Project Albus

Evidence on the potential of AI in Promoting Student Satisfaction and its Subsequent Impact on Learning Outcomes

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Project Albus is a distinguished digital transformation initiative, undertaken by Dalberg, in collaboration with Google for Education, to rigorously evaluate and demonstrate the educational benefits and scalability of Google's tools in pilot schools across the APAC region, supported by leading academics and stakeholders. In a bid to determine such benefits and scalability, our team undertakes independent research to broadly understand the potential of leveraging technology, including artificial intelligence, to improve teaching and learning outcomes.

As a part of this research brief, we have studied existing evidence on the multifaceted role of AI in improving student well-being, and its role in further enhancing academic performance.

There is growing evidence which suggests that leveraging AI in education can boost student's motivation, reduce frustration, increase satisfaction, thus improving overall emotional well being.

- Specifically, AI has shown to develop students' emotional wellbeing through personalised and intelligent tutoring, and adaptive learning.
    - In one of MIT Media Lab project, it was found that personalization of learning materials by adding relevant context, using AI, can foster a deeper connection of the students to the material, enhance their perception of the learning experience, thus boosting their levels of intrinsic motivation[1].
    - Moreover, AI intelligent tutoring systems have been proven to reduce students' anxiety by 20%[2]. This reduction is attributed to the system's ability to provide personalised feedback and support, creating a more supportive and less stressful learning environment. Thus, such AI tutoring systems help students manage learning challenges more effectively, thereby enhancing their overall well-being and thus academic performance.
    - Research indicates that adaptive learning platforms can increase student's enjoyment levels, as compared to traditional methods[3]. For instance, in one of the studies, it was found that 89% of the students using adaptive quizzes 'enjoyed' completing the quizzes, with 85% agreeing that receiving immediate feedback at the end of each quiz emerged as crucial for motivation[4].
- Gamified elements, such as points, badges, and leaderboards, which leverage AI to personalise challenges and rewards based on individual student progress, have shown to foster a sense of achievement and motivate continuous participation among students. Studies have shown that AI-led gamification can increase student satisfaction by 94%, as it transforms traditional learning activities into engaging, game-like experiences[5].
    - In particular, AI characters which blend learning experiences with fictional characters and narratives have proved to enhance student enthusiasm. For instance, VR experiences that allow students to embody successful figures have shown to reduce stereotype threats and boost self-confidence, thereby improving both academic performance and emotional resilience[6].

[1] Leong et al,Putting Things into Context: Generative AI-Enabled Context Personalization for Vocabulary Learning Improves Learning Motivation, 2024
[2] Hurix Digital, AI and Student Engagement: Fostering Interactive Learning Experiences, 2024
[3] Journal of Education Review Provision, The Effectiveness of Adaptive Learning Systems in Personalized Education, 2022
[4] Ross et al, Adaptive quizzes to increase motivation, engagement and learning outcomes in a first year accounting unit, 2018
[5] Hurix Digital, AI and Student Engagement: Fostering Interactive Learning Experiences, 2024
[6] Leong et al, Using Generative AI to Cultivate Positive Emotions and Mindsets for Self-Development and Learning, 2023

    - Furthermore, social rewards or praise from artificial entities such as robots and virtual agents have shown to enhance students' motivation and task performance[7].
- By boosting efficiency and saving study hours, e.g. through quicker assignment completion, AI systems allow students to engage more extensively in other extra curricular activities, including outdoor activities, which have been proven to have a significant positive impact on the improving wellbeing and reducing anxiety among students[8].
- Additionally, by freeing up 20-30%[9] of a teacher's time on routine administrative tasks to focus on core-teaching activities, deploying AI systems in classrooms can enable teachers to foster one-on-one relationships with students, encourage self-regulation and perseverance, and help students collaborate with each other. Research shows that strong relationships with teachers promote student learning and well-being, especially for students from low-income families[10].
- Furthermore, research indicates that automated, real-time feedback from AI-powered assessments can reduce the anxiety associated with waiting for test results. Automated scoring systems provide clear and consistent criteria, which can increase students' trust in the assessment process and reduce concerns about bias or unfair grading.
- AI can play a crucial role in identifying students who may be at risk of emotional or academic difficulties. By analysing patterns in student behaviour, performance, and interactions, AI systems can flag potential issues early on, enabling educators to intervene before these issues escalate[11].
- Further, AI-powered social-emotional learning in classrooms can be used for improving collaboration and conflict-resolution skills among students, especially in inter-cultural settings, thus leading to improved student satisfaction.
    - AI tools that incorporate collaborative learning scenarios help students practise teamwork and communication skills. These tools can simulate group activities where students must work together to solve problems, promoting collaboration and effective communication[12].
    - A study published in the Journal of Educational Psychology found that AI tools facilitating social-emotional learning (SEL) led to reduced instances of bullying and aggression, contributing to a better classroom climate and overall student well-being[13].

Further, studies consistently show that students who report higher levels of emotional well-being tend to perform better academically.

This positive correlation can be attributed to several factors, including improved concentration, higher levels of motivation, and better relationships with peers and teachers.
- Research in the Journal of Happiness Studies found that positive emotions broaden students' thought processes, making them more open to new ideas and improving their overall learning efficiency.
- A study published in the Journal of Educational Psychology found that students with higher emotional well-being were better able to manage their time, set realistic goals, and maintain focus during exams, resulting in better academic outcomes.

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[7] Pataranutaporn et al, AI-generated characters for supporting personalised learning and well-being, 2021
[8] Finnerty at al., https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8274476/, 2021
[9] McKinsey, How artificial intelligence will impact K–12 teachers, 2020
[10] McKinsey, How artificial intelligence will impact K–12 teachers, 2020
[11] Abbas et al., Enhancing Student Engagement through AI-driven Analytics in Higher Education Institutions, 2024
[12] Yale School of Medicine, Research Finds Social and Emotional Learning Produces Significant Benefits for Students, 2023
[13] American Psychological Association, Journal of Educational Psychology, 2024