Artificial Intelligence in Education: Benefits and Challenges

Shrutika Sunil Kaduskar[1], Shivani Subodh Chikhale[2], Swaraj Sanjay Malve[3]
[1,2,3]*Jai Hind College of Research and Management*

***Abstract*—Artificial Intelligence (AI) is now part of everyday teaching and learning. Tools such as intelligent tutoring systems, chatbots, automated grading, and learning analytics are used in schools and universities around the world. These tools can personalise learning, give quick feedback, widen access, and reduce routine work for teachers. At the same time, they raise serious concerns about data privacy, algorithmic bias, high costs, unequal access, academic dishonesty, and over-dependence on technology. This paper reviews the main benefits and challenges of AI in education using published research and policy reports, and it proposes a simple survey-based method to study how students and teachers view these tools. The paper presents a conceptual framework, a comparison of benefits and challenges, a literature review table, and a ready-to-use research design. The study aims to help educators and policy makers adopt AI in a careful, fair, and human-centred way.**

I. INTRODUCTION

Education is changing quickly because of digital technology. Over the last decade, AI has moved from research laboratories into classrooms, learning apps, and school offices. Students use AI-based apps to practise languages, solve problems, and get instant answers. Teachers use AI to prepare material, check assignments, and find students who need extra help. Institutions use AI to study attendance, performance, and dropout risk.

The growth of generative AI tools has made this change even faster. A student can now ask a question in plain language and receive a detailed answer within seconds. This creates new chances for learning, but it also creates new problems. Teachers worry about copying and loss of original thinking. Parents worry about children's data. Policy makers worry that only well-funded schools will gain from the technology, which may widen the gap between rich and poor learners. Because of these mixed effects, it is important to look at AI in education in a balanced way. This paper does not treat AI as either a perfect solution or a threat. Instead, it studies where AI helps, where it creates risk, and what conditions are needed for its safe and fair use.

II. PROBLEM STATEMENT

AI tools are being adopted in education faster than the evidence, rules, and teacher training needed to support them. Many institutions use these tools without a clear understanding of their real benefits for learning or their risks to privacy, fairness, and academic honesty. There is a need for a clear and simple study that brings together the benefits and challenges of AI in education and checks how learners and teachers actually experience them.

III. OBJECTIVES

The main objectives of this research are:

1. To understand the main types of AI tools used in education.
2. To identify the major benefits of AI for students, teachers, and institutions.
3. To identify the major challenges and risks linked with AI in education.
4. To review earlier research and find gaps that still need attention.
5. To design a survey-based method for studying student and teacher opinions about AI.
6. To suggest practical guidelines for responsible use of AI in education.

IV. LITERATURE REVIEW

Earlier studies show that AI in education has grown from simple computer-based tutoring programs to advanced systems that adapt to each learner. Table 1

summarises ten important works. These works are reviewed in my own words from the cited sources, and every entry should be checked against the original document before submission.

Table 1: Summary of Selected Literature

Sr.	Author & Year	Focus	Main Finding	Research Gap
1	VanLehn (2011)	Intelligent tutoring vs. human tutoring	Reviewed many studies and found that computer tutors can come close to human tutors in effect on learning.	Mostly limited to a few subjects and controlled settings.
2	Luckin et al. (2016)	AI and teaching	Argued that AI can support personalised learning and free teachers from routine tasks.	Limited classroom evidence of long-term results.
3	Holmes, Bialik & Fadel (2019)	Promises and implications of AI	Explained how AI can support teaching and what questions it raises for schools.	Few practical guidelines for school-level use.
4	Baker & Smith (2019)	Types of AI in schools	Described the main kinds of educational AI and warned against exaggerated claims.	Need for more independent evaluation of products.
5	Zawacki-Richter et al. (2019)	AI in higher education	Systematic review of studies; found that educators were rarely involved and ethics were seldom discussed.	Weak teacher participation and ethical analysis.
6	Chen, Chen & Lin (2020)	AI applications in education	Reviewed how AI is used in administration, instruction, and learning.	Little attention to developing-country contexts.
7	Williamson & Eynon (2020)	History and future of AI in education	Showed links between past and present AI work and raised issues of power and data.	Needs more empirical studies on real use.
8	Selwyn (2019)	Teachers and automation	Questioned whether AI should replace teachers and discussed social limits.	More research on teacher–AI cooperation.
9	UNESCO (2021)	Policy guidance	Offered guidance on planning, ethics, and inclusion for AI in education.	Hard to apply in low-resource schools.
10	Kasneci et al. (2023)	Large language models	Described opportunities and risks of tools like ChatGPT for learners and teachers.	Long-term effect on learning and integrity unclear.

The review shows three trends. First, AI can improve learning support, especially through adaptive tutoring and quick feedback. Second, many studies are descriptive and focus on technology instead of learners and teachers. Third, ethical and equity issues are discussed less often than technical performance.

V. RESEARCH GAP

From the literature, it can be seen that AI tools are widely promoted, but several gaps remain: (a) limited evidence on long-term learning results, (b) low involvement of teachers in the design and study of AI

tools, (c) limited attention to privacy, bias, and access, and (d) few studies that compare how students and teachers see the same tools. This study addresses these gaps by combining a literature synthesis with a simple survey design that includes both groups.

VI. BENEFITS AND CHALLENGES OF AI IN EDUCATION

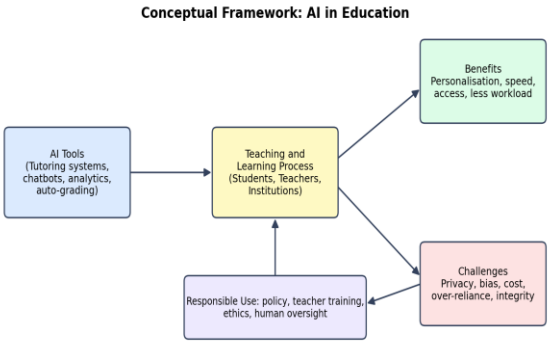

Figure 1: Conceptual framework of AI in education

A. Main Types of AI Tools

Table 2: Common AI Tools Used in Education

Tool Type	What It Does	Example Use
Intelligent tutoring systems	Gives step-by-step help and adjusts to the learner	Practice in mathematics or science
Chatbots and virtual assistants	Answer questions at any time	Student queries about courses
Generative AI tools	Create text, summaries, and explanations	Drafting, idea generation, explanation
Automated assessment	Checks answers and gives feedback	Quizzes, short-answer scoring
Learning analytics	Studies learner data to find patterns	Early warning for dropout risk
Language and accessibility tools	Translate, read aloud, convert speech to text	Support for learners with special needs

B. Benefits

- Personalised learning: AI can adjust the pace and difficulty to each learner, so slow and fast learners are both supported.
- Instant feedback: Learners get answers and corrections quickly, which helps them fix mistakes early.
- Reduced teacher workload: Marking, scheduling, and routine messages can be automated, giving teachers more time for teaching and mentoring.
- Wider access: Translation, speech tools, and online tutors can help learners in remote areas and learners with disabilities.
- Early identification of struggling students: Analytics can warn teachers before a student fall far behind.
- Support for self-study: Learners can practise and revise at any time, outside school hours.

C. Challenges

- Data privacy and security: AI systems collect large amounts of learner data, which must be stored and used safely.
- Bias and fairness: If the training data is biased, the tool may treat some groups unfairly.
- Digital divide: Learners without devices or internet cannot benefit, which can increase inequality.
- Academic integrity: Generative AI can be used to copy work, making it hard to judge a learner's real ability.
- Over-dependence: Heavy use may reduce critical thinking, writing, and problem-solving practice.
- Accuracy and reliability: AI tools can give wrong or made-up answers with confidence.
- Cost and training: Tools, infrastructure, and teacher training require money and time.
- Reduced human contact: Teaching also involves care, motivation, and social learning, which AI cannot fully replace.

Table 3: Comparison of Benefits and Challenges

Area	Benefit	Related Challenge
Learning	Personalised support and instant feedback	Risk of over-dependence and wrong answers
Teaching	Less routine work	Need for training and new skills
Access	Support for remote and special-needs learners	Digital divide and cost

Area	Benefit	Related Challenge
Assessment	Faster, consistent marking	Bias and academic dishonesty
Management	Better planning through data	Privacy and misuse of data

Part D: Perceived Challenges

- I worry about the privacy of my data.
- AI answers are sometimes wrong.
- AI use may encourage copying.
- AI may reduce my own thinking and writing skills.
- Not everyone has equal access to AI tools.
- My institution has clear rules for AI use.

VII. PROPOSED METHODOLOGY

The study follows a mixed approach: a literature synthesis followed by a questionnaire survey of students and teachers. Figure 2 shows the steps.

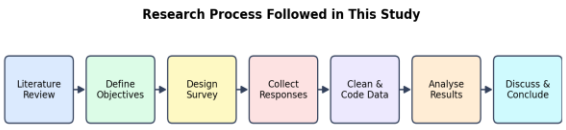

Figure 2: Research process

1. Research Design

A descriptive, cross-sectional survey design is used. It collects opinions at one point in time and is suitable for a first study on this topic.

2. Population and Sample

The target population is students and teachers of schools or colleges that use or may use AI tools. The researcher should record the sample size (n = ___ students and ___ teachers), the sampling method (for example, convenience or stratified sampling), the institution type, and the time period of data collection.

3. Data Collection Tool

A structured questionnaire with a five-point Likert scale (1 = Strongly disagree to 5 = Strongly agree) is used. It has four parts: (A) background information, (B) use of AI tools, (C) perceived benefits, and (D) perceived challenges. The questionnaire is given in Appendix A.

4. Reliability and Ethics

Reliability of the scales will be checked using Cronbach's alpha. Participation is voluntary and anonymous, no personal identifiers are collected, and participants are told the purpose of the study before they answer. Approval from the institution or ethics committee should be obtained where required.

5. Data Analysis Plan

Responses will be coded and analysed using descriptive statistics (frequency, percentage, mean, standard deviation). Differences between students and teachers can be tested using an independent-samples t-test or Mann–Whitney U test, and relationships between variables using correlation or chi-square tests, depending on the data.

Table 4: Research Phases

Phase	Activity	Output
1	Literature review	Summary table and research gap
2	Questionnaire design	Validated survey form
3	Data collection	Raw response file
4	Data cleaning and coding	Clean dataset
5	Statistical analysis	Tables and charts
6	Discussion and recommendations	Final conclusions

VIII. RESULTS AND DISCUSSION

This section is to be completed with the researcher's own survey data. No figures are included here because invented numbers would not be valid research. After data collection, replace the blank cells below with the values from your own analysis and write the discussion based on them.

Table 5: Profile of Respondents (to be filled from collected data)

Group	Number of Respondents	Percentage (%)
Students		
Teachers		
Total		

Table 6: Perception of Benefits and Challenges (to be filled from collected data)

Statement (short form)	Mean	SD	Agree (%)
AI helps me learn at my own pace			
AI tools save time in study or teaching			
I am worried about privacy of my data			
AI may reduce original thinking			
My institution needs clear rules for AI use			

Suggested Discussion Points

- Compare the highest- and lowest-rated benefits and challenges, and explain what they suggest.
- Compare students and teachers: do they agree on the risks?
- Link the findings with the literature in Table 1 and state where your results agree or differ.
- State limitations such as sample size, sampling method, and self-reported answers.

IX. RECOMMENDATIONS

- Use AI as a support for teachers, not a replacement.
- Train teachers and students in AI literacy, including how to check AI answers.
- Adopt clear policies on data protection and acceptable use of AI in assignments.
- Choose tools that are tested for fairness and accuracy, and keep human review in important decisions such as grading.
- Provide devices and internet access so that AI does not widen the digital divide.
- Design assessments that value reasoning, discussion, and original work.

X. CONCLUSION

AI offers real benefits for education, including personalised learning, faster feedback, wider access, and lower routine workload. However, it also brings risks related to privacy, bias, inequality, academic honesty, and over-reliance. The best results are likely when AI is used under human guidance, with clear rules, trained teachers, and fair access for all learners. Future work can test the proposed survey design with real participants, include long-term studies on learning outcomes, and study AI use in low-resource settings.

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