AI in Education and Personalised Learning

Aastik Gupta
Amity University Punjab

Abstract- This paper presents the results of two studies examining the use of Artificial Intelligence in Education and Personalised Learning, as well as AI's impact on education. The data for the first study were collected from undergraduate students in their 2nd and 3rd years at the Faculty of Cybernetics, Statistics, and Economic Informatics. The survey was conducted online and distributed through social media groups, with a total of 91 students participating. The collected data were analysed both quantitatively and qualitatively. Responses suggest that many students believe AI will be beneficial in future education, and they also show that AI will have a significant impact on the education field. AI will completely change the way of teaching, learning and evaluation, and the results show that students and teachers will have new products, benefits and also face drawbacks with the arrival of AI. The findings also give some suggestions for the use of AI and how possible problems can be prevented. The data for the second study were also collected similarly. It was survey of 10000 people who are doing technical courses from diverse education levels and age groups was conducted to support research on adaptive learning systems, personalised education, and predictive student success modelling, which captures interaction logs from online education platforms, including student engagement, quiz performance, learning preferences, and chance of dropout.

Keywords: Artificial Intelligence, Education, Personalised Learning, Adaptive Learning

INTRODUCTION

AI has generated a lot of interest among researchers in recent years. This is due to the rise of generative AI tools like ChatGPT, Gemini, Copilot, and DeepSeek, among others. Digital Education has existed for a long time, but in 2020, online education became widespread due to the pandemic. However, most recently, AI is revolutionising the way education is delivered. The potential for AI in personalised learning and education will be huge in future, and the global AI education market in 2023 already expanded by 36% from 2022. It is expected that over 47% of the learning management systems will be AI-powered in the next few years. AI might completely take over the learning process of students. A personalised educational experience is only possible because of AI. Personalised learning is an educational technique that concentrates on individual students' learning and caters to their skills, needs, and interests. Thus, it promises to offer varied levels of experiences and also help the learners acquire knowledge, skills and understanding. This technique goes beyond earlier education, and many people support the view that learners could perform better learning when the teaching environment is customised.

PREVIOUS WORK

Many researchers have studied the role of AI in education and personalised learning, including a study conducted by Claned that outlined several points on the topic. They stated six key areas where AI will be used in future, which include Adaptive Learning, Targeted Interventions, Cognitive Tutoring Systems, Predictive Analytics, Dynamic Content Library and Enhanced Accessibility. The research suggests that perhaps the biggest opportunity AI offers for personalised learning is its ability to provide learners with adaptive learning options. AI-based platforms can analyse students' learning patterns, strengths, and weaknesses to deliver content that is tailored and suitable for their needs. The results indicated that students using the AI-powered adaptive learning model experienced a 62% increase in their test scores. AI tools also enable educators to identify and support students with various learning difficulties. Additionally, they proactively provide the additional support required, such as practice tasks or one-to-one tutoring. AI also offers cognitive tutoring systems that enable learners to interact virtually with the tutor, who provides one-on-one guidance in real-time. They also give them interactive problem-solving tasks and adapt

to their responses. AI will also use predictive analytics, which can assess student performance and have a good understanding of advanced problem areas. AI systems will also be able to predict future academic problems and provide suggestions based on the progress, level of engagement, environmental factors, etc. This will also give the teacher insight into learner feedback. Dynamic Content Library is another advantage of using AI; it is a learning system that presents content in various formats, like videos or simulation models. which can assist in creating educational content that is personalised for each student, which can be learner's progress and personality. Lastly, AI provides enhanced accessibility. AI is taking steps to break the barriers to education and provide an individualised approach for students who have different types of learning disabilities and needs. AI can give extra help to students with disabilities by using AI text to text-to-speech ability and natural language processing. AI can fulfil the needs of every learner and adjust the content based on the individual accessibility requirements.

Another study was done by UNESCO, which says that AI has the potential to address one of the biggest challenges today in education, innovative teaching and learning practices, and is working to fulfil the SDG-4, which aims to ensure inclusive and equitable quality education, and promote lifelong learning opportunities for all. However, rapid development of technology brings various risks and challenges. UNESCO is committed to supporting member states to harness the potential of AI for achieving the 2030 Agenda on providing equal and inclusive education. UNESCO wants a human-centred approach that can address the current inequalities related to knowledge, research and the diversity of cultural expressions, and ensure that AI doesn't cause a digital divide within and between countries. UNESCO wants AI to be accessible for all, and everyone should be aware of AI, and everyone can use it in education.

METHODOLOGY

The research methods used in this research are both quantitative and qualitative. There were two studies conducted, assessing different questions on the role of AI in education and personalised learning.

Participants

The first study shows the opinions from the undergraduate students in their 2nd and 3rd years at the Faculty of Cybernetics, Statistics, and Economic Informatics. A total of 91 students answered this survey. Most of the students who filled out this questionnaire were females from the 3rd Year. All three departments had a similar number of responses, with the Statistics and Economic Forecasting department students having the most responses.

The second study had 10000 people who enrolled on one of four online technical courses from various age groups and education levels. There were slightly more females who did this survey, and the majority of the people at least had an undergraduate education level, and most people were from Machine Learning and Cyber Security courses. The age range was from 15 to 49, and almost all ages had a similar number of responses. Other questions asked had similar responses regardless of their age.

Data Collection and Analysis

The data from the first study was gathered in the form of a survey by circulating the online form on social media groups. The survey was anonymous. This survey had questions regarding the impacts of AI, the use of AI in education, how useful it is, where it can be used, etc. The survey was completely objective with multiple-choice questions only. There was a total of 16 questions asked that included their details like Major, Year, etc. In order to obtain relevant data, the following five questions were asked that were related to the use of AI in education:

- On a scale of 1 to 10, how useful do you think AI would be in the educational process? (1- not useful at all, 10-extremely useful)
- What do you think is the main advantage that AI would have in the teaching process?
- What do you think is the main advantage that AI would have in the learning process?
- What do you think is the main advantage that AI would have in the evaluation process?
- What do you think is the main disadvantage that AI would have in the educational process?

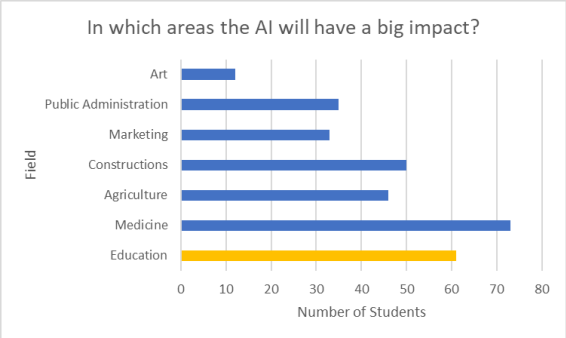
The data for the second research was also gathered anonymously; it was a larger sample of data. This dataset was designed to support research on adaptive learning systems, personalised education, and predictive student success modelling. There were four goals that this study wanted to find out: developing AI-driven adaptive learning models, analysing student engagement and performance patterns, predicting dropout likelihood based on learning behaviour, and designing personalised educational content. Several questions were asked regarding the learning style, time spent, exam scores, etc. Here are all the questions that were asked regarding their progress:

- Time_Spent_on_Videos (mins) – Total minutes spent watching videos
- Quiz_Attempts – Number of attempts per quiz
- Quiz_Scores (%) – Percentage score in quizzes
- Forum_Participation (posts) – Number of forum discussions participated in
- Assignment_Completion_Rate (%) – Percentage of completed assignments
- Engagement_Level – Low, Medium, High (Based on activity metrics)
- Final_Exam_Score (%) – Percentage score in the final exam
- Learning_Style – Visual, Auditory, Reading/Writing, Kinesthetic
- Feedback_Score (1-5) – Student rating of the course
- Dropout_Likelihood (Yes/No) – Whether the student is likely to drop out

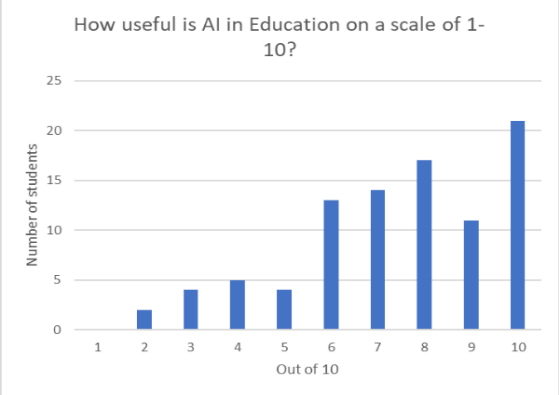
Once all the data was gathered, it was visualised in the form of graphs and summarised in the form of tables to understand the most popular answers and also the least popular ones. This method was able to analyse trends and patterns across different categories.

RESULTS

The findings from both studies were then analysed in the form of graphs and tables to understand them more easily. The findings are shown below:

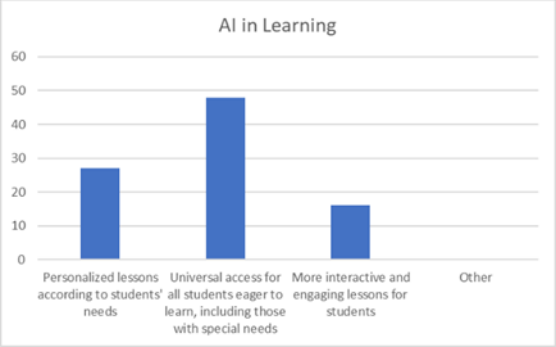


Graph A

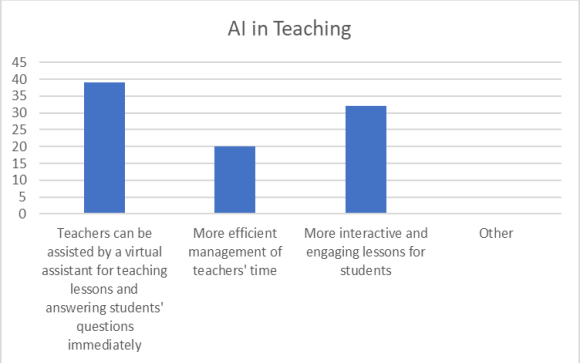


Graph B

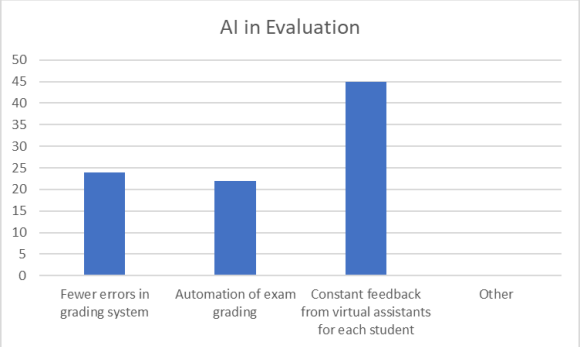
These are two of many questions asked in the first study. The results from Graph A show that 61 students said that AI will have a big impact on the education field, which is the second most popular response. And the results from Graph B show how useful AI will be in education; the majority of the students have rated it higher than 5, and more than half have answered between 8 and 10, which shows that AI is highly useful in education, and it also shows AI can be highly popular in the upcoming years.



Graph C



Graph D



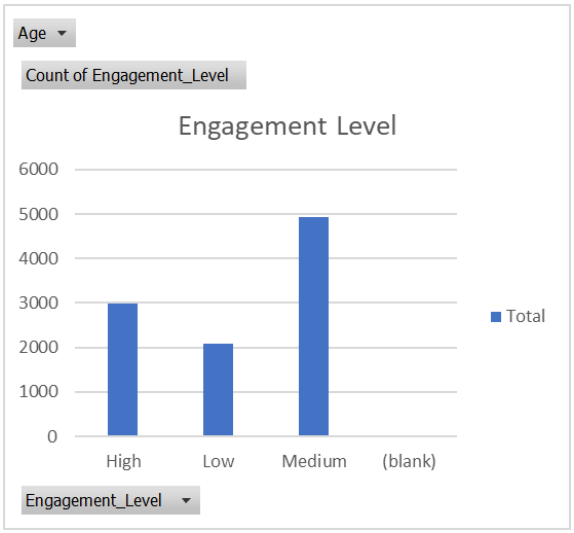
Graph E

These graphs show the advantage of having AI in Teaching, Learning and Evaluation processes.

Graph C shows the advantages that AI will have in learning. The majority of the students say that AI will give universal access for all students eager to learn, even those with special needs. This suggests that AI will make education more inclusive and accessible, which can increase the global literacy rate. A significant number of people also say that it will provide personalised lessons according to the needs of the students, which will increase their progress, and can help them perform well in academics and beyond. A few people say that AI will give more interactive and engaging lessons, which increases the motivation for learners to learn.

Graph D shows the advantages that AI will have in teaching. In this case, the majority say that AI will allow teachers to be assisted by a virtual assistant for teaching lessons and answering questions instantly, and also, a good amount of people say that AI will give more interactive and engaging lessons for the students, just like in the learning process, and this will increase the lesson output, and the learners will have a better understanding of the topics covered. A few people also say that AI will make time management more efficient for the teachers, which can increase the learning outcomes of the students.

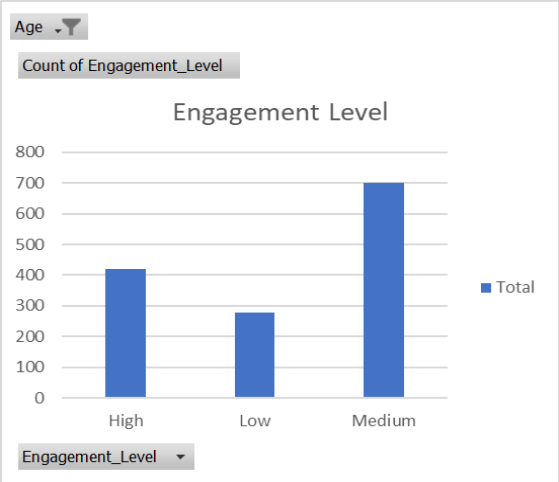
Graph E shows the advantages that AI will have in evaluation. The graph shows that nearly half of the students say that AI will provide constant feedback from virtual assistants for each student. This will allow parents and teachers to track the progress of the learners, and then they can focus on the strengths and cover the weaknesses. It will help the parents, teachers, and students understand their potential through the feedback provided. A significant number of individuals also say that it will provide fewer errors in the grading system and automation of exam grading. AI marking will be unbiased, and since it is automated, it will not make errors in marking, so this gives a more authentic evaluation, and automation of exam grading will allow teachers to focus on improving their teaching and focus on their students, making it quick and efficient. AI will take a shorter time to grade the assessments than manual grading, which can take hours or days.



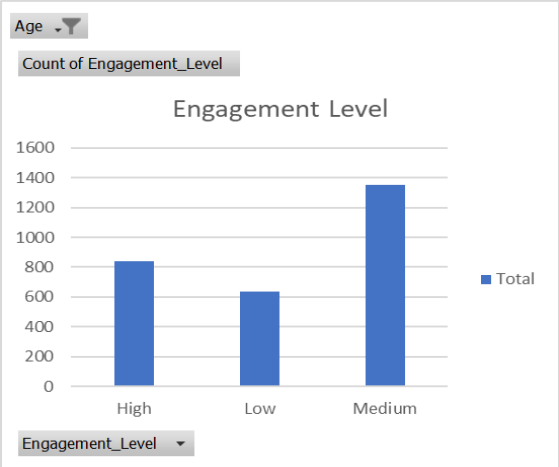
Graph F

In the second study, we want to analyse student engagement and performance patterns along with the dropout likelihood based on the learning behaviour. A question asked in the survey regarding the engagement level of the learners is presented on Graph F, which shows the engagement level of people in the online personalised course they enrolled in, which is very similar for all age groups. The majority have medium

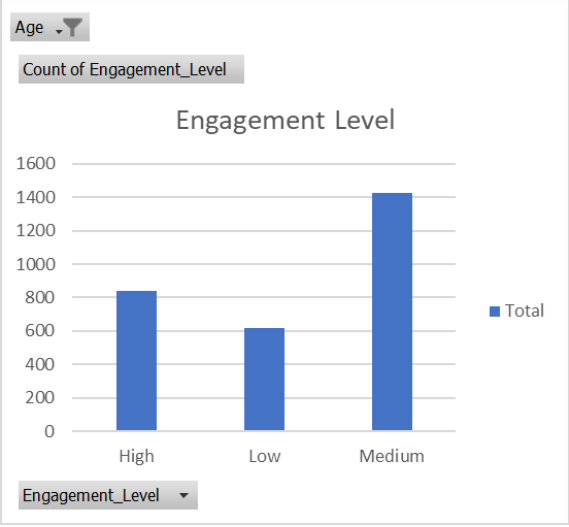
level, a significant number of people have high level engagement, and about 20% of the people have low engagement levels.



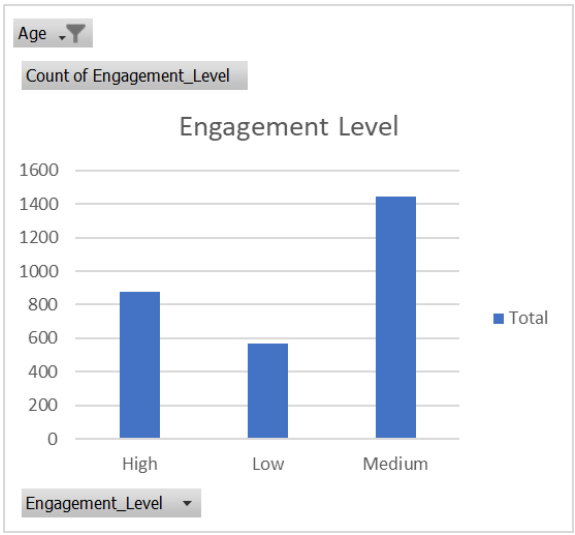
Graph G



Graph H

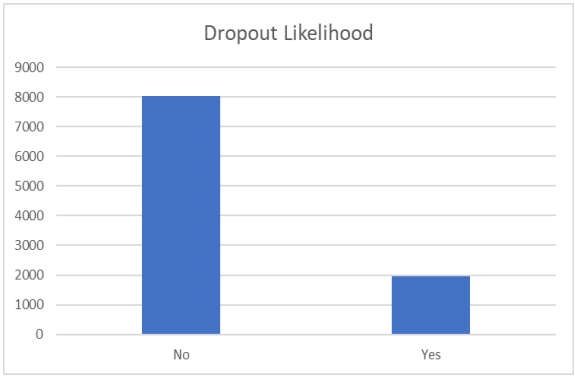


Graph I



Graph J

These four graphs show the engagement level of individuals with different age groups. Graph G shows the engagement level of teenagers, Graph H shows the engagement level of people in their 20s, Graph I represents people in their 30s, and Graph J represents people in their 40s. This shows that teenagers and people in their 40s slightly higher engagement level than those in their 20s or 30s. So, this shows that the older demographic is equally using AI in personalised learning. But overall, the majority have medium to high engagement levels.



Graph K

The Graph K shows that the dropout likelihood of the learners, which is less than 20%, shows that the personalised learning model is working successfully for the majority of the people. The dropout likelihood is similar for all categories. Based on the entire learning behaviour, the dropout likelihood is nearly 20% for all categories, whether the time spent is lower or higher, the learning style is visual or auditory, the

forum participation is lower or higher, the chance of dropout is 20% overall. This shows that there is a good future for the adaptive learning model.

CONCLUSION

The picture that emerges from the analysis of the collected data regarding the use of AI in Education and Personalised Learning is relatively encouraging, because more than half of the people in the first survey say that AI is beneficial for education in the upcoming years. A question in the first survey was also asked about how familiar the students are with AI, and nearly everyone rated at least 4 out of 10. This shows that almost everyone knows what AI does, and this survey was done over two years ago, when AI was not as widespread as it is now. Now, due to the emergence of LLMs (Large Language Models) like ChatGPT, everyone has started using AI, and especially in education, it has become highly popular, since it can generate content in simple language, solve assignments, help identify calculation and programming errors, and a lot more. AI has the potential to revolutionise education by making it more individual, accessible, engaging, and efficient, but challenges like privacy concerns and ethical questions remind us to proceed carefully. Also, AI is based on data, so the data could be biased, and lastly, there are implementation costs. By prioritising accessibility, carefully balancing innovation with ethical considerations and protecting the students' rights, AI can definitely harness the power to create a more inclusive and effective experience for all learners.

FUTURE WORK

Harnessing the full potential of AI in education requires continuous research and monitoring to ensure its effectiveness and sustainability. There is still research going on regarding this, and it will continue in the upcoming years.

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