Embedded Selforganizing Systems

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Artificial Intelligence Technology on Teaching-Learning: Exploring Bangladeshi Teachers' Perceptions

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***Abstract*— The increasing attention to artificial intelligence technologies in daily life and the need to consider it as a priority topic for students in the twenty-first century clearly leads to artificial intelligence (AI) integration in higher education. Therefore, university teachers must be properly prepared to use AI in their teaching for successful integration. In this study, the researcher aimed to survey to investigate Bangladeshi university teachers' perceptions toward AI as a teaching tool. The survey results showed that teachers have minimal understanding of Artificial Intelligence and its assistance in the classroom. However, they considered it as an educational possibility. The findings indicated that teachers require assistance to be effective and competent in their teaching practices; the findings suggested that AI has the potential to contribute as an assistant.**

Keywords—Artificial intelligence, AI in Education, Higher Education, Bangladesh

I. INTRODUCTION

In the teaching-learning process of a formal classroom, the use of Artificial Intelligence (AI) technologies has attracted attention throughout the years as a potential fix for almost all issues in many developed countries. From assisting with the automated evaluation of the performance of the students and monitoring their development [1,2] to offering students individualized scaffolding and suggestions [3,4]. Moreover, an insight into the future of AI that involves the education field has been endorsed by the G7 committee [5]. Human capacities may be significantly improved by AI, but it also poses new difficulties that we must address in terms of its proper and ethical use [6,7], the impartiality of AI algorithms and their susceptibility to partiality [8,9,10], comprehensibility [11], and its effect [12]. To address these challenges, there is a need for communication in 'available terms' with various stakeholder groups including educators, students, family members, and policymakers to respond to challenges and criticism [13]. These stakeholders should be informed of both AI's advantages and potential drawbacks for education. Given the variety of AI applications, it is important to consider whether, how, and to what extent AI technology can be employed to assist teachers in overcoming the difficulties they encounter in their profession.

To flourish on these 'available terms' there is a need of developing a common understanding of basic knowledge, perspectives aspirations, and challenges that stakeholders would experience in their context. From that ground, this study was intended to explore the perception of Bangladeshi university teachers regarding artificial intelligence in teaching-learning by answering the following research questions:

- How do University teachers of Bangladesh perceive AI as a tool for support teaching?
- What are the expectations of Bangladeshi teachers when it comes to AI's potential to help to teach?

The aim of the study was to assist Bangladeshi teachers regarding the scope of Artificial intelligence. In this study, the researcher tried to establish a better understanding in terms of establishing a common ground of AI in education for Bangladeshi teachers. However, there is very little literature available in terms of the integration of AI in education in the context of Bangladesh [14,15] But as technology develops, AI will soon appear and quickly become vital in the education sector. By encouraging the adoption and adaption of new technologies, digital literacy training, and digital pedagogies, Bangladesh is advancing digitalization and innovation, particularly in the formal education sector [16]. With these developments in mind, this research primarily focuses on aspiring teachers who are teaching different subjects in various public universities. Therefore, this study focuses on how teachers perceive and are familiar with utilizing AI as a tool for teaching and what are their expectations. This study refers back to Aiken and Epstein's [17] explanation of the principles for creating AI systems in order to validate these principles from the viewpoint of university teachers, which helps in contextualizing our results with regard to fairness, accountability, transparency, and ethics (FATE). This unfolds insights into the elements to consider while AI-related innovations and employing in teaching-learning within the framework of FATE.

II. BACKGROUND

A. Artificial Intelligence in Education

The term Artificial intelligence (AI) is used to describe computational techniques that enable computers to simulate human decision-making [18]. Since the late 1970s, researchers have been studying how AI may be used in education, for instance, in intelligent tutoring systems (ITSs) and computer-assisted instruction (CAI) [19]. AI techniques were used to create computer tutoring that might clone human tutors in how they modified lessons considering the student's knowledge level [20] or learning styles that are interactive and learning by doing would be enabled [21]. In the context of university teachers, AI may be utilized as a tool for instructors to help create learning activities and scaffolding tactics and improve teachers' awareness by giving data on student activity and performance [23,24,25]. Moreover, AI is utilized to assist and ease the analysis and display of student information as well as to give indications for a variety of learning-related outcomes, including achievement, cognitive state, affective component, cognition, and metacognition [26]. According to studies, developing tools for teachers that are enhanced by AI calls for participative methods. Holstein et al. [27], for instance, used the idea of "superpowers" as a tool to extract the difficulties that teachers commonly confront while conducting interviews. When designing real-time, teacher-facing tools, it is important to keep in mind the fundamental subject matters which emerge in teachers' exercises, for example, the need to witness learners' cognitive procedures, the ability to identify which students are plunged, and the capacity to imitate oneself. This demonstrates the necessity of including teachers in all phases of design to comprehend their unique requirements for the visualization of data and for real-time statistics and expectations.

B. AIEd and FATE

The use of AI technology in the classroom has drawn significant criticism, and research has expressed the need for ethical and legal frameworks to comprehend and account for the ramifications of AI systems [2]. These consequences include potential harms AI systems may do to teachers' and students' privacy, the effectiveness of learning, and human interactions and relationships. AI in education is frequently presented as a tool for individualized instruction. The advantages of personalization, especially when combined with bias reinforcement, are, however, not well supported [28]. AI algorithms may also reinforce adverse stereotypes, societal injustices, and unfairness [25]. One can contend that the obvious answer to creating fair systems is to eliminate data instances that might support prejudice. However, in educational settings where we aim to help learners by comprehending their requirements, particularly when this arises from systemic or racial inequity [29], this is not a solution.

A set of principles based on six key aspects of the human are designed by Aiken and Epstein [17]. These aspects indicate moral issues in creating AI technology for education. The evolved principles emphasized the fundamental needs of humans, for example, social contact and well-being, and the demand to foster optimistic perceptions, like innovation and curiosity. The teacher's responsibility as a facilitator was reinforced by some principles at the same time, with the AI system acting as a supplement rather than a replacement for the human. In this study, we aimed to explain the findings with the validation of FATE principles from teachers' perspective to the integration of AI in classrooms as a means of teaching tool.

C. AI in Education and Bangladeshi context

Bangladesh is a small country with 45 public universities and nearly 15000 teachers [30]. Though there is some training arranged for schoolteachers a few pieces of training are available for university teachers. And mostly university teachers are supposed to have Ph.D. degrees from different countries and enough IT skills to teach their students. Again, these teachers have the desire to learn more about technology and integrate it into their teaching [31]. Using technology in teaching-learning throughout all levels of education is highly inspired by the government [16]. However, there are also some difficulties with the unavailability of electronic devices and the internet in rural areas, the lack of proper training for the teachers, and so on [32]. Studies showed that for social networking, sports news, entertainment, and music listening, 68.67% of university students used cell phones to access the internet. Meanwhile, only 23.7% of them use mobile phones to study online content or textbooks, as well as for library research and note-taking.[33] Therefore, students lack of interest in using their mobile phones as learning tools may be a symptom that teachers probably do not include instructional technology in the design of learning assignments.

III. METHODOLOGY

A. Participants

This study followed a survey among 100 public university teachers in Bangladesh. The survey was made available online. Initially, the questionnaire had been circulated through Google form to the respective participants. Here, the sampling strategy was random sampling. The researchers circulated the form in different social media groups for teachers where teachers from all over the country are available and also in some personal connections of the researcher with the university teachers. The survey was completed by 100 instructors in total. After deleting incomplete replies, there were 80 individual responses left. The aim of the study was briefly explained to the participants. The participants also asked for their consent.

B. Instrument

Our main objective was to utilize the survey results as guidance for integrating AI-related technology in teaching-learning environments. Therefore, this survey focused on gaining deep insight into teachers' perceptions, familiarity, and expectations regarding AI. The researcher adapted the Artificial Intelligence: Public Perception, Attitude and Trust survey, specifically the perception part, as the aim of this study to examine teachers' perspectives and familiarity with AI and insights into its implementation of it in educational environments (RQ1) [34]. There were 10 items in the questionnaire. In the first section, there were 5 items. Examining teachers' individual understanding of AI was the goal of the first two items. For the first item, participants were asked to assess their level of understanding of AI by using a 6-point Likert scale. Next, in the second question, participants were given five AI-related statements and were asked to indicate those that they believed to be true. One of the claims, for instance, was as follows: "AI is a collection of connected machines". The researcher hypothesized that the replies on

these two topics might offer insight into the instructors' expertise in AI. The next item sought to ascertain users' experience with AI applications and whether they have ever used AI applications. The final two questions sought to elicit perceptions of teachers on the usage of AI in education. Here, participants were given a set of positive and negative characteristics of AI gleaned from previous studies. In addition, the teachers were allowed to enter their feedback via a text-based aspect.

The third section of the survey sought information on the participants' professional profiles and work environments (RQ2). The participants were specifically asked about the instructional technologies they use to the assistance of their profession, and what aspects of their work may possibly be aided by AI. In addition, the participants were asked about their professional experience years as university teachers and whether they had their Ph.D. or not yet.

C. Data analysis

To address the research questions, data analysis was conducted by evaluating survey responses from participants. SPSS V-25 was used to analyze the data. First, the researcher determined all the variables by defining both categorical and nominal variables. The researcher put numerical values for close-ended questions and string values for open-ended questions. Then descriptive analysis was employed to identify teachers' perspectives and knowledge of AI and their expectations of learning technology.

IV. RESULT

The teachers were asked to rank their acquaintance with the idea of AI ranging from " never heard of AI" to "expert in AI." Most of the participants have either limited knowledge (50%) or decent (47%) knowledge of AI. Only 7% of teachers claimed that they know a lot about AI (Figure 1). Everyone heard about AI and No one considered themselves to be AI experts. Then five statements were then given to the teachers about AI and asked to determine which explanations were accurate for validating their perceived knowledge. Most of the respondents (71%) provided 60% of their answers correctly. Finally, teachers were asked if they had ever utilized an AI-assisted educational tool. Most of the participants (35%) stated that they are unsure if they had utilized AI tools (Figure 1). However, 21% of teachers stated that they had never used AI-related educational apps, while 43% stated that they have previously used it (Figure 1).

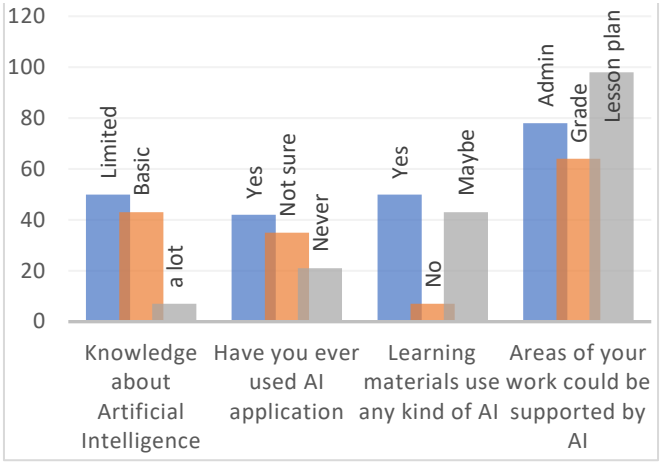

Fig 1. Teachers' perspective regarding Artificial Intelligence in Education.

The inquiry was motivated by two different factors. First and foremost, this might indicate instructors' knowledge of AI. Second, the researcher suggests that openness at this level may facilitate the implementation of a tool. The second goal was to learn about instructors' perceptions toward the employment of AI in education. To do this, multiple-choice inputs were asked participants to rank the favorable and undesirable elements of employing AI in education (Table 1). The participants were also given the opportunity to submit feedback. Regarding positive aspects, most of the participants (92%) marked that AI has the possibility to reduce time while searching for teaching materials for the lesson. In terms of negative aspects, 57% of participants thought that AI would demand a certain amount of effort to learn to utilize it, and 43% of participants stated that they don't think that AI can do teachers' jobs without human development. Teachers also mentioned that students prefer to connect more with humans than machines. In terms of assisting their job, participants stated that doing their administrative work (78%), grading students' assessments (64%), and monitoring students in the classroom (71%) can be supported by AI technologies. Participants also commented that AI could assist in planning lesson plans in terms of time (57%) and content (42%). Moreover, teachers also commented that AI can help in grading students' assignments instantly, preparing lectures for students, creating tools for personalized learning for students, and boosting students' critical thinking ability in terms of their personalized feedback. Some teachers also saw a necessity for AI-based projectors and tables in the classroom.

TABLE 1. PARTICIPANTS' PERSPECTIVES IN TERMS OF POSITIVE AND NEGATIVE ASPECTS OF AIED

Options	Positive aspects	Negative aspects
1	Saving time while creating a time plan for lessons (35%)	Require effort to learn how to use AI (57%)
2	Saving time while looking for content for lessons (92%)	AI can take someone else's job (28%)
3	Saving time when reviewing homework (50%)	AI can not carry out tasks without error (21%)
4	Assisting in making less errors (71%)	Teaching requires human involvement and AI can not do fairly what is needed (43%)

Next, we looked at whether the participants' years of professional experience had any impact on their survey replies. In terms of experience, the teachers who had more experience in years like over ten years (21%). They had their Ph.D. from a different country than Bangladesh and comparatively, they use more technology tools in the classroom. In terms of personalized uses of Ai, teachers mentioned some technology tools such as zoom, google classroom, padlet, slowmation app, canva, prezi. However, 32% of the participants are not sure whether the tools used any kind of AI or not while 50% teachers think the tools used AI and only 7% think that the tools do not use any AI or machine learning.

V. DISCUSSION

A. Teachers' perception regarding AI

In general, instructors are knowledgeable about digital learning technology and how to incorporate them into the classroom. The findings of this exploratory study showed that most instructors believed their understanding of AI to be limited (50% of participants) or basic (42% of participants). On the other hand, when questioned about the essential ideas of AI, most teachers gave answers that were, on average, 60% accurate. These findings are partially in a line with the previous study regarding Bangladeshi teachers that they are knowledgeable about AI [31]. However, the interviewees showed a positive attitude regarding the application of AI in education. They saw it as a tool to assist them in finding educational resources, planning, and scheduling their classes, and evaluating homework assignments. Though it's a typical criticism of the use of AI in the workplace that it would replace workers and cause job losses [35], Bangladeshi University teachers only had minimal reservations about this. Participants, however, expressed their worries about the time and effort needed on their side to learn how to utilize AI technology properly and about any possible trust issues that would result from using AI. For instance, several participants said they wouldn't trust AI to complete duties accurately. Most notably, participants expressed concern about how AI would impede social elements of learning and impair human-to-human contact. In line with the findings of Holstein et al. [36], the findings showed that instructors place a strong emphasis on having the ability to read students' minds, be cloned, and correctly spot misunderstandings. Additionally, teachers would like to keep an eye on their pupils all around and evaluate not just their academic performance but also their motivation and emotional condition.

Thus, teachers' curiosity regarding AI technology validates the moral issues of FATE principles. Moreover, teachers are aware of social contact with students and also their responsibilities as a facilitator, so few teachers are doubtful about the replacement of teachers with AI, these issues were also considered as FATE principles while adopting AI technology [17].

B. Teachers expectations

In terms of expectations, teachers focused on assisting in their course planning in terms of time and content (98%). AI might assist to make suggestions on instructional strategies and teaching materials to assist teachers in course preparation. One possible hazard associated with this technique is related to the openness of the recommender systems [37], such as the reason for suggesting certain resources over others, and the efficiency of the suggestions, for instance, the accuracy and relevancy of these suggestions. The ethical and accountability considerations surrounding teachers' duties provide another possible concern in this situation. One issue is the risk of compromising the function of instructors if we overprescribe automated solutions to them. One of the duties of educators is to plan and carry out a curriculum that strives to achieve certain learning objectives. It's possible that instructors' autonomy will be reduced if AI is used to organize their courses. According to teachers' comments, it is possible to adapt Aiken and Epstein's principles to meet educators' demands. Teachers, for example, indicated a desire to conduct assessments more efficiently and fairly, to closely monitor children, and to plan and offer appropriate, individualized, timely feedback. The suggestion of teachers emphasizes the urgency of effectiveness and exactness of teaching, feedback, and evaluation, quoting from the guideline that "encourage and do not demoralize the users" [17].

VI. CONCLUSION

This research was conducted with the understanding that Bangladesh is a small country that actively promotes digitalization and encourages technological innovation in education. Nonetheless, previous surveys have indicated that Bangladeshi educators do not completely see the potential or use of AI in education, despite their little understanding of AI. Furthermore, they do not use technology in classes or are unaware of its potential application. These previous results were partly validated in this research. However, it is evident that Bangladeshi university teachers were enthusiastic about employing AI in education, particularly for administrative duties and retrieving and customizing instructional materials. Furthermore, the findings were contextualized to support Aiken and Epstein's [17] design principles for AI systems from the viewpoint of instructors and we offered insights into the practical and theoretical consequences of employing AI to address teachers' FATE-related issues.

The limited number of participants in our study is one of its limitations. The instrument (survey) selection is another limitation. To make the survey brief and interesting to responders, we restricted the number of subjects we covered. Consequently, we did not gather potentially useful information by considering teachers' expertise on a subject Future research can be employed with some specialized subject teachers and with greater samples including all kinds of educational institutions.

The findings of this study can be envisioned in two ways. Firstly, the findings need to be reached to the governmental agencies and other stakeholders in education like different varsities. Then, some university teachers would be invited to attend a workshop where teachers will be introduced to AI-enhanced technologies and will be guided through the process of incorporating technologies into their classrooms, with an emphasis on FATE characteristics as a part of effective incorporation. Human-technology collaboration, including AI, may turn out to be a considerably more essential strategy than depending just on computing. [38]. Therefore, the crucial objective of the current educational technology is to articulate the various possibilities and uncertainties that such cooperation involves.

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