Research Article

AI Tutors vs. Human Teachers in Punjab: Complementary Allies or Educational Competitors?

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Abstract

The field of education has been invaded by Artificial Intelligence (AI). It provides individualized tutoring, platform's adaptive learning and instant comments. In regions of India such as Punjab where identified urban-rural disparities exist in education, the AI tutors have served as supplementary sources to human-based education. This paper examines the answer to the question, are AI tutors helpful or threaten human teachers, and looks into the aspects of accessibility, effectiveness, and student and educator perceptions. The responses to this are mixed in terms of a quantitative survey of 600 students and 150 teachers in higher secondary schools and colleges of Punjab. The results also show that two-thirds of students consider the support of AI tutors valuable, namely, in more technical areas, as they help them prepare their exams, even when they are not even in class (24/7 customer availability). On the other hand, 72% of educators note that AI technology is insensitive to culture, lacks the emotional relationship and the capacity to change, which are all critical in the holistic learning. Although AI reduces the cost of additional coaching and opens more opportunities in rural communities, the insufficient ability to solve tricky questions and promote motivation remains apparent. The researchers draw a conclusion that AI tutors cannot be used to substitute human teachers but can be helpful when implemented in hybrid format. The policymakers and institutions would be advised to target on developing governance structures, educating teachers, and developing culturally sensitive AI tools to make sure that there is a balanced incorporation of AI-based technology into the education system of Punjab.

Keywords: AI tutors, human teachers, Punjab education, hybrid learning, personalized learning, educational technology, teacher-student interaction.

Introduction

Artificial Intelligence (AI) has already found its way into classrooms, both in adaptive learning modes such as Byju and Toppr, and also in chatbots like ChatGPT [1]. The tools provide individualized on-demand learning. They will solve the key issues of traditional education systems, including teacher shortage, time constraint and access to subject specialists [2]. Studies throughout the globe have demonstrated that AI tutors have the potential to make students more engaged as well as enhance test scores, particularly in such disciplines as mathematics, science and language acquisition [3]. In Punjab, the rates of education between urban and rural locations are defined by high differences. Government schools tend to have large student-teacher ratio, lack of subject specialists and insufficient support [4].

On the contrary, technology-driven solutions are more widespread in the sphere of private schools [5]. AI tutors pose the opportunities and concerns in this environment. They enhance learning resources access and reduce the use of costly personal coaching [6]. Nevertheless, they too raise controversies concerning their effectiveness and the effect they have on teaching profession [7]. The key issue to wonder is whether AI tutors are supposed to be regarded as an addition to the human teachers, enriching their skills and expertise, or as an adversary threatening their work [8]. To comprehend this, it is necessary to consider a number of aspects: accessibility, cost, learning outcomes, inclusiveness, ethical issues [9]. Punjab with its hybrid rural and urban education environment is a useful case study. The study examines the perception of students and teachers towards AI tutor and human teacher through quantitative survey information in Punjab. Through the analysis of these two

weaknesses and strengths it is the purpose of this paper to provide information on whether competition or collaboration between AI and human teaching is the future of education in Punjab State, India.

Thus, the present study aimed to (1) Assess how accessible AI tutors are compared to human teachers in Punjab (2) Examine the cost-effectiveness and affordability for different groups of students, (3) Compare the effectiveness of AI tutors with human teachers regarding learning outcomes, (4) Analyze teachers' views on AI as competition or support, (5) Identify challenges such as algorithmic bias, inclusivity, and a lack of emotional intelligence and (6) Suggest recommendations for a balanced inclusion of AI tutors in Punjab's education system.

Materials and methods

Chemicals and biochemicals

Fungal α-amylase of *Aspergillus oryzae*, Zinc acetate dihydrate, Glutaraldehyde, Potassium dihydrogen phosphate, Yeast extract, Peptone,

Data and Methodology

This research is a mixed-methods study, mostly quantitative. As shown in **Fig. 1,** the information was collected using structured surveys conducted during February to April 2025 in five Punjab districts; Ludhiana, Amritsar, Jalandhar, Patiala and Bathida, India.
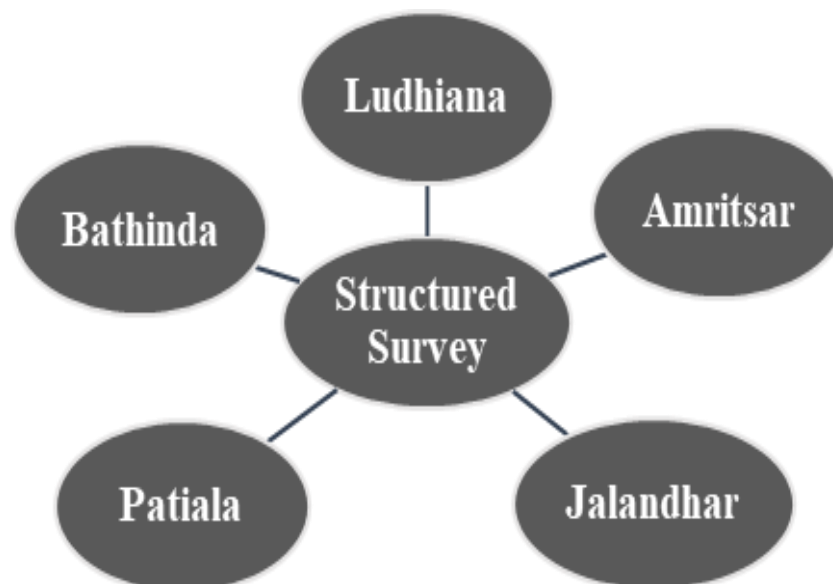

Fig. 1. Data Collection places in India during February-April 2025

Sample

Students (n=600): Higher secondary (XI-XII) and undergraduate students of both governmental and non-governmental schools. Teachers (n=150): STEM, social science and humanities subject teachers.

Survey Design

The student survey was oriented at accessibility, cost, perceived effectiveness and satisfaction with AI tutors relative to human teachers [10]. Educators received questions regarding their experiences, their attitudes towards the integration of AI, and the issue of losing their jobs [11].

Data Analysis

The data were interpreted via descriptive statistics- percentages and mean scores, and comparison between AI and human instruction [12]. Thematic analysis was followed on open-ended responses of teachers in order to identify concerns that quantitative data could not have revealed.

Secondary Sources

The information was complemented with the reports of Ministry of Education, UNESCO, and the literature on AI in education, which guarantees wider context and confirmation of the research [13].

Results and discussion

Survey findings as per **Fig. 2** revealed that 74% of rural students in Punjab relied on AI tutors as their primary after-school resource due to a shortage of subject experts [14], with platforms such as Byju's and Khan Academy being used by 58% at least three times a week [15] while urban students mostly used AI tools to supplement private tutors [16], indicating improved accessibility though challenges like poor internet connectivity, reported by 29% of rural students, remain significant [17]. In terms of cost, private tutoring, often priced at ₹2,000–₹5,000 per month, proved unaffordable for many families, whereas AI platforms offered lower-cost subscriptions ranging from ₹500 to ₹1,200, with some free options [18], making them attractive to 64% of government school students; however, 41% of teachers highlighted misalignment between AI tools and the Punjabi curriculum [19].

Effectiveness varied across contexts, with 68% of students finding AI particularly useful for repetitive practice, MCQs, and math problem-solving [20], though 52% noted its lack of depth compared to human teachers, and subjects such as history and philosophy remained strongly in favor of human instruction [21]. Inclusivity emerged as a major concern, since only 23% of students could access content in Punjabi and teachers observed that adaptive platforms frequently assumed prior English proficiency [22].
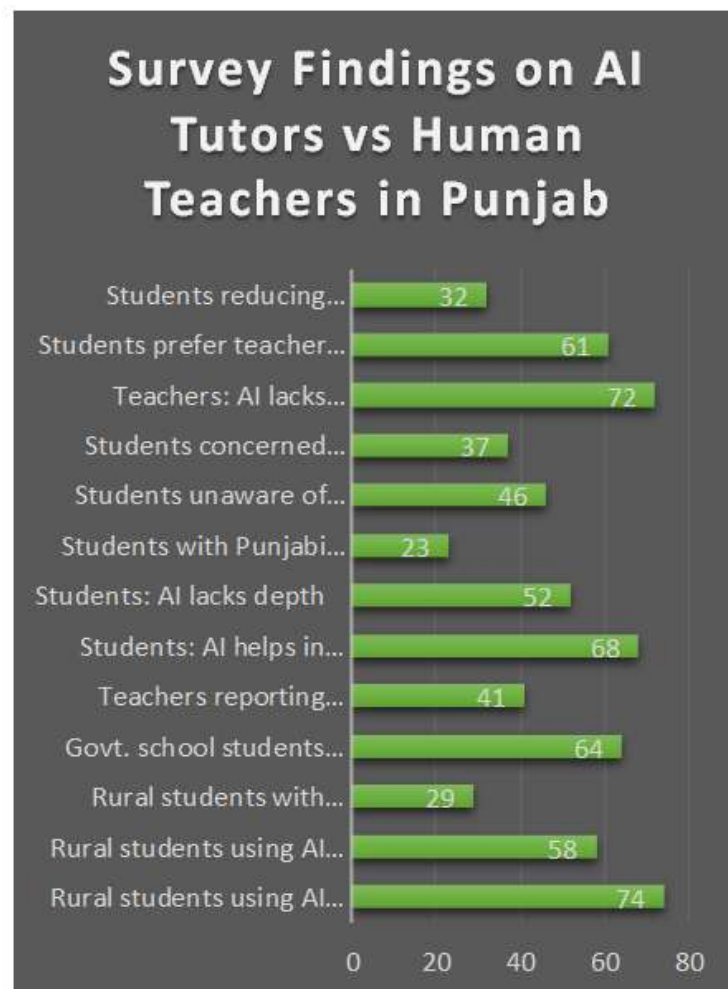

Fig. 2. Survey findings on AI tutors versus human teachers

Privacy concerns were also evident: 46% of students were unaware of data storage practices, 37% expressed worry over misuse of personal information, and teachers advocated for stronger data protection regulations [23]. Equally important was the human empathy gap, with 72% of teachers and 61% of students stressing that AI tutors lacked the ability to provide motivation, emotional support, or mentorship [24], leading to lower confidence compared to human guidance. Over-reliance was another challenge, as 32% of urban students admitted reducing face-to-face interaction with teachers due to AI use [25] risking depersonalized learning and fewer opportunities for collaboration. Despite these

challenges, both teachers and students strongly supported hybrid models, with 67% of teachers favoring AI tutors as supplementary tools provided clear guidelines, curriculum alignment, and training were ensured [26], highlighting the urgent need for state-level governance frameworks that balance innovation with ethical considerations. The strength and limitations of AI tutors, essential role of human teachers and future of hybrid models are described in **Fig. 3.**
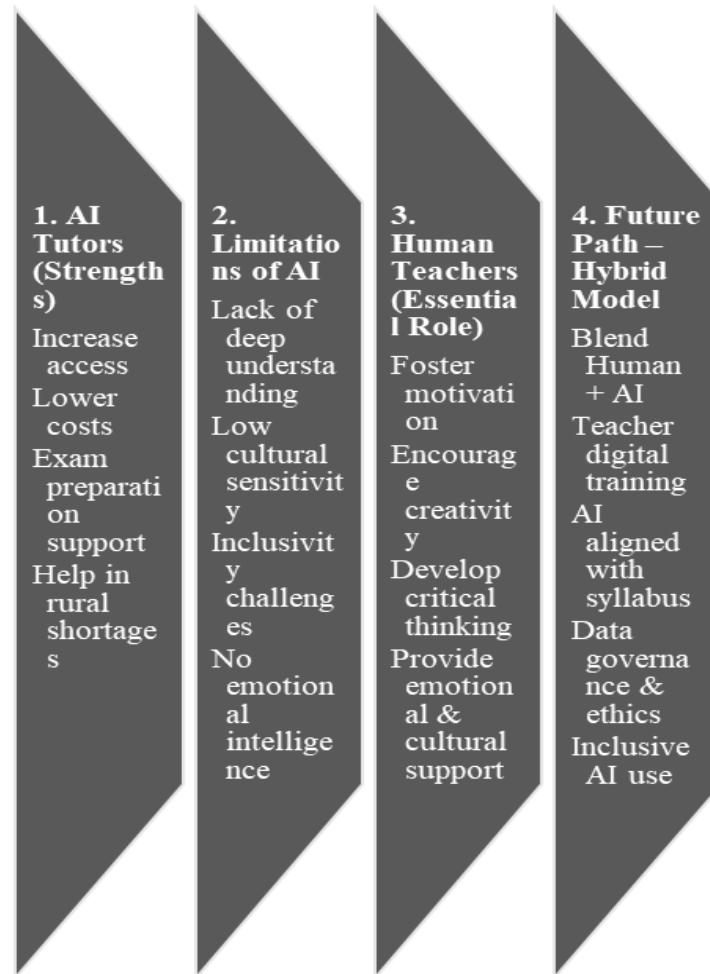

Fig. 3. AI Tutors in Punjab's Education System

Conclusions

The AI tutors are mainly serves as supplements to human teachers. They increase access, lower costs, and help with exam preparation, especially in rural areas facing teacher shortages. However, limitations in understanding, cultural sensitivity, inclusivity, and emotional intelligence mean AI cannot replace human educators. Teachers remain essential for fostering motivation, creativity, and critical thinking. The future of education in Punjab relies on hybrid models that blend human and AI support. Policymakers should concentrate on teacher training for digital integration, aligning AI platforms with the syllabus, and establishing strong data governance. By promoting ethical and inclusive AI use, education in Punjab can achieve both technological growth and human-centered development.

Conflict of interest

The authors declare no conflict of interest.

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