The Alteration of Lecture-Based Pedagogy Through Generative AI and a Proposed Ethical Framework for AI Detection Tools: A Mixed-Methods Study from the Perspectives of Students and Teachers in Secondary and Higher Secondary Education in Urban Bangladesh

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Research Question

This research proposal is centered around two primary questions,
RQ1: How might the lecture-based pedagogical methods within the traditional education system change with the integration of generative artificial intelligence in secondary and higher secondary schools?
RQ2: What might be an effective ethical framework to use AI detection tools to evaluate submission-based curricular works as perceived by the students and teachers?

Introduction

With the rapid implementation of generative artificial intelligence in various fields, education has been a primary focus for AI engineers and educators as reflected by the increasing number of academic publications and studies regarding AI in education. [4] [5]. Ai's revolutionary potential to increase productivity by reducing the usual pedagogical workload and creating an efficient and personalized educational environment has popularized its usage. [5] [6] However, AI's implementation into education has raised academic and ethical challenges, including the potential impact on students' self-reliance, critical thinking and the risk of overdependence. [5] Ethical questions, including the violation of data privacy, plagiarism, and cheating, further complicate the issue. [3]

This research proposal aims to analyze and provide a basic structure for Bangladeshi educational institutions for AI integration and develop an ethical framework for the use of AI detectors in student evaluations through the perspectives of the students and teachers.

Literature Review

Studies show that generative AI has substantially impacted the global education system, with notable shifts occurring since the launch of the first effective AI model, Chat GPT, in late 2022. [7] Studies earlier have categorized this as an "early stage" topic [4], whereas the studies conducted after have recognized its deeper potential. [5] [6]

To accurately research this topic, studies published after 2022 will be focused. In these more recent studies, the transformative role of AI has been acknowledged. Reviews by Bahroun et al. (2023) [6] and Mogavi et al. (2024) [5] have consolidated findings on AI's benefits and challenges in various sectors of education. Though, In Bangladesh only a few studies, such as one by Tanvir, Kazi, et al. (2023) [3], have identified key influences generative AI models may have on the local education system. However, the existing research lacks a qualitative study to analyze the perceptions of students and teachers on this topic to answer RQ1. The bibliometric analysis of [6] and the quantitative method of [3] do not capture this in-depth perception. Although research [5] has used qualitative methods, its different purpose and the use of social media samples limit its applicability in Bangladesh. Previous studies explored AI's general impacts on education but lacked in-depth analysis of teacher and student perspectives, except for [5], which does not relate to the traditional education system in Bangladesh and as mentioned before, uses an unreliable data sample in this case.

Regarding RQ2, some research has already addressed the ethical issues of generative AI in education and the applications of AI detectors. However, the usage of AI detection software to evaluate student submissions has yet to be properly researched. Research from Farrelly et al. (2023) [2] constructively analyzes the ethical dimensions of generative AI by highlighting several drawbacks and mentioning the unreliability of AI detectors in detecting plagiarized and AI-generated content without proposing an ethical framework. On the other hand, studies from Bukar et al. (2024) [1] demonstrate a decision-making framework based on various ethical studies to propose restrictions or legislation in generative AI content but do not include AI detection software. This study will therefore specifically investigate the alteration the lecture-based education system may face in the perception of students and teachers and will also generate a reliable ethical framework for AI detection in submission-based evaluation.

Research Methodologies

The methodology applied in this research follows a mixed-methods (quantitative and qualitative) approach to gather and analyze data.

Quantitative Phase

A stratified random sampling method will be used to survey approximately 300 students, aged 14 to 19, from secondary and higher secondary schools and 50 teachers from selected urban secondary schools while maintaining representation. To gather the responses, online surveys like Google Forms with Likert-scale and multiple-choice based questions will be implemented. Multiple-choice-based questions will be aimed at capturing participants' familiarity with AI in the academic sector, preference between AI and human teaching methods, and ability to differentiate AI lectures from real ones. Whereas questions on a Likert scale will evaluate their usage, concerns, and reliability with AI detection software.

Qualitative Phase

For in-depth analysis, a subsample of approximately 50 students and 15 teachers will be asked for a semi-structured interview. These interviews will investigate participants' use of AI for generating academic content, evaluating assignments, detecting AI-generated work, and their experiences with AI-assisted teaching, including instances where they were either correctly or mistakenly identified for using AI. Additionally, data will be collected on students' familiarity with AI, their academic results, their preferred subjects for AI usage, and the subjects taught by the participating teachers.

Data Analysis

Collected data will be managed using Microsoft Excel and analyzed using qualitative data analysis software such as Atlas.ti. Thematic analysis will be conducted on qualitative data to derive the perception of the participants on AI's academic impact and the ethical concerns related to AI-detecting software usage. Quantitative data will be analyzed statistically to identify trends, which will be later summarized with qualitative responses to generate a thorough understanding.

Data Practicalities:

The data collection phase of this project will last about 2-3 months, allowing ample time to gather data through surveys and interviews. This timeframe will provide a comprehensive and diverse dataset. A stratified random sampling method will ensure diversity among the participants. Data analysis will be conducted with professional software such as Excel and Atlas.ti, which allow structured and accurate qualitative and quantitative analysis. All collected data will be stored securely, and strict protocols will ensure its privacy. Key principles of this research will include ethical study, informed consent, and respect for privacy. Participants will be informed about the research's purpose, and their information will be kept confidential. The study will align with relevant data protection guidelines to safeguard privacy and maintain ethical integrity across all stages of this research.

Roadblocks and potential limitations

This study may face several roadblocks and potential limitations. Firstly, a focus on urban areas limits the representation from different socioeconomic backgrounds and lacks the participants of people from rural areas. Moreover, there may be a lack of honesty among participants regarding personal topics such as results and AI usage in evaluations, which may introduce bias and reduce the accuracy of the study.
The study's sample size is relatively small for such a complex topic. Alongside the possibility of an inadequate timeframe, this could restrict the depth of this analysis. Lastly, while the selected mixed-methods approach is reliable, this study could benefit from a more sophisticated research method. Although proper efforts will be made to address these issues, they may have an impact on the depth and reliability of this research.

Post-program plan

Following the completion of this research, the findings will be published in relevant academic journals, conferences, and presentations. The reports will be provided to various educational organizations. By sharing these insights with numerous educational institutions, including schools and colleges, the study hopes to reach a wide audience, including educators, students, and parents who are involved in education. The Results will clarify generative AI's potential in academic education and help dispel various biases regarding this topic. This perspective-based study will offer insights into how the education system might transform with the integration of AI, enabling teachers and institutes to implement necessary strategies in order to prepare for these changes. Additionally, the proposed ethical framework for AI detection tools in submission-based evaluation will provide a guideline for a balanced use of AI in academics, benefiting both students and teachers.

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