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A Complete Review of Artificial Intelligence Tools in Various Fields in Education

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Abstract:

In rapidly evolving technological landscape, the intersection of artificial intelligence (AI) and education is not just a future possibility; it is imminent. In education, AI is being used to enhance learning experience, automate administrative tasks, and provide real-time feedback. AI in education refers to the use of artificial intelligence technologies to enhance teaching and learning experience. The importance of AI in education comes with AI tools such as educational apps, online tutoring systems, interactive games, and platforms that analyze data to improve educational outcomes. AI tools have become increasingly important in various aspects of our lives, especially in education. As AI continues to evolve, it has the potential to revolutionize education and make learning more accessible and efficient for students of all ages and abilities. In this paper we will focus on AI tools used in various fields in education.

Keywords: AI tools, Education, Teachers, Students.

1. Introduction

Artificial intelligence is revolutionizing education with cutting-edge tools that enhance teaching and learning, from personalizing experiences to optimizing administrative tasks. The categories of artificial intelligent tools include Adaptive Learning, where AI-driven platforms assess students' skill levels in real-time and tailor instructional content to meet individual needs, adapting lessons dynamically to help students master concepts at their own pace. Assistive Technology, such as speech recognition software, transcribes spoken words into text, helping students with disabilities to participate more fully by converting speech to text and vice versa. Data and Learning Analytics utilize AI to analyze data from online learning portals, classroom attendance, and grades, providing insights into student performance, helping educators identify trends, and tailoring instruction to address gaps. Classroom Management platforms use AI to gamify management, tracking student behavior and engagement, reward positive actions, and providing insights into classroom dynamics. Intelligent Tutoring Systems, like Carnegie Learning, offer personalized feedback and support, adapting to individual learning styles. Automated Grading and Assessment Tools use AI to evaluate assignments and provide detailed feedback, streamlining grading, ensuring consistency, and saving teachers time, even grading abstract assessments like essays. Chatbots and Virtual Assistants, such as Mainstay, provide immediate student support outside classroom hours, answering questions, reminding deadlines, and guiding through administrative processes. Curriculum Planning employs AI to analyze educational data, ensuring curricula remain relevant, comprehensive, and aligned with learning objectives by suggesting updates. Interactive and Learning Games use AI to create engaging and adaptive

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experiences, providing tasks and challenges that adapt to student responses. Personalized Learning platforms create customized experiences by adapting to unique student understanding, reducing cognitive load and tailoring instruction. Task Automation uses AI for routine tasks like homework assessment, test grading, and report generation, allowing educators to focus on instructional activities. Smart Content Creation tools like Magic School AI and Eduaide.AI aid instructors in creating digital lessons, study materials, assessments, and individualized education plans. Proctoring systems powered by AI monitor exams to prevent cheating, analyzing student behavior and providing real-time alerts. Language Learning AI tools, like Duolingo, use adaptive algorithms to personalize experiences, adjusting difficulty based on user progress. Finally, Closing the Skill Gap involves AI identifying skill gaps by analyzing performance data and providing targeted resources to address deficiencies, helping learners achieve proficiency and prepare for future academic challenges.

2. Data Analysis of Ai tools in Education

The survey received a total of 116 responses from faculty members across various school/colleges and departments at the university. The colleges with the highest number of respondents were the College of Arts and Sciences (Science), the College of Education and Human Services (Education), and the School of Business (Business). In terms of follow-up interviews, 36 faculty members opted for further discussions, with a notable interest from the College of Science (Science) and the College of Engineering (Engineering). This diverse representation of faculty members provides a broad perspective on the attitudes and opinions towards AI tools and LLM based technologies in education. Figure 1 shows the participants from each school and department.

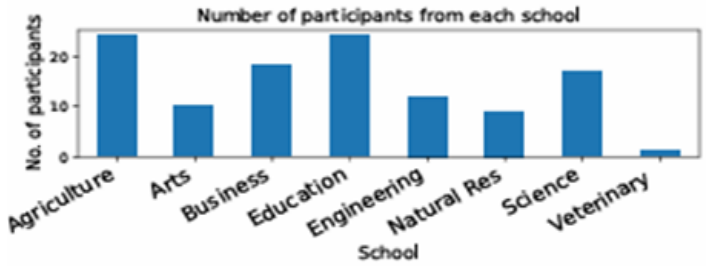

Figure-1 Participants Across Various Schools

Our survey revealed that most educators have at least heard of these tools or tried them. More than 40% of the faculty members said they use them at least periodically or regularly. While no significant difference was found across various age brackets and tenure lengths. The familiarity varied by school (Figure 2). The College of Science and School of Business have the highest familiarity overall, while the College of Arts affiliated educators were the least familiar.

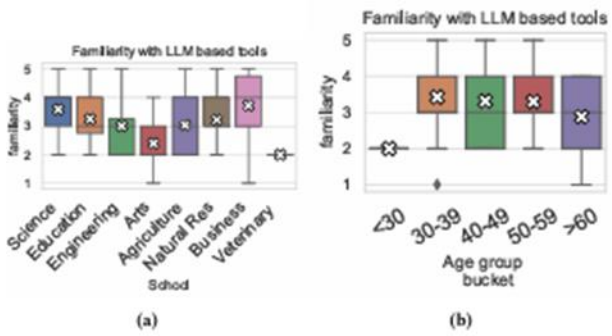

Figure-2 Familiarity by a) School and b) Age Group

Table 1 shows the discovery source of these Generative AI-based tools among the educators. Through the interviews, we discovered multiple instances where faculty members who followed the development of these tools more closely held formal or informal workshops to inform their colleagues of these developments. Among those interviewed, 19% had a technical understanding of Generative AI and LLMs, while others had only a basic understanding. 38% of the interviewees were very aware that they lacked technical understanding of the tool.

Table-1 Discovery sources of Generative AI tools

Discovery Source	Proportion
News	33.33%
Peers	16.67%
Work/Training	16.67%
Family Member	11.00%
Social Media	11.00%
Others or unsure	11.33%

3. Review of Literature

Kandula (2020) researched Artificial intelligence as the simulation of human intelligence processes by machines, especially computer systems. Artificial Intelligence is present in our lives and is progressing with efficiency in modern times. Artificial intelligence provides a secure solution to ensure the integrity of online test system assessments in a cost-effective and scalable manner.

Artificial intelligence has applications in almost every field and education, in particular, it can help a lot both the teachers and the students be it in grading, revision, testing, or improving the learning capability of the students and giving additional support to those who are weak in particular subjects or students who can't learn properly in class or who just want a quick revision before an upcoming test it can help students no matter the stage they might be on.

Chen (2020) studied Artificial intelligence-aided education includes intelligent education, innovative virtual learning, and data analysis and prediction. Various techniques are incorporated into artificial intelligence systems for learning analysis, recommendation, knowledge understanding, and acquirement, based on machine learning, data mining, etc. The 3 main things in artificial intelligence in education are machine learning, learning analytics, and data mining. At the core of machine learning is knowledge discovery. It

can help create recommendations for students, then comes learning analytics that gives a better insight to the teachers of how the students are taking the classes whether they are understanding or not, and how the course is customized or changed according to the needs of a particular student.

4. Conclusion

This combination of behavioral analytics and anomaly detection makes it possible for organizations to identify and respond to social engineering rapidly. This is achieved through the real-time analysis of the behavior of systems and users to identify the subtle signs of social engineering occurring like phishing attempts, credential theft, or unauthorized access attempts [13,14]. For example, behavioral analytics and anomaly detection can be adjusted to the changeable threats by their automatic learning and updating of the models. Consequently, the true power of behavioral analytics and anomaly detection depends on the quality and applicability of the data applied for analysis. Organizations should give priority to the quality of their data, thus avoiding confusion arising from false positives and false negatives which may cause wrong interpretation [15]. Besides, the results of behavioral analytics and anomaly detection need context and human expertise to distinguish between legitimate anomalies and genuine security incidents. Notwithstanding the above, behavioral analytics coupled with anomaly detection provides a potent defense from social engineering attacks because it enables organizations to detect and block threats earlier in today's ever-changing cybersecurity terrain

5. References

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8.Conflict of Interest

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