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Fakhruddin Noori

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Fakhruddin Noori

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Abstract

This paper explores the potential benefits, limitations, and risks associated with implementing GPT-4, a state-of-the-art AI chatbot, in the educational landscape of Afghanistan. Given the country's unique socio-economic challenges and educational needs, GPT-4 presents promising opportunities and significant concerns. The benefits of deploying GPT-4 in Afghan education are multifaceted. It offers scalable, accessible, and cost-effective learning support, particularly valuable in remote and underserved areas where qualified teachers are scarce. However, the application of GPT-4 is not without its limitations. Given Afghanistan's linguistic diversity, language barriers pose a significant challenge, as do cultural sensitivities that require careful customization of the chatbot's responses. Furthermore, the AI's reliance on internet connectivity and digital infrastructure, which are limited in many parts of Afghanistan, could hinder its widespread adoption. The risks associated with using GPT-4 in Afghan education include the potential for reinforcing biases in the training data, which may inadvertently propagate stereotypes or misinformation. So, there is a problem with data privacy and the ethical use of student information. Additionally, over-reliance on AI could sabotage the development of critical thinking skills and human teacher-student interactions. In conclusion, while GPT-4 offers substantial advantages for enhancing educational accessibility and quality in Afghanistan, carefully considering its limitations and proactively managing its risks are essential to ensure its effective and ethical deployment. Future research and pilot projects are necessary to tailor GPT-4's implementation to Afghanistan's specific educational context and to maximize its positive impact on the learning outcomes of Afghan students.

Keywords: *GPT-4, AI Chatbot, Education, Benefits, Risks, Afghanistan.*

1. Introduction

Artificial Intelligence (AI) integration in education has garnered significant attention in recent years, with numerous studies highlighting its potential to transform learning and teaching practices. Prior research has largely focused on AI's role in developed countries, emphasizing its ability to personalize education, enhance access to resources, and streamline administrative tasks. However, limited attention has been given to its application in developing nations, particularly in Afghanistan, where challenges such as remote access, linguistic diversity, and infrastructural limitations hinder the adoption of advanced educational technologies.

A significant gap exists in understanding how AI, particularly AI chatbots like GPT-4, can address these educational challenges in Afghanistan. While studies have explored AI's

benefits, they often overlook cultural, linguistic, and infrastructural barriers unique to this context. Addressing this gap is crucial, as leveraging AI to align with Afghanistan's specific needs could provide scalable, multilingual, and accessible solutions to improve education, especially in underserved regions.

This study aims to evaluate the use of GPT-4 as an AI chatbot in the Afghan educational system, following frameworks such as constructivist learning theory and technology integration models. This research aims to analyze the benefits, limitations, and risks of GPT-4, focusing on its ability to enhance education while considering the unique cultural and infrastructural challenges in Afghanistan. The study contributes to the growing discourse on AI's transformative potential in education by linking these findings to practical applications.

This study contributes to both theory and practice. Theoretically, it provides insights into how AI can bridge educational gaps in developing nations, adding to the literature on AI in education. Practically, it offers recommendations for implementing GPT-4 to address challenges in Afghanistan's educational landscape, ensuring that AI complements traditional teaching methods while respecting local contexts.

1.1 AI and Learner-Facing Tools

As an example of a learner-focused tool, Betty's Brain is a platform to assist students in grasping ecological concepts. In this system, the user interface plays a vital role. Through the interface, students create a conceptual diagram using nodes and arrows to represent processes within a river ecosystem, such as oxygen absorption and carbon dioxide production. The platform also supplies reading materials, enabling students to construct their diagrams based on the information provided. Students can request the system to evaluate their diagram for accuracy and completeness at any moment, receiving feedback to refine their work.

The system operates within a narrative framework where the learner designs the conceptual map for a virtual student named Betty, hence the name Betty's Brain. The evaluation is portrayed as being conducted by an artificial teacher, Mr. Davis, who also provides metacognitive guidance if the student appears to neglect effective learning strategies, such as fully utilizing available resources.

Since its inception, AI has evolved to emphasize learners as individuals with emotions, ambitions, and knowledge. This expanded perspective on learning has been driven by a deeper understanding of learner motivation and emotional states. Such advancements enhance the human connection between learners and systems but also introduce ethical challenges, particularly regarding data privacy and the types of information gathered and stored. This broader focus has led to the development of methods to evaluate learners' emotional and motivational conditions, aiming to foster positive states like focused engagement and mitigate negative ones such as frustration or disinterest. A practical example is seen in a math tutoring system that categorized students' learning behaviours into profiles based on hint usage, problem-solving time, and error frequency. Each profile combined cognitive and emotional/motivational traits. The system offered tailored responses for each profile, such as presenting harder problems (cognitive), providing encouragement, and minimizing the pressure of immediate success

(emotional/motivational).In their editorial for a special issue on AI in higher education, the editors observed that, while promising, there is limited evidence of transformative advancements in modern AI specifically for teaching and learning in higher education, except perhaps in learning analytics.

2. Literature Review

The evaluation of a student involves gathering, analyzing data, interpreting that information, and responding based on their performance regarding learning objectives. There are various kinds of evaluations. However, the assessment selection depends on the aim and preference of the individual conducting the evaluation. For instance, educational institutions primarily utilize standard-based evaluations, which are advantageous for grading and similar purposes. Another form of evaluation is learner-centred assessment models, which are predominantly formative and useful for guiding instruction and supporting student learning. This may not consistently be valid or beneficial. Unlike the traditional assessment methods, contemporary computer-based applications are also employed for evaluation purposes. These AI applications provide rapid evaluations for large groups of students while maintaining the same standards without biases, ensuring that all students receive grades without concerns over favouritism or aversion.

Furthermore, these systems support educators, reduce their workload, and allow time for other responsibilities. While evaluating a vast number of students is a challenging endeavour, it remains one of the primary responsibilities of educators. Following the COVID-19 pandemic, educational institutions have transitioned to online learning platforms and systems such as Learning Management Systems, MOOCs, and MOODLES, making it difficult for teachers to manage everything online, particularly the assessment of assignments, quizzes, and examination papers. Automated grading systems are one solution to this challenge. Various questions, such as short-answer and multiple-choice, can be assessed using automated evaluation systems. Numerous researchers have focused on developing impartial and effective grading or assessment mechanisms through various computer technologies. AI Applications using machine learning techniques and unsupervised clustering algorithms can operate efficiently and address the issue effectively [3]. This research focuses on the managerial use of AI tools in evaluating student performance, with technical details elaborated in works like [2–6], among others. It can be inferred that AI tools can significantly aid in evaluating and grading students while reducing teachers' workload. This approach also promotes fairness and efficiency in assessments compared to conventional methods. The defining characteristic of GPT models is their scale. While no official details about GPT-4 are available, GPT-3 comprises 175 billion parameters [1]. In the rapidly evolving job market, continuous learning and skill enhancement have become essential components of modern education [2]. Despite advancements in AI and its increasing everyday influence, there is limited research on how to teach young children effectively and what specific content should be taught in schools [3]. University students in many English as Foreign Language (EFL) contexts often lack opportunities to practice the target language outside or inside the classroom.

Spoken interaction is typically limited to communication between the teacher and peers. Through participant observation and surveys with both rating scales and open-ended questions, a study examined 128 EFL students from diverse academic fields enrolled in business English courses [4]. It was observed that most studies employed ensemble machine-learning methods or hybrid models. This aligns partially with previous findings

emphasizing learner models' importance for actionable insights rather than solely focusing on machine learning accuracy [5]. Schools often use NAPLAN data to track improvements over time. These results are incorporated into online reporting systems as evidence of school progress. However, the reporting system does not accept all forms of evidence that schools may use to showcase advancements [6]. School culture often poses obstacles to implementing AI-focused curricula. The successful incorporation of AI education in K–12 settings requires all stakeholders' collective commitment to the education system [7].

ChatGPT-4 offers significant theoretical contributions to teaching and learning in accounting. It builds upon earlier research in technology-enhanced education and provides insights into current trends in academic research [8]. The potential of AI to enhance education has spotlighted AIEd (AI in Education) for researchers, policymakers, and practitioners. However, earlier studies primarily concentrated on engineering aspects, such as creating novel algorithms and refining machine learning and deep learning approaches [9]. No study has explored teachers' readiness and intention to teach AI in schools, highlighting the need to address this gap [10]. Consequently, a continuous and in-depth understanding of the learners and their learning environments is crucial to support learners better. Temporal analysis of learner data, including their performance and behaviours, can provide such insights [11]. This research delivered programming instruction using the ChatGPT tool, an advanced language model developed by OpenAI. ChatGPT is built on the GPT (Generative Pre-training Transformer) framework and has been trained on a vast internet-based dataset. It is designed to produce human-like text and can be fine-tuned for specific applications such as answering questions, translating languages, and summarizing content [12]. Therefore, this literature review integrates key findings from twelve research articles, highlighting their importance in education.

2.1 AI Chatbot Technology

A chatbot comprises two primary elements: a general-purpose artificial intelligence system and a conversational interface. This discussion focuses on a specific AI model, GPT -4 (Generative Pretrained Transformer 4), integrated with a chat interface. This system, actively developed by OpenAI, an organization specializing in AI research and deployment, is widely accessible. To interact with a chatbot, users initiate a "session" by inputting a query — often called a "prompt" — in simple, natural language. Typically, although not exclusively, the user is a human. The chatbot then provides a natural-language "response," usually within a second, tailored to the given prompt. This back-and-forth exchange of prompts and responses mimics a human-like conversation.

As illustrated in the transcript of a typical session with GPT-4 (Figure 1A), the system's ability to maintain the context of an ongoing dialogue enhances its utility and creates a more intuitive experience. Modern chatbots are influenced by the format and phrasing of the prompts they receive, which has led to the emergence of "prompt engineering" as both a creative and analytical discipline. While future AI systems may become less reliant on the exact phrasing of prompts, currently, careful design and testing of prompts are essential to achieve optimal outcomes.

At its simplest, if a prompt poses a straightforward question or request with a definitive answer — for instance, one derived from documented sources or basic calculations — GPT-4's responses are almost always accurate. However, some of the most intriguing

interactions arise when prompts have no single correct answer. Two examples of such cases are presented in Figure 1B. In the first scenario, the user expresses concern or frustration, and GPT-4 responds by attempting to address the inferred needs of the user. In the second example, the user asks a question that GPT-4 cannot answer and might be interpreted as assuming the chatbot is a human. Incorrect responses by GPT-4, often referred to as "hallucinations," can be especially risky in sensitive fields like medicine, where inaccuracies can be subtle yet convincingly stated, potentially misleading users. Therefore, verifying the output from GPT-4 is crucial.

Unlike systems designed for specific tasks, such as interpreting images or analyzing medical notes, GPT-4 was created to possess broad cognitive capabilities aimed at helping users perform a variety of tasks. A prompt may be a question but can also involve instructions, such as "Please read and summarize this medical research paper." Prompts are not limited to English sentences; they can be written in various human languages and incorporate data inputs like spreadsheets, technical documents, academic articles, or mathematical formulas.

With backing from Microsoft, OpenAI has developed increasingly advanced AI models, with GPT-4 being the most sophisticated publicly available as of March 2023. For the past six months, Microsoft Research and OpenAI have explored GPT-4's potential applications in health care and medicine to better understand its core abilities, limitations, and risks to human well-being. These explorations include health documentation, data integration, diagnostics, research, and education. Other noteworthy AI chatbots have also been examined for their educational applications.

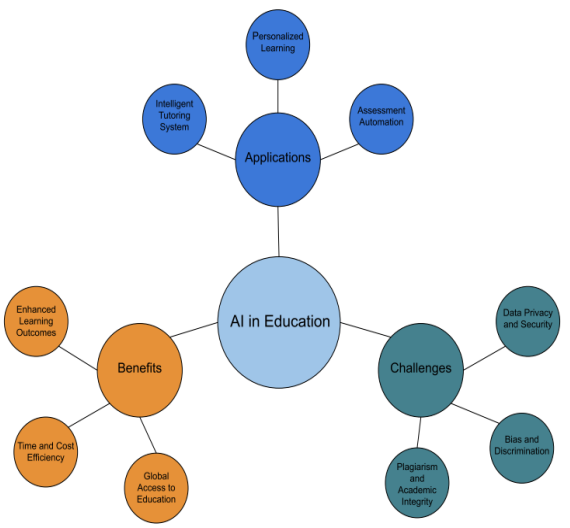

Fig. 1. Multifaced impact of artificial intelligence in education

3. Methodology

This research follows a systematic literature review approach, aiming to examine and interpret findings based on predefined research questions and criteria to identify potential future directions. These criteria include educational level, research methodology, and outcomes. The review was conducted in three stages: planning, execution, and reporting.

Planning the Review. While prior AI reviews predominantly focused on the physical and computer sciences, this study targeted the social sciences domain. Relevant articles published between 2018 and 2024 were retrieved from the Web of Science database and Social Science Citation Index (SSCI) journals, which are considered high-quality resources by education researchers. The keyword "artificial intelligence" was used, and the subject area was limited to "education and educational research." This process yielded 12 articles: 2 research studies, 9 review articles, 1 interview, and 5 book reviews. These works included analytic studies (mainly qualitative research) and empirical studies (primarily quantitative research), excluding studies focused on Afghanistan's education system.

Executing the Review. Following the methodology of Wu et al. [5], the review was conducted in two phases: identification and classification. In the identification phase, articles were included if they implemented specific AI methods to support teaching or learning or provided empirical evidence or detailed analysis. Only SSCI-indexed articles were considered. Studies lacking educational relevance or treating AI solely as a subject without practical application were excluded. In the classification phase, analytic studies examining the impact of Chat GPT-4 or AI chatbot techniques on education were prioritized. Analysis principles were defined, and a coding framework was developed to assess AI chatbot integration in education. The study focused on two critical aspects: research questions and technology integration. Regarding research questions, prior studies identified three core AI models for knowledge processing: knowledge representation, knowledge acquisition, and knowledge derivation.

4. Discussion

Educational institutions require educators to balance instructional duties with classroom management and related tasks. Artificial Intelligence (AI) systems assist by analyzing data to predict students' learning behaviours and academic needs, enabling personalized learning. Unlike the traditional "one-size-fits-all" approach, which overlooks individual differences, AI recognizes unique learner profiles to provide tailored education in real-time. Customized learning allows educators to address students' specific abilities and requirements, enhancing engagement and outcomes while managing larger groups more efficiently. Furthermore, AI introduces smart content, such as e-books, video lessons, and lecture materials, expanding education access. These digital resources enable remote and simultaneous learning for multiple students, surpassing the limitations of traditional classrooms. By enhancing personalization and accessibility, AI empowers educators to deliver knowledge more effectively, transforming the educational landscape.

5. Result

This research evaluated the benefits, limitations, and risks of using GPT-4 as an AI chatbot in Afghanistan's education sector. The findings reveal that GPT-4 enhances access to quality educational resources, particularly in remote and underserved areas. Its multilingual capabilities, supporting Dari and Pashto, effectively address Afghanistan's linguistic diversity. The study highlights GPT-4's potential to deliver scalable, multilingual, cost-effective educational solutions. However, it emphasizes the need to tackle cultural, infrastructural, and ethical challenges to ensure GPT-4 complements, rather than replaces, traditional educational methods. Based on the data collected from the interviews, the results are summarized and presented in Figure 2.

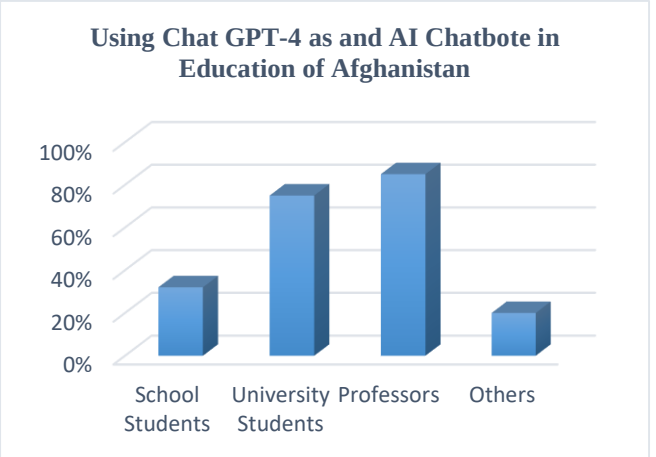

Fig. 2. Usage of Chat GPT-4 in education

Figure 2 shows the usage of Chat GPT-4 in education. School students use around 35%, University level students use 85%, professors use 90% for different proposed and other people use 25% to collect various information. Therefore, Chat GPT-4 in education in Afghanistan is being enhanced daily.

6. Conclusion

This literature review highlights GPT-4's remarkable capabilities and notable limitations, leaving unresolved questions about acceptable performance standards for general AI systems. While GPT-4 can identify and correct errors, it may also produce mistakes, raising concerns about the level of trust users can place in its outputs and the need for verification.

GPT-4's broader intelligence introduces opportunities and challenges, unlike earlier AI models with narrowly defined educational scopes. It is not an end goal but a stepping stone to more advanced AI systems. When used responsibly, GPT-4 and its successors have the potential to benefit Afghanistan's education sector significantly. AI chatbots can promote inclusivity, effectiveness, and engagement, offering broader access to quality education and fostering a transformative learning environment for Afghan students.

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About the Author

Mr. Fakhruddin Noori, *Assistant Professor, Department of Information Technology, Faculty of Computer Science, Kardan University, Kabul, Afghanistan.* <*f.noori@kardan.edu.af*>