previous studies. They added that they use these tools because of time-saving, and ease of access.

Recently, Maxwell et al., [19] aimed to investigate the differences across different groups of students in the perceived readiness, benefits, and challenges. The students demographic data included enrollment status, classification, and institution category. The findings proposed the necessity to integrate the AI education in current curricula in order to determine the difficulties relating to integrating AI tools in high education context. Hence, the study recommended to carry out studies on the integration of GenAI tools in high education context over time in order to follow its impact on students of high education.

Based on these studies, it can be ensured that the use of AI tools, particularly ChatGPT, by high education students was very widespread. These tools are considered very helpful and effective. For instance, it was reported that the tools are used to support and enhance students' education by emphasizing creativity, fostering critical thinking skills, providing educational materials, among others. Moreover, the students hold a positive attitude towards the utilization of AI tools in their learning journey, indicating that these tools can save time, providing high quality tasks, and improving the skill of comprehension.

2.2. Advantages and Challenges of integrating GenAI in Higher Education

A significant focus has been paid to the adoption of AI tools in different contexts, and several studies particularly explored the advantages of these tools in high education settings. Chen [20] showed that the GenAI tools offer the opportunity of self-learning with immediate feedback environment. They also develop the learning experiences [21], increase learners' motivation and technology use efficacy [22], fostered academic success, help understating the core concepts, improve time management skills, summarize and edit research papers, and generate researchable proposals [23-25] These advantages could contribute in improving the efficiency in academic publications [26,27]

Despite these advantages of AI tools, their integration on high education may encounter various obstacles that need to be addressed Fadlilmula & Qadhi, [28] academics have highlighted the risk of using AI tools in education, such as academic plagiarism and its unintentional impact on human intellectual skills [29,30]. Another serious issue relating to the use of AI tools in education is the absence of a researcher's point of view and inappropriate references [31]. Previous studies paid attention to another problem arising from the use of AI tools in education, particularly high education. These problems included ethical challenges such as human oversight, comprehensiveness, and honesty [32,33].

Moreover, Telli et al., [34] added that the misuse of GenAI tools include misinformation, out of date information, and plagiarism. Chan and Hu [13] demonstrated that the students were worried about the limited use of AI tools in their teaching due to the unclear and unsystematic policies. These perceptions were verified by Nelson et al., [35], where the findings revealed that the students had the belief that the AI generated essays and reports could increase different possible plagiarism concerns. Jin et al. [36]

revealed that the participants (students) expressed dissatisfaction with the feedback obtained from AI tools due to their long and unclear feedback. Hence, Tierney et al. [37] pointed out that in order to use AI tools effectively in education, there should be clear and strong support and guidance from the academic institutions. Moussawi et al. [38] pointed out that ethics of AI should address massive ethical issues, including development of AI algorithm as well as training data, and environmental effects.

2.3 Theoretical Framework

This study is based on different theoretical models related to the use of technology in educational settings. One of these common models is Technology Acceptance Model (TAM). It is a theoretical model developed to clarify how users or students accept and adopt new technologies. The TAM provides strong foundations to understand students' familiarity, perceptions, and willingness to utilize AI tools in their academic tasks. It proposed that the acceptance to use any new technology is basically influenced by two key components; namely the perceived ease of use and perceived usefulness [39].

Perceived usefulness refers to as the extent to which an individual believes that using a specific type of technology will improve the quality of their work and productivity. On the other hand, perceived ease of use refers to the extent to which an individual believes that the technology is easy to understand and easy to use [40]. Consequently, using GenAI in education is related to perceived usefulness that reflects how students perceive the use of tools to improve their academic tasks, and perceived ease of use reflects their familiarity in using such tools. Therefore, this study adopts TAM to identify how these two factors may influence students' use of GenAI tools in their educational assignments.

Furthermore, another theoretical framework related to GenAI adoption is task Technology Fit (TTF), developed by Goodhue and Thompson Goodhue [41]. TTF reflects the quantifiers efficiency of technology. TTF measures the efficiency of technology in a system by analyzing its compatibility (fit) with activities it facilitates. Spies et al. [42] pointed out that TTF focuses on the degree to which a technology meets its expected tasks, which is the essential key for users' retention and satisfaction. It is proposed that TTF is based on the hypothesis that efficiency of technology is founded on the equivalence between a task and technology features which help the users to perform these tasks effectively [43,44]. The requirements of any academic task guide students to involve in these tasks, affecting their adoption of AI tools, whereas technology functionality refers to the competencies of these tools in performing and enhancing the tasks. Integrating these theoretical frameworks presents a comprehensive foundation to investigate different aspects of using AI tools in high education context. Hence, TTF model is used in this study, along with TAM, to explore the students' perception in high education context and highlight the benefits and difficulties they encounter when using AI tools.

These two models have been used extensively in previous studies. For example, Al-Maatouk et al., [45] aimed to assess the adoption of using social media in academia using TTF and TAM. The results revealed a significant relationship between technology, social elements, and assignments, and TTF for academic use. This relation led to increasing students' performance and satisfaction. It was also found that ease of use, comprehension efficiency, and satisfaction were associated with behavioural intention to adopt social media in academic purposes.

3. Methodology

3.1. Research Design

The current study utilized a descriptive quantitative research design to investigate Elmergib University students' use and perceptions of GenAI tools.

3.2. Research Instrument

The study used a structured questionnaire survey to collect the required data. The questionnaire items were constructed from the previous studies in order to answer the two research questions stated above. Moreover, the items were adapted from Almassaad et al., [18], as it confirmed the validity and reliability of the questionnaire. The items reflect how the undergraduate students use AI tools and the challenges they encounter when using these tools. The questionnaire used 5-point likert scale. It includes 25 items and it is divided into four major factors.

- Demographic characteristics: Age, Gender, Academic level and Faculty.
- Awareness and familiarity (utilization): one item measuring students' use of GenAI tools, one item measuring students' reasons for non-use, one item measuring GenAI AI tools (applications) that students' use in high education and one item measuring why students' using GenAI tools in the educational environment.
- Educational purposes of employing GenAI: one item measuring students' use Gen AI tools in education , such as facilitated project work and assisting in creating digital multimedia and presentations.
- Perceived benefits and challenges related to the adoption of GenAI tools. There are 8 items measuring students' benefits of using GenAI tools in education and 9 items measuring students' challenges of using GenAI tools in education.

This study was theoretically established on Technology Acceptance Model (TAM) and Task-Technology Fit (TTF). Specifically, TAM was adopted to view the awareness and familiarity with AI tools through questions such as "*Do you use generative AI tools in higher education?*", as well as educational purposes through statements such as "*I use GenAI tools in education*", corresponds with the constructs of TAM of Perceived Ease of Use and perceived of Usefulness. It also aligns with TTF constructs of Task Requirements. Moreover, perceived benefits represent TTF through statements, like "*enhance academic performance*", and challenges in integrating GenAI tools, such as "*provide inaccurate of false references*".

Most questionnaire items were assessed using three-point Likert scales (Agree, neutral, disagree) and four questionnaire items were assessed using "choose all that apply", in addition to demographic and open-ended questions.

3.3. Data Collection Procedure

The target population consisted of undergraduate and postgraduate students enrolled in different majors at Elmergib University, Libya, during the academic year 2025–2026. The study adopted a convenience sampling approach due to the availability of the participants and the nature of the study. The data collection process followed through a structured online questionnaire. The questionnaire, meticulously designed using Google Forms, was shared via official university channels, student groups, and departmental WhatsApp lists. This distribution strategy was chosen to maximize reach and ensure the engagement of a broad and diverse student demographic.

3.4. Validity and Readability

The study instruments was presented to academic experts in the field of educational technology in order to verified its content validity. The experts assessed the relevance, clarity, and suitability of the items to the study objectives. On the other hand, the instrument was checked for its internal consistency using Cronbach's alpha ($\alpha=.79$). Based on the p value, the results indicated that the instrument is acceptable for all the measurements scales, and thus it is suitable for collecting the required data.

3.5. Data Analysis Techniques

The data collected for this study is quantitative data; hence it is analyzed statistically. Accordingly, descriptive statistics were performed to provide the mean scores (M), standard deviations (S.D), percentages (%), and frequencies (n). these statistics present and describe the participants' responses

towards the use of GenAI tools and challenges facing them when using these tools, as well as their demographic information. The analyses was conducted with the help of Statistical Package of Social Science (SPSS).

The survey was available from 10 April 2026 to 15 may 2026. Participants in this study were from seven faculties (Faculty of Arts and Science, Education, Medicine, Engineering, Law, Pharmacy, Economics and Commerce) of Elmergib University, Libya. The number of students who participate in the study are 162 undergraduate students. Majority of the participants (68%) are female, while males constitute 32%. As for their educational level, 81.5% of the participants enrolled in an undergraduate program, whereas 13.6% are pursuing a master's degree, 4.9% are doctoral students. The academic discipline of respondents were in scientific programs and humanities disciplines from the different faculties. Regarding faculties, (26.54%, n = 43) of respondents were enrolled in Faculty of Economics and Commerce, whereas Arts and Science (24.69%, n = 40), Engineering (18.52%, n = 30), Education (13.58%, n =22), Medicine (7.41%, n = 12), Law (6.17%, n = 10) , and Pharmacy (3.09%, n = 5). Table 1 shows the demographics information.

Table 1. Demographic Characteristics of Respondents

Item	Values	Frequency	Percentage
Gender	Male	52	32
	Female	110	68
Academic level	undergrad	132	81.50
	master	22	13.60
	PhD	08	4.90
Faculty	Arts and Science	40	24.69
	Economics and Commerce	43	26.54
	Education	22	13.58
	Medicine	12	7.41
	Engineering	30	18.52`
	Law	10	6.17
	Pharmacy	05	3.09
Total		162	100%

4.Results an Discussions

4.1. RQ1: To what degree do Libyan undergraduate and postgraduate students use GenAI platforms?

The primary objective of the present study aimed to determine the extent to which higher education students use GenAI tools. Table 2 shows the frequency of students use GenAI tools for learning purpose. 24 of the 162 participants (14.81 %) have reported never using GenAI tools. In contrast, among the respondents, 162 respondents (85.19%) use GenAI tools. As for the frequency of use, it was shown that 138 students use the tools, with 52 (32.10%) often use them, 81 (50%) sometimes use them, while only 5 (3.09%) of the participants rarely use them.

Table 2. Frequency of GenAI tools use among the students

Item	Frequency	Percentage
Never	24	14.81%
Rarely	05	03.09%
Sometime	81	50.00%
Often	52	32.10%
Total	162	100%

Based on the findings in Table 3, 24 respondents who never used GenAI tools in higher education unanimously agreed that the five key obstacles are limited knowledge of GenAI tools (n=11, 45.83%). This suggests that students may be lack of knowledge about of advantages GenAI tools in the

educational settings and the consequences of its use. Additionally, some respondents (n = 9, 37.50%) mentioned that they have never hear about such platforms. It is clear that a segment of the student population remains unaware of generative AI tools. A percentage of students (n = 8, 33.33%) reported concern about the possible risks connected with these technologies. These results are in line with Grassini [46] results, who found that ChatGPT are not always trusted, particularly in specialized field tasks. Moreover, producing a content that seems to be authentic, but lacks the factual support increases the doubts about the integrity of information [47,48]. A percentage of students (n = 5, 20.38%) indicated that they possessed no interest in adopting GenAI tools.

Moreover, two students who participated in the open-ended questions provided more in-depth reasons for not using GenAI tools. For instance, the reason of one student was, *"I don't want to rely on generative AI tools at the beginning of my studies until I've built myself on the right foundation that guides me to use and control it as I want "*. The students' perceptions revealed that they are aware that these tools may limit their creativity. They added that the use of GenAI could weaken their imagination and work integrity. The participants highly support the fact that classroom interaction, activities and instructions motivate novel ideas and creative works. These challenges were also found in previous studies. For instance, Chan and Hu [13] pointed out negative effect of AI tools on creativity because such tools impede their thinking.

Second student stated that, *"The lack of verification of the credibility of information provided by generative artificial intelligence tools is considered a form of cheating and indicates a lack of credibility on the part of the researcher in presenting the information"*. These perceptions reflect concerns related to the quality of information needed. The students identified certain obstacles associated to verifying the accuracy of AI content, particularly during the in fact checking processes. That is, validating the reference of information has to be a serious issue highlighted in previous studies. Wolfe and Mitra [49] suggested that this process may lead to get fake information and value tensions on the potential use of inaccurate information.

Table 3. Reasons hindering the use of GenAI in the educational environment n=24.

Item	Frequency	Percentage
I have limited knowledge of GenAI tools	11	45.83%
I have not heard about GenAI tools	9	37.50%
To avoid the harms of using GenAI tools	8	33.33%
I lack interest in GenAI tools	5	20.38%
other reasons	2	8.33%

Data presented in Table 4 displays that students have adopted GenAI technologies widely, with (n=111, 80.43%) reporting that their peers use them frequently. Students in higher education are increasingly adopting GenAI tools, with widespread peer usage often described as social influence or peer pressure acting as a major driver. When students observe their peers using and endorsing tools like ChatGPT, it normalizes the technology and reduces barriers to adoption. Venkatesh et al. [50] further highlighted that the adoption and usage of new technology can be driven by social influences and cognitive processes of a learner in academic settings. Social influence significantly impacts student's technology adoption when they see their peer and instructors using it effectively [51]. Furthermore, these data also reveal that a small number of students (n= 36, 26.08%) mentioned that the instructors motivated them to use the tools affectively.

Additionally, only (n=22, 15.94%) indicate that university's management has founded the principles for using AI tools responsibly, proposing that Libyan high education organizations lack the understanding of using the AI tools effectively during the academic process. These results suggest that a significant number of faculty members remain hesitant to encourage their students to use generative AI. This points to a lack of clear institutional policies outlining guidelines and regulations for integrating these tools. This highlighted with Barrett and Pack [52], who reported that a great percentage of high education students (90%) and their institution did not have a clear policy for using GenAi tools and they did not receive appropriate training on using GenAI. Additionally, instructors indicated that they did

not teach their students to use AI tools effectively.

Therefore, it is suggested that educational institutions have to propose and apply clear and strict policies in order for the students to use the tools efficiently and safely. In addition, the academics and teachers should aim to acquire and develop the computer skills and competencies in order to guide their students to use the tools effectively.

Table 4. the use of GenAI tools in the educational environment n=138.

Item	Frequency	Percentage
Widespread among my peers	111	80.43%
My teachers (s) encourage its use	36	26.08%
My university has established rules or guidelines for its responsible use	22	15.94%

The respondents' awareness of GenAI tools in higher education is shown in Table 5. Students' responses to the use of ChatGPT indicated the highest percentage at 87.68%. The primary reason for ChatGPT integration into the learning environment was its time-saving capability, particularly for study and writing assignments, enabling more efficient task completion [53]. This positioned ChatGPT as a valuable tool for supporting tasks such as idea generation, topic exploration, and referencing [54]. The data also indicate that 22.46% of students are using Gemini tool. Scholars emphasized that the integration of AI tools, particularly Gemini, can support students' abilities that are crucial for a successful learning setting [55,56].

In enhancing educational and administrative functions, Gemini.ai also facilitates the development of critical thinking and problem-solving abilities in Student. Furthermore, 17.39% of students utilize GPTZero to verify their work for AI-generated language before submission, ensuring their writing maintains a human voice to avoid false positives. It acts as a safety tool for students using AI for brainstorming or editing, while also offering "writing replays" to prove authenticity. It is not just for detection, but for improving writing to sound more authentic, followed by Quillbot at 15.21%. Meanwhile, attitudes towards Quillbot were generally positive, as students find it helpful and encouraging the writing. Students use QuillBot primarily to enhance academic writing efficiency, and polish grammar [57].

Making it a popular tool for improving writing quality and speed. It helps students rephrase content, summarize long documents, paraphrase text to avoid plagiarism, and correct errors, which boosts confidence and supports academic integrity. It is important to notice that Galileo AI is also used by a small significant percentage of students (13.04%) and Socratic by (11.59%). These tools are favored for their focus on visual and interactive learning, catering to specific pedagogical needs beyond basic text generation. The other tools account for less than 10% for each GenAI tools, such as CoPilot (7.97%), Midjourney (7.24%), ChatSonic (5.07%), and Tome (4.34%). The result reveals that students are increasingly treating generative AI (GenAI) as an indispensable, multi-purpose toolkit, shifting from occasional use to deep integration into their daily academic and creative workflows.

Table 5. the most common GenAI tools utilized by Libyan university students (n = 138).

GenAI Tools	Frequency	Percentage
ChatGPT	121	87.68%
Gemini	31	22.46%
GPTZero	24	17.39%
Socratic	16	11.59%
Quill Bot	21	15.21%
Galileo AI	18	13.04%
CoPilot	11	07.97%
Midjourney	10	07.24%
Chat Sonic	7	05.07%
Tome	6	04.34%

The participants were requested to choose any multiple choice from 13 options (including apply all category) to show for which tasks they use the AI tools. Table 6 illustrates that the tasks most frequently identified included defining or clarifying topics (72.46%, n=100), translating (62.31%, n = 86), searching for academic literature (57.97%, n = 80), assisting in completing home exams (46.37%, n = 64), and generating ideas while writing (40.57%, n = 56). A great percentage of the participants reported employing GenAI to accomplish the required tasks.

Additionally, least used tasks, selected by fewer than 40% students, included facilitating project work (39.13%, n = 54), summarizing articles, books, and videos (37.68%, n = 52), aiding in solving numerical problems (34.78%, n = 48), enhancing the quality of writing, proofreading and editing writing, and assisting in completing assignments (27.53%, n = 38).

Interestingly, a smaller proportion of students (20.28%, n = 28), report using GenAI to support coding, and (19.56%, n = 27) use these tools to help them in generating digital multimedia and presentations. Compared to the results of Chung et al., [58], these findings show the similarities in students' perceptions of adopting GenAI. According to Chung et al., university students considered using GenAI was less utilized in some kind of tasks that were related to specific fields such as designing certain apps, software, and games. Overall, it is noteworthy that when considering the numbers and frequencies of the response choices, it can be observed that the students are very positive about all of the tasks, and find GenAI helpful or very helpful [59,60].

Table 6. Educational purposes of employing GenAI among higher education students n=138.

GenAI Tools	Frequency	Percentage
to define or clarify concepts	100	72.46%
for translation	86	62.31%
to search for academic literature	80	57.97%
to assist in completing home exams	64	46.37%
to generate ideas while writing	56	40.57%
to facilitate project work	54	39.13%
to summarize articles, books, and videos.	52	37.68%
to aid in solving numerical problems.	48	34.78%
to enhance the quality of writing	38	27.53%
to proofread and edit my writing	38	27.53%
to assist in completing assignments.	38	27.53%
to support coding	28	20.28%
to assist in creating digital multimedia and presentations.	27	19.56%

4.2. RQ2: What are the benefits and obstacles that Libyan undergraduate and postgraduate students experience when using GenAI platforms?

Tables 7 and 8 address the second research question: What are the benefits and obstacles that Libyan undergraduate and postgraduate students experience when using GenAI platforms?

For benefits of use GenAI tools in education, in table 7, the results of the questionnaire's findings indicate that the respondents generally have positive perceptions towards using GenAI tools in education. Majority of the respondents (about 90.6%) explained that the GenAI tools save time on tasks as indicated in item 2. Item 7 also indicates that 77.5% of the students believe that the GenAI tools improve their learning engagement. Additionally, item 1 shows that 73.9% of the students believe that GenAI tools have transformed education by providing highly accessible, user-friendly solutions for students. Items 6 and 8 also indicate that about 66% of the students agreed that the GenAI tools enhance their academic performance and increase their confidence while learning respectively. It also fosters other skills, such as problem-solving skills and critical thinking, as shown by item 4 by 65% of the respondents. It enhances general language ability as shown by item 5 by 62% of the respondents, while 55% of students reported that GenAI tools provide instant feedback as shown in item 3.

The scale received an overall mean score of 2.64, revealing a high level of agreement among

participants. The items related to time saving scored the highest means ($M=2.91$, $SD=0.29$) followed by items of learning engagement ($M=2.75$, $SD=0.48$). Other items, such the easy to access and use ($M=2.68$, $SD=0.58$) and enhance academic performance ($M=2.64$, $SD=0.54$), also recorded an acceptable level of agreement. Generally, the results show that students generally hold positive perceptions regarding the education value of using GenAI tools in education.

Table 7. Perceived benefits of using GenAI tools in education among Libyan university students.

Perceived Benefits		Disagree	Neutral	Agree	Mean	Std. Dev
1. easy to access and use.	F	8	28	102	2.68	.58
	%	5.8	20.3	73.9		
2. save time on tasks.	F	0	13	125	2.91	.29
	%	0	9.4	90.6		
3. provide instant feedback.	F	7	54	77	2.51	.60
	%	5.1	39.1	55.8		
4. foster critical thinking and problem-solving.	F	12	36	90	2.57	.65
	%	8.7	26.1	65.2		
5. enhance general language ability.	F	11	41	86	2.54	.64
	%	8.0	29.7	62.3		
6. enhance academic performance.	F	4	42	92	2.64	.54
	%	2.9	30.4	66.7		
7. improve learning engagement.	F	3	28	107	2.75	.48
	%	2.2	20.3	77.5		
8. increase confidence while learning.	F	15	33	90	2.54	.69
	%	10.9	23.9	66.2		
Mean					2.64	

For challenges of using GenAI tools in education, as shown in Table 8, the findings indicate that students believed that the educational use of GenAI tools in education was related to different types of challenges, such as practical barriers, including the limited speed of internet and high subscription costs, privacy, learning autonomy, and social interaction, inaccurate information or references, cheating, and plagiarism, as well as long term impact of tools on learning. Specifically, 70.3% of the participants agreed that GenAI tools need a fast internet connection, particularly in the areas with poor internet connection. Besides, 63.8% of students widely agree that the premium version of AI tools that have advanced features need expensive subscription fees, which is considered as a big barrier for many students.

Another areas of concern are privacy and human or social interaction, in which the participants revealed a moderate level of agreement. Half of the students (50%) perceive the AI tools as a threat to their private information, whereas 31.2% were neutral about this area. These opinions revealed that the students did not give the highest priority to their privacy, although it seems they are cautious about their private data. As for human social interaction, 44.9% of the students agree that relying on AI tools most of the time decreases human interaction, while 34.8% are neutral as they consider using AI tools did not harm human social interaction in education settings. Regarding learning autonomy, 36.2% of the students agree and 34.1% disagree that AI limited self-learning and shape learning experience, suggesting that the students feel the limitation of AI on their autonomous thinking.

On the other hand, 36.2% of the participants agree that GenAI tools sometimes provide inaccurate information and false references, and caused cheating and plagiarism, while 42.8% are neutral. This indicates that some students did not fully trusted the results generated from such tools, while others trust the outputs. Moreover, 45.7% of the participants thought that online tools provide inaccurate resources, and 33.3% are neutral about this statement, leading to uncertainty about the content generated from these tools. In terms of cheating and plagiarism, 44.2% agree and 31.9% are neutral that may cause plagiarism, highlighting the need to establish solid policies regarding the academic dishonesty. These perceptions demonstrated that the respondents had a level of fear regarding the degree to which the future tools may reach, especially the false outputs.

Finally, the results reveal concerns about students' perceptions about the long terms impact of GenAI tools on learning, as 34.8% agree that future AI tools will have negative effect on learning, while 31.9% disagree. In line with these findings, the findings of Mihmas et al.(2024) also showed that excessive dependence on GenAI could adversely affect the creativity and writing skills of the students. Such AI dependence lead the students to be passive learners, obstructing the enhancement of overall cognitive skills. Hence, there should be great concerns regarding the long-term effect of AI on students' critical thinking and creativity.

Student's' challenges of use GenAI tools in education were assessed using nine items. The overall mean score of this dimension was ($M=2.24$), indicating a moderate level of agreement. The findings in Table 8 revealed that the top two obstacles to using GenAI tools included “*require fast internet connection*” [$M=2.62$, $SD=0.63$], and “*require a subscription fee for accessing advanced features*” [$M=2.40$, $SD=0.85$]. In contrast, “*restrict learning autonomy and narrow learning experiences*” was the least concerning challenges, with mean score of 2.02, just above the average level.

Table 8. Challenges of using GenAI tools in education among higher education students.

Challenges		Disagree	Neutral	Agree	Mean	Std. Dev
1. require fast internet connection	F	8	28	102	2.68	.58
	%	5.8	20.3	73.9		
2. require a subscription fee for accessing advanced features	F	0	13	125	2.91	.29
	%	0	9.4	90.6		
3. poses a risk to privacy and data security	F	7	54	77	2.51	.60
	%	5.1	39.1	55.8		
4. provide unreliable information	F	12	36	90	2.57	.65
	%	8.7	26.1	65.2		
5. provide inaccurate or false references	F	11	41	86	2.54	.64
	%	8.0	29.7	62.3		
6. restrict learning autonomy and narrow learning experiences	F	4	42	92	2.64	.54
	%	2.9	30.4	66.7		
7. reduce human-to-human interaction	F	3	28	107	2.75	.48
	%	2.2	20.3	77.5		
8. lead to plagiarism and cheating	F	15	33	90	2.54	.69
	%	10.9	23.9	66.2		
9. negatively impact learning in the future	F	44	46	48	2.03	.82
	%	31.9	33.3	34.8		
Mean					2.24	

5.Conclusion

Overall, the goal of this study is to examine the degree to which Libyan higher education students at Elmergib University use generative AI tools. The study revealed that 85.19% of participants use these tools in their education. However, despite the recognized potential of generative AI in education, the actual usage of these tools was relatively low; more than half of the respondents reported using generative AI tools infrequently or rarely. This low usage rate is corroborated by a national study indicating that Libya students at universities do use Artificial Intelligence chatbots ChatGPT for English language learning. However, these students do not entirely rely on them to enhance their English language proficiency. Instead, they tend to utilize AI chatbots occasionally.

They reveal that ChatGPT appeared to be the most common GenAI tools, used by 87.68% of participants. These responses highlight significant preferences across the students for devices with functionalities and accessible interfaces designed to meet the educational needs. These results align with prior research which have shown that ChatGPT is capable in interpreting difficult questions, producing accurate answers, simplifying the academic tasks, and providing large opportunities for independent learning support in educational contexts. The second mostly common used tools is Gemini, which indicated that students are starting to look for other tools as alternatives of ChatGPT, although it is not as popular as ChatGPT. Such extensive use of online tools suggests that the students recognize the

advantages of these tools in illustrating academic topics, searching for references, translating, and brainstorming when writing.

The study revealed that students, in general, had positive attitudes towards the significance and role of GenAI tools in the high education. High mean scores across most perception items indicate strong agreement regarding GenAI tools contribution in saving time on tasks, improve learning engagement, ease of access and use, and enhance academic performance. Therefore, the findings advocated that students at Elmergib University are interested with the GenAI tools based learning environment to provide high quality learning outputs.

In spite of this general positive attitude, the findings showed that students encountered different obstacles that impeded the effective use of AI tools during their educational journey. Precisely, these challenges are represented mainly in limited speed of internet, expensive subscription costs, social communication, data privacy, learning autonomy, and inaccurate information and false references, plagiarism and cheating. Moreover, the practical obstacles related to internet speed and subscription costs were identified as the most critical barriers. The result of their study reported that obstacles such as limited training and inadequate infrastructure were identified as obstacles to effective usages.

Theoretically, this study provided a clear view about the factors that affect students' perception towards the use of GenAI tools based on TAM and TTF. Specifically, TAM proposes that the chief determinants of students' intentions to use AI tools are usefulness and ease of use. Plagiarism, reliability of information, and learning autonomy can be analyzed and interpreted through the perceived usefulness factor.

It is very necessary to examine these factors in order to enhance students' acceptance and implementation of AI platforms in their educational assignments. On the other hand, the TTF model focuses on making these tools align with students' academic needs. Based on the findings of this study, it was found that the students view the possibility of these tools to enhance their learning, comprehension, and the overall research steps. Nevertheless, the gap between the GenAI tools and educational requirements remain unclear. Moreover, this study proposes that the integration of GenAI applications is relatively limited or still evolving in some fields of computing. Hence, high educational institutions should show flexibility in using the online platforms to improve the learning and academic research process through aligning between these tools and students' needs. Finally, based on the foundations of TAM and TTF, this study offers strong theoretical evidence in clarifying the multi-dimensions aspects of GenAI usage among Libyan students.

6.Limitations and Future Research

This study has several limitations that should be acknowledged when interpreting the findings. This study was carried out on students at one of Libyan universities, hence, it may not be possible to generalize the current findings. Specifically, although the findings from the sample of this study highly contributed in understanding the current situation of using AI tools in Libyan high education, they may not represent the general and the actual practices of these tools in other Libyan universities. Moreover, the findings present a robust theoretical foundation for future studies regarding the role and efficiency of adopting AI tools in educational process.

Future studies may aim to highlight the long-term effect of GenAI tools on boosting the academic skills of students and meeting the educational goals across various fields of studies in high education institutions. Studies may employ a mix-method research design which helps to deeply understand the students' use and experiences with GenAI tools through thematic analysis and statistical results. Moreover, future longitudinal studies could enhance understanding of how students' use and perception shift overtime as they use these tools continuously. Future studies could explore the role of AI policies employed by educational institutions, awareness initiatives, and training courses in shaping students' and academics' perception, and their commitment to the ethical and responsible use of such tools. On the other hand, this study highlighted some challenges that the students may encounter, particularly the practical ones, including internet speed and subscription costs. Hence, policymakers should focus on developing the digital infrastructure and implement comprehensive policies that promote equitable access to GenAI tools. These procedures can help to get the valuable advantages of

online tools and reduce the potential risks. Finally, students had little exposure to AI tools because these tools have not been used in formal educational settings. Therefore, it is suggested to conduct future researches to examine the nature and extent of students' exposure to AI and its direct impact on their learning outcomes.

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