

# Artificial Intelligence Tools for Undergraduate Students

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## Abstract

**Background:** The rate at which technology is adopted in the education sector is rapid. More so, artificial intelligence is gaining wide adoption as it aims to enhance the learning outcomes of students. The purpose of the current research paper was to find out the best artificial intelligence tools for undergraduate students that may be used to enhance their learning results and also discover what students use AI tools for.

**Method:** The purpose was achieved by adopting a survey design to collect data that was analyzed statistically using percentages and pie charts. **Findings:** The study found out that undergraduate students use ChatGPT, Grammarly, Meta AI, ELSA Speak, Notion AI, BlackBox, Tome.APP, Tabnine, Microsoft Copilot, Perplexity, AI Notes, Phatomath, Midjourney, StarryAI, Murf, Runway, Copy.AI, Durable or Soundful in their learning process. Such AI tools help them gain a better understanding of the topics related to their study, do assignments, create content faster, write a certain piece of content, get feedback on a given content, and do its translation. The AI tools also organize tasks, review answers, and instruct how to go about answering given tasks.

**Conclusion and Recommendation:** The use of numerous AI tools by undergraduate students enhances learning. The upscaling of AI tool usage requires universities to focus their efforts on integrating AI into their curricula and offering regular training sessions, and workshops. They should also foster continuous research and development in AI and continuous monitoring and evaluation of AI tools and their impact on the performances of students.

## Keywords:

*Artificial Intelligence, AI tools, Undergraduates, Learning Outcomes*

## I. INTRODUCTION

Technology has undoubtedly revolutionized everything, from the way people walk at home to the way they conduct their day-to-day work. Artificial Intelligence (AI) is one of the technologies that has changed the work environment, be it education, marketing, law, or even transportation. Any domain can benefit from AI because it helps individuals learn to solve complex problems. Barrett et al. provided a glimpse of the future of AI and its advancement and importance in a business setting by highlighting its rapid adoption and transformation of modern business models [1]. Besides the business field, AI has become important within the realm of education, and institutions are trying to find a suitable ground to effectively implement it for learning and teaching. Being able to understand how the cognitive model can depict the

emotional impact of the learner on their education is extremely interesting, as the technology can be applied through various formats. However, what is more surprising is how AI can break free from traditional methodology and content thereby transforming the experience of learners. Holmes and Luckin [2] added two other important models that can be more widely identified in the education field and these include the domain model which is more focused on subject learning and the learner model which shifts its perspective based on the learner's perception of the learning process.

AI has the potential to transform education in many ways. Singh and Mishra [3] argue that the most compelling benefit of AI technology is its ability to provide students with personalized learning. People are not the same, as the current education system seems to suggest; everyone possesses different attributes and capabilities and that is where AI comes into play. There is no need for the current equality-based pedagogy of education where teachers are expected to teach every student the same way. Instructors need to enhance their ability to prepare personalized lesson plans for every student to meet their unique needs. In these circumstances, AI technology helps determine how students can be taught differently if they are having difficulty attempting a certain task. Depending on how students learn, AI modifies the content of the courses to optimize learning. Moreover, AI technology assists in automating the tasks of monitoring and giving feedback. Such tools recognize punctuation mistakes, help to plan sentences better, and provide corrections [4]. Feedback and monitoring capabilities offered by the AI tools help teachers understand how learners are reacting to the material taught to them so that they can address any learning gap by changing their pedagogical approaches.

Owing to the increasing speed of AI evolution, its role in education is expected to also grow. As such, this study aimed to highlight the best artificial intelligence tools for undergraduate students which can be used for enhancing their learning results and also, discover what students use AI tools for. The research questions stated: What AI tools do students use to enhance their learning results? What are the most relevant applications of AI tools to enhance students' learning experience?

## II. LITERATURE REVIEW

The ability to gain knowledge and use it appropriately to obtain the best possible solutions to problems is what is generally termed intelligence. Even though a variety of definitions exist concerning intelligence, they all seem to indicate mental processes involved in reasoning, logic, problem-solving, and planning. In contemporary usage, intelligence encompasses the capacity to learn by experience and adapt acquired knowledge in finding and solving problems [5]. The art of learning, retaining, and utilizing knowledge by learning appropriate problems and applying learning to solve problems is an essential manifestation of intelligence. While humans are considered innately intelligent, machines can be programmed with specific tasks that are built into their programs to become intelligent. When the machine exhibits human-like intelligence within the intelligence levels paralleled to those of human cognition, this is termed AI [6]. Accordingly, AI concerns the emulation, by machines especially computer systems, of intelligence processes of the human being [7]. Hence, AI stipulates creating computer systems that simulate human-like vision, reasoning capabilities, learning mechanisms, problem solutions, perception systems, and capacities for understanding, as well as generating language expressions. In generic terms, therefore, AI attempts to come up with systems that can copy or even replace human cognitive capabilities.

In a general sense, there are two types of AI: narrow or weak AI, and general or strong AI. Narrow AI is designed for specific tasks in which it excels without possessing wide cognitive abilities like a human. Sometimes it is referred to as weak AI, able to do just one thing well and nothing else, while human intelligence does not rely on rigid constraints [8 and 9]. A few examples include virtual assistants, image and speech recognition systems, and recommendation algorithms. General or strong AI (AGI) is seen to be understood, learned, and then applied in almost all domains to perform at least at a human level [10]. AGI will have more flexibility, be more adaptive, and be independent of human intervention in its operations [11]. Therefore, it is capable of handling complexity without those limitations that apply to narrow AI.

Both Narrow AI and AGI concepts have been implemented in education, with most practical applications falling under Narrow AI. For example, personalized learning path (PLP) systems use AI to analyze the learning behavior of students in

recommending study material, exercises, and learning pace [12][13]. Various researchers, such as Hashim et al. [14] and Naseer et al. [15], have explored the usage of PLPs and revealed their benefits. Because students have different aptitudes, ways, and preferences for learning, AI-supported PLPs ensure that the content best fits their individual needs [16]. Intelligent Tutoring Systems (ITS) is another area in which AI has been used to adapt learning to meet the unique needs of every student. ITS has been purposed for feedback [17], question-and-answer services [18], and also for guiding students through the processes of learning [19]. In performing these functions, these systems model teachers' roles by automating a range of pedagogic functions that include generating and presenting problems and giving responses [20]. The AI can help in redefining educational objectives and designing innovative teaching and learning methods.

Many AI-enabled systems and tools assist students in learning better and performing better. Math Thinker is, for example, an AI-enabled tool created specifically for students of K-12, to help students relate math to real-life situations. This AI tool was started during the COVID-19 pandemic because of the challenges arising due to the closure of schools. The AI tool has also been found useful for students at higher levels of education [21]. Similarly, Thinkster Math provides individualized math problems for the students [22]. Other services use AI for students to work with texts in particular. For instance, Cram101 allows content to be divided into bite-sized portions with AI tools in order to redevelop textbooks into intelligent study guides composed of chapter summaries, practice tests, and flashcards for books and book chapters. Additionally, Just The Facts 101 provides on-demand text and chapter summaries [23]. Other such tools that would be used for students in the area of grammar, style, and clarity include Grammarly, ProWritingAid, Hemingway App, WhiteSmoke, and WordTune [24], hence enhancing educational outcomes.

AI Chatbots, which play an increasingly common role in the world, are also increasingly being used in the educational context. Most chatbots being developed today draw on the techniques of Natural Language Processing to understand the underlying user requests and respond appropriately [25]. Examples of this variety of conversational AI include OpenAI's now-famous ChatGPT, which allows users to steer and focus conversations according to their needs. Others include Microsoft Bing, Google Bard, Claude, Meta, and Perplexity, all of which bring search and conversation capabilities together. Other platforms include Brainly, Guru, and Zenius [26], where a community of students and experts come together to help solve each other's

complex assignments. Mika and virtual tutors provide real-time feedback to react to each student's needs in order to achieve learning objectives with improvement [27]. SmartEd allows learners to personalize learning materials, including gamification elements, thereby making education enjoyable. Even though these AI tools have been developed, they have not been fully adopted into the learning process for fear of being penalized for cheating [28]. In this regard, research into their adoption in the education process remains minimal. Therefore, it is crucial to investigate the potential of AI tools in the learning process to offer practical recommendations aimed at increasing their adoption in universities and colleges offering undergraduate degree courses.

### III. METHOD

#### *Population and Sample*

The study population involved university students selected from various departments, including engineering, computers, mathematics, physics, chemistry, economics, tourism and hospitality, business and administration., accounting, social science, Islamic studies, Arabic language, English language, designs and arts, and medicine. The sample consisted of 413 students randomly selected from the different faculties. The technique was applied because all students had equal chances of selection [29]. Moreover, it was one way of minimizing sampling bias that may affect final findings and conclusions.

#### *Research Instrument and Procedure*

The research project utilized a survey guide as an instrument for data collection. Surveys involves collecting information from a sample of people responding to given questions [30]. The survey was designed to include seven questions. From the first question to the fifth questions were for collecting demographic information of participants. The sixth question aimed to collect data for identifying AI tools used in the learning process. Finally, the seventh question helped identify the most relevant use of AI applications in the learning process. The experimental survey was administered to students during their free time and participation was anonymous and voluntary. After data was collected, it was imported into the Microsoft Excel software and then analyzed using statistical methods (percentages and pie charts) [31].

#### *Research Validity*

Researchers should often indicate ways in which the validity of their studies is ensured. Researchers should

ensure their studies are valid because they minimize chances of introducing research bias and amplify transparency [32]. The current study explored three key aspects of validity: construct, internal, and external validity [33]. Each of the aspects has different strategies that can be employed to enhance the quality and confidence in results. Internal validity involves accurate measurement of the variables and tries to limit the possibilities of biased explanations of the results [34]. To ensure the internal validity of this study, simple random sampling was used to reduce the possibility of sampling biases that could facilitate biased explanations. Further, research bias was reduced by minimizing direct interaction with the subjects to avoid biased results and explanations. Ambiguous variables were also avoided by using clear and straightforward language. Controls, including maintaining a similar survey template were adopted to reduce errors and increase the accuracy of the results. On the other hand, external validity refers to the generalization of the results of a study to the targeted population [35]. Generalization was enhanced by choosing an adequate and representative sample of the target population. Finally, construct validity indicates that the research actually measures the theoretical constructs under study [36]. In ensuring that this study had high construct validity, it was supported with already-validated instruments based on widely accepted survey questionnaires and requirements in this field for consistency.

### IV. RESULTS

The section presents results linked to the demographics of the participants first and then followed by findings related to identified AI tools and the most relevant use of the applications in the learning process. Out of the sample (413), only 357 completed the experiment. The percentage distribution of the participants in each category is provided in Table 1 below.

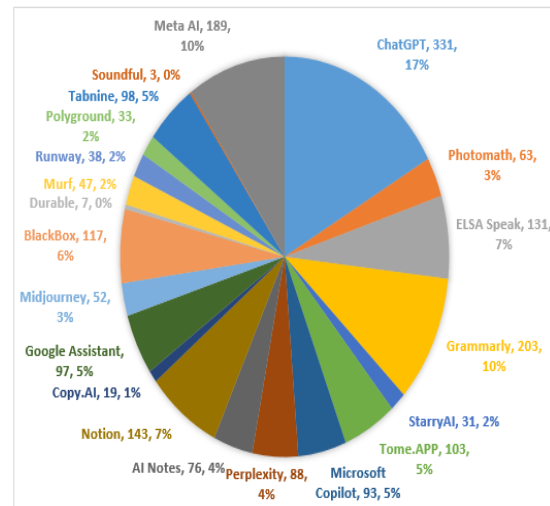
TABLE 1. PARTICIPANT DEMOGRAPHICS

Category	Participants No.	Percentage (%)
<b>Familiarity</b>		
Yes	380	92.6%
No	33	7.4%
<b>Usage</b>		
Yes	357	86.8%
No	56	13.2%
<b>Gender</b>		

Male	163	40.1%
Female	194	59.9%
<b>Field of Study</b>		
Engineering	26	6.3%
Computers	112	26.8%
Mathematics	22	5.3%
Physics	9	2.2%
Chemistry	10	2.4%
Economics	11	2.6%
Tourism and Hospitality	11	2.6%
Business and Administration	9	2.2%
Accounting	8	1.9%
Social Science	11	2.6%
Islamic Studies	14	3.4%
Arabic Language	19	4.6%
English Language	47	11.3%
Designs and Arts	29	7.0%
Medicine	19	4.6%
<b>Level of Study</b>		
First Year	78	18.8%
Second Year	64	15.4%
Third Year	69	16.6%
Fourth Year	63	15.2%
Last Year	83	20.0%

As highlighted in Table (1), the majority (92.6 %) of the participants were familiar with AI tools while a few (7.4%) were not familiar. Among the participants, 86.8% have used AI, whereas 13.2% have not used such tools. The majority of the participants (59.9%) were female while males were few (40.1%). Equally, most participants (26.8%) were selected from computer faculty while the least (1.9%) came from the department of accounting. Participants from other departments ranged from 2.2% to 11.3 %. Finally, most students (20.0%) were in their last year, and a few (15.2%) were in their fourth year. Among the respondents, 15.4% were in their second year and 18.8% were in their first year.

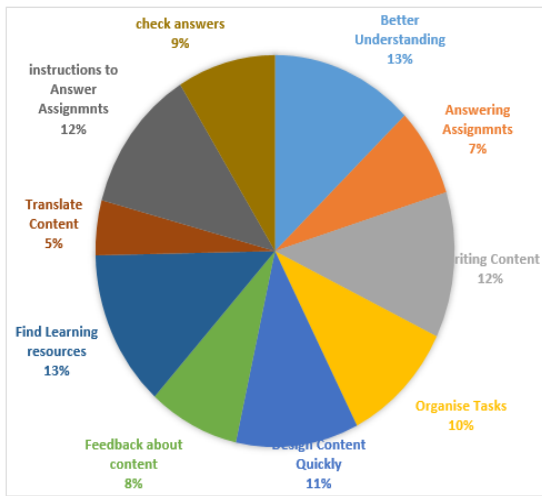
*AI Tools Used in the Learning Process*



**Fig. 1** Participant Distribution Based on AI Tools Used in the Learning Process

After the experiment, the study revealed that various AI tools are used in the learning process. Their level of application is captured in Fig. (1) above. ChatGPT is the most commonly (17%) used AI tool in the learning process followed by Grammarly and Meta AI, each with 10% representation. ELSA Speak and Notion AI tools were represented by seven percent of the participants. While six percent of the participants indicated using BlackBox in their learning journey, five percent of the participants indicated using either Tome.APP, another five percent Tabnine, and another Microsoft Copilot. Equally, while four percent revealed using either Perplexity or AI Notes, three percent indicated using Phatomath or Midjourney. Finally, while at least two percent highlighted using either StarryAI, Murf, or Runway, at least one percent use Copy.AI, and less than one percent use either Durable or Soundful. Regardless of the level of application of the AI tools, one thing is clear, they apply these tools to improve their learning results.

### Use of AI Applications in the Learning Process



**Fig. 2** Use of AI Applications in the Learning Process

Students indicated using the various AI tools in the learning process. While 13% of the students use AI to gain a better understanding of the topics related to their study, seven percent use such tools in answering their assignments. Others use AI tools to design content quickly (11%), write some content (12%), receive feedback about content (8%), and translate content (5%). Moreover, 10% of the participants indicated using AI tools to organize their tasks and check answers to various questions associated with the given tasks (9%). Finally, 12% of the students indicated using AI to give instructions on how to answer given assignments. The above applications of AI tools are most relevant to enhancing students' learning experience.

## V. CONCLUSION and RECOMMENDATIONS

The research paper aimed to highlight the best artificial intelligence tools for undergraduate students which can be used for enhancing their learning results and also, discover what students use AI tools for. The research questions stated: What AI tools do students use to enhance their learning results? What are the most relevant applications of AI tools to enhance students' learning experience? To answer the two research questions effectively, a survey was conducted. The survey targeted a sample of 413 students randomly selected from various university faculties but only 357 completed the survey as required. After data collection, it was imported into Microsoft Excel and analyzed statistically using pie charts and percentages. The findings indicated that students from universities use ChatGPT, Grammarly, Meta AI, ELSA

Speak, Notion AI, BlackBox, Tome.APP, Tabnine, Microsoft Copilot, Perplexity, AI Notes, Phatomath, Midjourney, StarryAI, Murf, Runway, Copy.AI, Durable or Soundful in their learning process. The various AI applications are used in gaining a better understanding of the topics related to their study, answering their assignments, designing content quickly, writing some content, receiving feedback about a given content, and translating the content. Equally, they use AI tools to organize their tasks, check answers to various questions associated with the given tasks, and give instructions on how to answer given assignments. Such applications are essential in improving the learning process of students in universities.

Various recommendations can be given to enhance the learning process of undergraduate students. Universities and other institutions of higher learning providing learning services to undergraduate students should integrate AI into their curricula. All academic programs should integrate relevant AI tools to improve learning outcomes and ensure students are familiar with emerging technologies. Equally, such institutions should conduct regular training sessions and workshops to allow students and educators to understand AI tools, their capabilities, and their challenges. Universities should promote continuous research and development to explore innovative applications of AI in the field of education that could address associated adoption challenges to optimize learning outcomes. Finally, higher learning institutions should continuously monitor and evaluate AI tools and their impact on the performance of undergraduate students and adapt appropriate strategies to address any gap. By adopting these measures, educational institutions can harness the full potential of AI to revolutionize learning to prepare students for a technology-driven future.

During this research project, some limitations were recorded. To begin, the research project was limited to understanding the use of AI tools among undergraduate students to enhance their learning outcomes. Using the study findings to conclude on other groups of students may be impractical due to varying attributes, learning environments, and capabilities. Future research should focus on using comparative analysis of different student groups. The current study was also limited to a quantitative understanding of the topic of study, implying there was minimal qualitative understanding of the study. Future research should be inclined toward mixing qualitative techniques such as interviews to gain an in-depth understanding of the social phenomenon under study. Finally, the research was limited to a specific university context. As such, findings cannot apply to other institutions. Future research should include students from other universities to make a general conclusion on the use

of AI tools in enhancing the learning results of undergraduate students.

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