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RESEARCH ARTICLE

Artificial Intelligence in Education: A Thematic and Descriptive Analysis

Sihem Ben Zakour[1]*, Nadia Selmi[2]

[1]Department of Basic Science, Deanship of Preparatory Year and Supporting Studies, Imam Abdulrahman Bin Faisal University, P.O. Box 1982, Dammam 34212, Saudi Arabia

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***Corresponding Author:**

shzakour@iau.edu.sa

ABSTRACT

The integration of artificial intelligence (AI) into educational settings has become increasingly significant. AI programs can help with writing, studying, and answering tests. This paper aims to explore the contribution of AI in the educational process. For that, we first conducted thematic analysis based on interviews with 10 students to identify key themes, followed by a survey of 100 participants. The findings indicated that most students employ AI in their academic circus. Although AI provides customized answers and assistance for students in their studies, some students are looking for more improvement, such as detailed explanations and better handling for complex queries. Overall, the research reveals a positive sentiment toward AI tools, highlighting their frequency of use and the satisfaction levels among learners and educators.

INTTRODUCTION

Artificial intelligence is the study of the design of intelligent systems. This includes computer-related hardware and software, which is often used to develop problem-solving techniques for a wide variety of complex programs. The promise of truly intelligent machines has been a recurring theme in the history of computer science, but the overwhelming majority of operational computer programs are not truly intelligent in the conventional sense of thinking or problem-solving for themselves. Nonetheless, computer professionals are becoming adept at creating programs that can solve many problems that humans currently regard as requiring intelligence to solve [1, 2, 3 &4]. These programs may not necessarily be the most intelligent in a human sense, but they can outperform the intelligence of humans in terms of their speed in solving complex problems [5 & 6].

The technological landscape of recent decades has seen exponential development. Tethered to this growth has been an ever-increasing prevalence of artificial intelligence (AI), which is being introduced to a myriad of environments [7]. Due to its wealth of applications, there is an undercurrent of excitement in the educational sector about the potential of this suite of tools [8]. As a transformative technology, AI is anticipated to have far-reaching impacts that can mold the learning environments of students.

The consistence of the development of AI stems from its potential impacts in any given context and education is no exception. Given the increasing investment in AI and educational technologies, our interest in this subject gain further importance. Indeed, understanding AI's potential impacts on our students may conduct to begin to at least shape AI, if not predict it, for policymakers, administrators, and educators.

This study aims to explore the impact of AI on students learning experiences. To investigate this topic, we started by thematic analysis of 10 students' interviews, then a survey was conducted with a sample of 100 students from the Kingdom of Saudi Arabia.

This paper is arranged as follows: First, Section II provides an overview of the literature. Section III introduces the methodology applied. Section VI presents the results of the research and the discussion of the findings followed by the conclusion.

LITERATURE REVIEW

The impact of AI on learning process has been extensively covered by the literature in the recent decade since education is one of the many areas that artificial intelligence is revolutionizing. Artificial intelligence (AI) has the power to completely rethink education by making it more effective, interesting, and individualized. Artificial intelligence (AI) in education is the application of AI technologies, like natural language processing and machine learning, to improve the educational process [9]. Through the use of algorithms that evaluate data, spot trends, and forecast outcomes, teachers are able to customize instruction for each student. Digital artifacts and relics that methodically incorporate movable visuals, audio-visual inputs, and other digital and script commands are the result of the advancement and integration of deep learning (DL) and replicable AI technology.; which is carried out by carefully examining training inputs and coordinating different data patterns and designs are necessary [10 & 11].

That is, the application of AI in education has a lot of potential advantages on students' learning process. Artificial intelligence offers several key strengths that can greatly benefit students and educators alike. Primarily, AI systems have the potential to offer an adaptive and personalized learning experience based on students' strengths, weaknesses, and learning styles [12]. Using the flipped classroom approach, [13] concluded that AI is likely to enhance students learning performance with moderate motivation level. Through concept mapping integrating the AI-IESLS system, [14] established how the use of chatbot improved the learning experience for higher education students. For example, AI tools can adjust and customize difficulty levels, courses, and exercises according to the individual progress pace of each student, offering accelerated progression through subjects for some students and extra practice for others.[15]; AI even has the potential to identify individual students' learning styles and strengths and offer the most relevant resources. AI systems can also provide timely and detailed feedback to students regarding their progress, including any errors [16].

Another important advantage of AI is that it is scalable, providing access to educational content and a personal learning assistant adapted to everyone in need. [17 & 18] Such adaptive learning programs can support different groups. For example, AI algorithms can offer appropriate encouragement for working students learning through web-based classes allowing them to progress independently of the course instructor with better time flexibility. and can offer diverse support for people who engage in these systems targeting very distinct faculty topics and learning resources. AI technologies offer a lot of promise for different contexts for learning and belief-based systems, including demos for planning future lessons. Consequently, many new educational technology firms have entered the wellbeing market with products and tools. However, many legal and ethical problems make it difficult to fully integrate AI and application systems into the education system.

Indeed, the aforementioned studies have been conducted with a special focus on the advantages. The excitement that has arisen, however, requires diligent examination, reflection, and critical thinking about the implications of AI technology in learning environments. There are significant roles for philosophers, ethicists, and critical thinkers in addressing the ethical, social, and political considerations raised by AI, learning analytics, and educational data science. When applying AI in educational contexts, serious legal and ethical considerations need to be addressed. A significant area of concern pertains to privacy [19], specifically in relation to student data. This encompasses the entirety of a student's online and offline activities, including schedules, library check-outs, and coursework. An AI system has the capability to gather and utilize a diverse range of data, such as audio and video recordings, social media posts, surveys, observations of human interactions, and demographic information about individuals. Personal data is abundant in today's society, and following data collection, the user's privacy is consistently considered by the AI system for analysis, data modification, and result disclosure.

Moreover, the use of predictive analytics and nudging in student success models raises ethical questions about transparency and consent [20]. It is important to consider how these interventions may disadvantage certain students and create new forms of policing and sorting. Algorithmic fairness

is a major concern in using AI in education, and there is a need for more effective and equitable AI design. The existing AI is biased and unfair, and its adoption has the potential to stratify student learning and reinforce marginalization [21]. Another major problem related to the incorporation of AI in learning experience surges from the partiality in the input training data leading to Strengthening preconceptions [22]. When input data is prejudiced or contains language that is prejudicial, the output will be compromised and won't match the learning goals of students [23]. According to recent studies [24] there is a substantial bias in the questions pertaining to mental patients around preconceptions, which compromises the quality of the data. This poses a substantial concern regarding the appropriateness of AI for learning systems where the quality of the training data is essential to the system's usability [25& 26].

The potential of AI in education is enormous, despite these obstacles. approaches continue to be refined, promising even greater accuracy and utility in the future. AI can improve data analysis, empowering teachers to make judgments based on facts. By offering dynamic and captivating educational opportunities, it can also raise student engagement [27] and has the potential to transform the educational sector through digital means making education more inclusive and accessible so that students from all backgrounds can receive a top-notch education [3].

METHODOLOGY AND RESULTS

A. Thematic analysis

Thematic analysis (TA) is a strong qualitative research tool for fixing, examining, and interpreting patterns or "themes" within qualitative data. Large and small data sets as well as homogeneous and heterogeneous populations could be analyzed using TA. TA is an unrestricted approach which makes it adaptable to various research frameworks. In this study, the research was initiated by conducting directive interviews with a sample of ten students to assemble their standpoints on the use of artificial intelligence (AI). The motivation of conducting directive interview, compared to semi-directive (a series of open-ended questions with a lack objectivity) and non-directive (the candidate steers the conversation, and it is challenging to evaluate and contrast answers from interviews), is that the interviewer oversees the interview process and guides the flow of questions. The purpose of the subsequent thematic analysis of the interview data is to uncover key themes related to students' involvement with AI tools. Once these recurring themes are pointed out, the study will provide a follow-up survey that builds on the insights derived from the initial interviews. Below are the primary themes identified in the analysis.

1-Using AI Helps to overcome Academic Difficulties.

Proof:

Interview 1: The student states that while he encounter trouble in organizing an argument for project, AI was helpful.
Interview 2: When a student gets error messages in his assignments, AI can identify the problem.
Interview 9: Student can get clarification on issues they are unclear about by using AI.
Analysis: This indicates that AI is mainly viewed as a problem-solving tool that helps students get past obstacles and continue working on their educational tasks.

2-Enhanced Productivity Proof:

Interview 5: AI is a helpful tool for a research, particularly when it comes to identifying sources.
Interview 7: The student discusses AI enables them to better comprehend some topics.
Interview 8: The student reports that AI enables her to overcome obstacles more easily compared to other tools

Analysis: This demonstrates how AI helps students complete several academic assignments more effectively.

3- Generate Ideas and Brainstorming Proof:

Interview 3: The student generates outlines and ideas for essays using AI.

Interview 7: AI assists in planning group projects.

Interview 2: When working on research papers, AI might be useful in providing ideas and sources.
Analysis: AI is a useful instrument for organizing and generating ideas

4- Customized Education and Explanation Proof:

Interview 4: A student utilizes AI to get clarification on scientific subjects.
Interview 6: AI is characterized as a conversational tool that facilitates deeper engagement with academic content and offers clarification.
Interview 9: AI assists students with exam preparation and retention by assisting in the clarification of misconceptions.
Analysis: AI helps users comprehend academic material more deeply.

5-Complement toolsProof:

Interview 3 Student highlights that AI is a tool for idea generation but not substituting teacher.

Interview 10: A student use AI to get ideas for organizing report, but he still modifying according to his needs.

Analysis: This theme emphasizes how students use AI as a tool completing own knowledge.

6- AI as a Regular Study FriendProof

Interview 6: The student says they utilize AI on a daily basis as part of his study.
Interview 9: Before tests, student can review their notes with AI, which helps him reinforce his knowledge.
Interview 1: AI is a reliable resource for summarizing points and concepts.
Analysis: This subject demonstrates how Students view AI as a reliable, always-available partner for both simple and complex academic assignments.

According to table1, the overall interviewed University students see AI as a valuable academic tool that helps them overcome obstacles, save time, and generate ideas. It is viewed as an integral part of individual study routines, a support system for learning. Students consider it an essential part of their academic toolset because of its accessibility and ability to increase productivity.

Table1: Results of thematic analysis

Basic themes of AI according to directive interview

	Helps to overcome Academic Difficulties (exam preparation, Homework assistance, tutoring)
	Enhances Productivity (Language learning, Lesson planning, access to wide range of information, Improve understanding)
	Generate Ideas and Brainstorming (Project idea, Provide different perspective)
	Customized Education and Explanation (Generate interactive learning, personalized response)
	Complement tools (Research support, Writing support)
	Regular Study Friend (Instant feedback)

B. Survey analysis

In order to understand more the effect of the use of Artificial intelligence in Education, 100 students were surveyed about AI.

The survey focuses on Six questions given as follows:

How do you primarily use AI?

What do you like most about AI in education?

What improvements would you suggest for AI?

What is your overall sentiment regarding AI in education?

Frequency of Use: How often they use AI?

Satisfaction Level: **Their satisfaction level (e.g., Very Satisfied, Satisfied, Neutral, Dissatisfied, Very Dissatisfied).**

A random sample of 100 student respondents will be analyzed. The results were given below

Table 2: Use Case

Categories	**Percent**
Exam Preparation	11%
Homework Assistance	16%
Language Learning	12%
Lesson Planning	11%
Project Ideas	10%
Research Support	13%
Tutoring	13%
Writing Support	14%
Total	100%

AI could potentially assist around 43% of students in educational processes divided into three classes. 16% of surveyed students employ AI in their homework's for assistance, followed by writing assistance 14%, and tutoring 13%. Moreover, 13% of users consider AI a toolbox that academics have at their disposal for research. (Table 2).

From table 3, about a quarter of the sample (24% of users) consider AI as a search engine that provides direct answers to queries rather than one must obtain the information on their own. Additionally, AI is regarded as a helpful tool to make complex concepts easier and more understandable (17% like AI since it is improving their understanding).

Table 3: What do you like most about AI?

Categories	Percent
Access to a wide range of information	12%
Engages students in interactive learning	13%
Helpful for brainstorming	11%
Improves understanding of difficult concepts	17%
Instant feedback	9%
Personalized responses	24%
Provides diverse perspectives	14%
Total	100%

No one can deny the advantages of AI, Nevertheless, AI has important restrictions as well. It occasionally provides non detailed responses; 21% of students claim the feeling of the need to get more expanded explanation and 17% are still not really convinced about answers given by AI; they want better performance to face complex requests (Table 4).

Table 4: Suggested Improvements

Categories	**Percent**
Better alignment with curriculum standards	12%
Better handling of complex queries	17%
Enhanced summarization capabilities	13%
Improved conversational abilities	11%

Increased accuracy in responses	11%
More detailed explanations	21%
More subject-specific knowledge	15%
Total	100%

After analyzing the reasons for use, advantage (most like in AI), and suggest improvement (seen as a weak point to ameliorate), we move on to analyze the overall sentiment, the frequency of use, and the satisfaction level. The distribution of data shows that more than one third of students 35% have a positive idea about AI. 31% have negative sentiment since some students suggest making improvements in answers in order to fit their needs (Table 5).

Table 5: Overall Sentiment

Categories	Percent
Negative	31%
Neutral	34%
Positive	35%
Total	100%

From table 6, 23% of students use AI occasionally according to their required tasks as listed in table 1 (doing homework or writing assistance). Students are divided into daily, weekly, occasionally, or rarely according to their own needs.

Table 6: Frequency of Use

Categories	Percent
Daily	19%
Very rarely	21%
Occasionally	23%
Rarely	18%
Weekly	19%
Total	100%

The satisfaction level is analyzed in Table 7, and most of the students who use AI are satisfied with a 28% satisfaction percentage.

Table 7: Satisfaction level

Categories	Percent
Dissatisfied	15%
Neutral	21%
Satisfied	17%
Very Dissatisfied	19%
Very Satisfied	28%
Total	100%

IV. CONCLUSION

This paper has presented some of the developments in the field of artificial intelligence and considered the potential impact of these developments on students and learning. It has presented some of the ways in which AI-based tools can support students through the provision of adaptive tutoring, providing instant feedback on practice and essay writing through automated marking, and enabling learning analytics at scale. These tools have been shown to have some positive impact in real educational contexts. The first stage of this study was to explore AI phenomena through thematic analysis allowing the creation of relevant themes from qualitative data. The identified themes are applicable to the research subject and employed to arrange and report the researcher's analytical observations. Key themes listed by interviewed students were the use of AI in education as time-saving, allowing easy access, offering learning support, and serving as a powerful tool for generating

ideas and improving student educational levels. These themes were collected through directive interviews. The second stage of this study aimed to analyze statistically a six questions survey where 100 answers were analyzed. The mjor findings indicated that despite the consistence of AI as a contributor tool of education and learning, some limitations have been detected including providing occasionally non-detailed responses. That is, it cannot fully substitute human intelligence and competence. Ongoing improvements in AI are expected to enhance these tools, ultimately boosting satisfaction levels and overall sentiment within the educational system.

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