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AI and Pedagogy in Higher Education: Assessing Its Impact on Teaching and Learning in Academia

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ABSTRACT

The integration of AI technologies in education, like adaptive learning systems, automated grading, and virtual teaching assistants, is controversial. Supporters say AI improves personalized learning, streamlines administrative tasks, and gives quick feedback to students. Critics worry about the loss of personal connection, over-reliance on technology, and new inequalities. This study evaluates if AI helps or hinders teaching in higher education, focusing on its effects across different subjects. It reviews literature and collects data from educators and students to see how AI influences teaching methods, student involvement, and learning results. The research aims to reveal how AI can enhance teaching while addressing challenges for its successful use in education.

1. Introduction

The integration of Artificial Intelligence (AI) into the educational field has brought in a new era filled with opportunities and challenges. As AI technologies such as adaptive learning platforms, automated assessment systems, and virtual teaching aides become increasingly common, higher education institutions are reconsidering the organization of teaching and learning. While supporters of AI argue that it can tailor instruction, simplify administrative tasks, and improve student feedback systems, critics raise concerns about its long-term effects on teaching methods, human relationships, and educational fairness. This paper seeks to examine how AI is changing teaching methods in higher education, particularly in Bangladesh, by assessing both the advantages and disadvantages of its integration based on existing research findings and the dual perspectives of higher education learners.

2. Background and Literature Review

AI in education is not a novel concept; however, its recent advancements and applications have significantly expanded. Existing literature points to several key areas where AI contributes to teaching and learning:

- **Adaptive Learning Systems**: Platforms such as Knewton and Smart Sparrow offer tailored educational content based on learners' speeds and styles.[1] In 2016, China's Ministry of Education mandated 8% budget allocation for digital education, with 95% school connectivity, enhancing digital higher education through collaboration. [2]
- **Automated Grading and Evaluation**: Tools like Turnitin and Gradescope enhance assessment efficiency, enabling instructors to prioritize instructional design.[3] AI-driven essay evaluation, used in 60,000 schools with 92% accuracy, employs neural networks for assessments, despite its increasingly complex and opaque decision-making processes.[4]
- **Virtual Teaching Assistants**: AI bots like IBM's Watson Tutor and Georgia Tech's Jill Watson effectively address student queries and support coursework.[5] In China, Liulishuo, an AI generated app teaches English to 600,000 students for one teacher's cost, while Master Learner aims to create a "Superteacher" to assist 500 million Gaokao exam inquiries. [6]

- **Lab-work and Educational Data Analysis:** France has unveiled a strategic AI plan for itself and Europe, featuring research labs on AI's work impact, incentives for researchers, and expanded AI higher educational programs from graduation to post graduation levels.[7] The UAE Ministry of Education has introduced an AI-driven data analytics platform encompassing over 1,200 schools and 70 higher education institutions, benefitting around 1.2 million students. It collects diverse data, aiming to improve the education system through machine learning algorithms and strategic studies. [8]
- **Artificial Intelligence as an important arena of study in HI:** South Korea is preparing for the 'Fourth Industrial Revolution' with a detailed strategy that emphasizes education. The government aims to train 5,000 new graduates in AI each year from 2020, targeting a total of 50,000 new AI professionals by 2030.[9] The plan also includes ten years of support for graduate schools as research centers with $4.3 million, plus $2 billion for six AI institutions and 4,500 scholarships.[10]

3. Methodology

This research uses qualitative data which begins with a review of relevant literature to establish the research issue, followed by empirical data collection through interviews with 30 master's students and 15 faculty members from the Institute of Education and Research, University of Chittagong. Interviews, particularly effective for exploring complex topics and adaptive discussions, are well-suited for studying processes.[11] Open-ended questionnaires guided the interviews, allowing for in-depth exploration and raising the question of how many interviews are sufficient for comprehensive insights.[12] The research was aimed to illustrate a picture of wide-ranging judgement of the learners and teachers who are the researcher of pedagogy in actual sense. That's why from the previous interview respondents 14 students and 7 teachers were taken as sample for focus group discussion . Focus group discussions are commonly employed as a qualitative methodology to attain a comprehensive understanding of societal challenges. This approach seeks to gather information from a deliberately chosen cohort of participants, as opposed to a statistically representative sample of a wider demographic.[13] Participants were selected through purposive sampling, as master's students had prior experience with internships during their Bachelor of Education program, offering insight into AI use from both student and teacher perspectives—with emphasis placed on learners' views. Purposive sampling is efficient and useful for exploring relevant issues within specific populations.[14] The study aims to understand perceptions of AI tools among facilitators and learners in higher education. APA 7th referencing style has been applied.

4. Findings

4.1 Impact on Teaching Practices and Learning

AI tools, especially *ChatGPT*, were positively received by students for reducing workload and supporting learning during internships. They found AI helpful in understanding topics, generating teaching aids, and organizing concepts. Such thing revealed from the statement below:

> *AI tools and Chatgpt helped us to find out a certain concept or topic in an organized way. Also, when I wanted a picture for using as a teaching aid AI would prepare me according to the command that I have typed on the user interface*.

However, some emphasized that relying on AI for tasks like drawing graphs could hinder skill development without practice. Others noted AI's usefulness in research writing, but stressed that *evaluation, decision-making, and critical assessment* must remain human-led due to AI's limitations in emotional and contextual understanding. According to a learner:

> *With help of AI we can draw and understand a graph when it will take too much time to do it manually but it must be noted that although we can get a graph drawn by the help of AI it won't help me to build the skill of drawing a graph or any figure as well as understand it we need to practice to adopt that skill.*

Another respondent learner added that:

> *Although Google or Google Scholar has AI but with vast data per search makes difficult for to choose rather which one is better while Chatgpt puts the fraction in more organized and clarified way. But AI should never be involved in criticism, evaluation and any process of assessment which involves a human initiative because it should be done in human perspective rather than a machine learning tool which cannot convey human emotion and understanding.*

Faculty also appreciated AI's role in reducing workload and aiding idea generation, but echoed concerns over human oversight in decision-making.

> *If I type something in a search bar of AI platform it will provide me the particular information in an organized way with the source according to my command.*

Another faculty opined:

> *Yes, AI has reduced the workload and helped a great deal in idea generation. But matter related to decision making, evaluation must ensure direct involvement of human.*

4.2 Creativity of Students and Academic Integrity

Participants acknowledged AI's role in fostering creativity while maintaining academic integrity. Students suggested using AI to learn problem-solving steps rather than seeking direct answers and emphasized personal input in tasks like essay writing. As a learner stated:

> *If anyone wants to learn a math or problem solution rather asking AI to solve that math or problem directly s/he could ask AI to provide the steps of solving the math problem so that s/he could similarly solve problem of same category. Thus, AI can help everyone to learn skill instead of copy pasting any work or solution. On the other hand, if anyone wants to write an essay with the help of AI than s/he should put personal preference mapping and ideas in search bar so that even every student used AI to generate that essay on similar topic the outcome would be different.*

Learners appreciated AI for practice, idea generation, and presentation planning, but stressed the importance of fact-checking and verifying data authenticity. According to one of them:

> *AI is a good partner for practicing lessons and skill. For instance, we can learn a topic and ask AI to provide us some question, exercise, quiz related to that topic for practicing purpose. That will never break any academic rules.*

Another added:

> *Although AI will provide us different data and organized information we need to check if they are authentic or not. Otherwise wrong facts will make our academic performance erroneous which is contradictory to academic integrity*

Faculties agreed that learners should use AI for guidance, not for completion of tasks and highlighted the need to redesign assignments to promote critical thinking and collaboration, alongside regular fact-checking to uphold academic standards. According to a distinguish faculty:

> *Learners should not use AI directly to prepare an assignment rather learn and get idea from AI and do the work on by their own capability. Also, task providing and question asking system must change so that learner never goes to AI platform to do the whole task or answering question rather depend on own critical thinking and communication among people. Also, fact checking is a must in case for ensuring the data is authentic or not.*

4.3 Student Engagement, Accessibility and Equity

AI enhanced learning through features like gamification, but some faculty observed a drop in student interaction and critical thinking. One of the facilitators stated:

> *Before AI learners used to ask questions from teachers and they used to be very enthusiastic during group discussion. Now a days, when you ask a general concept from students instead of human networking they immediately go for AI as a result they provide biased answers which lacks critical thinking.*

Others believed innovative task design could restore engagement. As a teacher said:

If there are new and creative ways of providing task and asking question learners will become interactive and will think critically before answering question.

Students admitted that dependency on AI reduced classroom interaction, but creative pedagogy helped balance AI use and human collaboration. One student put his/her thought like below:

We the students of university have become depended on AI that now-a-days classroom interaction are decreasing but few of our teachers do ask question or provide task in a way we have to interact with the teacher and our peer.

Equity issues emerged, *as* students from low-income backgrounds *f*aced challenges accessing AI tools. A student responded:

Not everyone belongs to same economic background. Many cannot afford to have access in platform which demands money. Those who can are in a great advantage than those who cannot.

Both students and faculty proposed institutional support such as device loans *or* free platform access to bridge the digital divide and promote inclusive learning. As a learner said:

If we have some institutional device in central library, seminar library, departments/ institute as well as in residential hall that ensures proper access to necessary AI tools that can reduce digital divide.

A notable faculty member opined:

If university can provide soft loan for device, ensure students get free access or access fee discount in certain platform it would be better.

4.4 Interdisciplinary Variations

The AI and adaptive learning tools which were particularly effective in language disciplines, may not be that effective to other.

Adaptive learning Platforms like Duolingo is used by all sort of student from different discipline but those who learn new language or student of linguistics has much more advantage learning a term from Duolingo rather than student of medical science who wants to learn meaning and synonyms of medical terminology.

AI and adaptive learning tools were particularly effective in STEM aiding concept mastery through repetition and personalized practice. As a student said:

There are so many adaptive learning tools and platforms are available for STEM field in comparison to social science, business, and humanities. In STEM, for individual math or other type of exercise practice, easy feedback or demo lab work etc. becoming more accessible to learner. It can be said that adaptive platforms have more impact in STEM than other discipline.

Students noted greater tool availability and usage in STEM, while learners from non-STEM fields often used AI for surface-level tasks. A big portion of responder including both student and teacher agreed STEM students used AI more efficiently. According to a learner-

The students of computer science, physics etc. use AI in more diverse way than the learner of social science or humanities. They use it for writing code, practicing demo lab work on contrary non- STEM background learners use it for copying assignment directly or for information like definition, general concept etc.

A faculty member mirrors that exact opinion:

I think learners from engineering or other science background use AI more properly than other background.

Some faculty argued that non-STEM learners might benefit more in terms of developing practical and critical skills, since their disciplines often demand creativity and human interpretation. A faculty member who voiced different opinion stated:

Although STEM learners using it more, I think they are in a disadvantaged position. I believe learner from Music department, literatures etc. must think critically and perform practically as those could not be done by AI which ensures their skill development in their respective field unlike STEM learners.

Both groups acknowledged AI's potential in interdisciplinary collaboration, especially when learners from varied fields work together on shared projects. According to a respondent learner:

> *If two researcher one from history major and another majoring in statistics collaborates for a particular project where the statistics major needs to some basic historical information and the history major needs to know about some general statistical concept in this case they can take help from AI.*

4.5 Ethical consideration

Faculty emphasized the need for clear *ethical guidelines* on AI usage, including setting limits on its use in assignments and employing tools like *Turnitin* to detect AI-generated content. A faculty stated:

> *Before we provide any assignment or task, we should place some condition like extent of using AI also implement the tools like Turnitin that can detect AI based plagiarism*.

They called for updated policies and ethical practices involving all academic stakeholders. According to a statement from a faculty:

> *In large extent policy makers of education field as well as syndicate, senate, academic council, controller of examination should impose and implement some strict rules regulation that can maintain ethics in academic activity despite entanglement of AI in teaching-learning.*

Students echoed these views, noting that *teacher instructions* and personal responsibility play vital roles in ensuring AI is used appropriately. One added:

> *Teachers sometime tell us what to do and what not to regarding AI when they assigned us any task. Also, our personal ethical practice is important. And if authorities announced such rules which make us to perform our academic activity not taking advantage of AI in wrong way.*

Together, both groups recognized the importance of fostering a culture where *AI supports learning* without compromising academic ethics.

5. Discussion

The data suggest that AI tools, especially ChatGPT, are valued by students and faculty for boosting academic efficiency, aiding in content organization, research, and classroom planning. Students find AI beneficial for grasping complex topics and brainstorming ideas, but both groups stress the necessity of human oversight in evaluation and skill development to uphold educational integrity. Participants acknowledge AI's potential for fostering creativity and personalized learning if used ethically, emphasizing that it should enhance problem-solving rather than replace it. A tension exists between AI's ability to engage students and its impact on in-person interactions, with suggestions for creative task designs to mitigate disengagement. Additionally, access disparities for economically disadvantaged students highlight the need for institutional support. Ethical concerns demand clear guidelines for AI use, with faculty advocating for updated teaching approaches and transparency to ensure academic integrity.

6. Conclusion

AI is neither a cure-all nor a threat in higher education; its impact depends on thoughtful implementation and awareness of its limitations. This research underscores the need for a balanced approach that integrates innovation with essential human elements. Further studies should guide ethical, effective use of AI across disciplines.

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