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Attitude of Teachers Towards Integration of Artificial Intelligence (AI) in Teaching-Learning Mathematics

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Abstract:

AI (Artificial Intelligence) has increasingly influenced several fields, like education. Over decades, AI (Artificial Intelligence) has been known as the disruptive technology including substantial potential to enhance mathematics instruction for educators. AI can be tailored to meet the specific challenges in teaching mathematics by providing solutions that enhance the efficiency, effectiveness, and problem-solving skills of students. The goal of the investigation is the examination of the attitudes of mathematics teachers towards Artificial Intelligence (AI) in teaching Mathematics subjects. The present research is quantitative and it is Descriptive research.

The sample of the research comprised 50 Secondary school Mathematics teachers from the Dimapur district of Nagaland selected randomly. A five-point Likert scale with 25 items was employed to gather data from mathematics teachers. The investigators developed this tool to understand the attitudes of mathematics teachers toward AI. According to the research's findings, the majority of math teachers appear to be supportive of using AI to teach the subject and know the possible benefits of using AI tools to improve students' mathematical learning.

Keywords: Artificial Intelligence, Teachers' Attitude towards AI, Mathematics, Secondary School.

1. Introduction:

In this digital age, AI technologies have revolutionized different sectors, like education, finance, transportation, and healthcare. In this field of education, AI is reshaping the way students learn and teachers teach, especially in the fields like Mathematics that depend heavily on logic, reasoning, and computation. AI tools are revolutionizing mathematics education by making it more accessible, engaging, and efficient. Using AI can help one grow as a mathematics teacher. There are many AI tools available like ChatGPT and PhotoMath, which can help break down complex mathematical concepts and provide feedback on problems. Using AI can help students to pace up with their own time of learning and style that can ensure an effective and personalized learning experience.

The possibility of AI to transform education across a range of disciplines and educational levels. According to Holmes et al. (2023), AI may be useful for teacher-teaching assistants, student



forum monitoring, continuous evaluation, and the advancement of learning sciences, all of which could improve our understanding of learning. AI tools empower teachers with resources for creating dynamic and adaptive lesson plans. These AI tools are capable of creating and organizing a wide range of educational materials which includes interactive visual aids and additional exercises, providing teachers with a comprehensive collection of resources. This helps educators save time and enables them to utilize various teaching methods that address different learning styles in the classroom.

The subject of teachers' attitudes toward AI in the education has attracted notable interest from several scholars like Karaca & Kilcan (2023) who argue that optimizing AI's benefits in education should start with an understanding of teachers' concerns, experiences, and perceptions. Positioned at the forefront of education, teachers may provide essential insights into the practical impact of AI integration, contributing to a well-rounded understanding of both its advantages and challenges in educational contexts.

The present work aims to throw a light into the kind of attitude mathematics teachers have concerning the application of the AI in their teaching practices. Studying about teachers' attitudes towards AI regarding gender, locality, and type of institution is highly crucial to understanding how AI impacts teaching and learning practices in regions with technological infrastructure and educational resources that differ from those in more developed regions.

2. Literature Review:

Chiu (2023) emphasized the necessity for more investigation on how AI-based systems, for instance, chatbots and conversational AIs, affect students' educational results. Floris et al., (2022) conducted research in Italy to the knowledge about the attitudes of educators toward AI in Education. The study's conclusions show that the majority of teachers require greater assurance in their AI abilities. Additionally, they are less alarmed by the growing prevalence of AI on all fronts. Polak et al. (2022) surveyed the application of AI. They used a focus group as well as a survey to gather their data. The final outcomes showed that teachers demonstrate a favorable attitude toward implementing AI and its integration, in the educational context, even if their skills were restricted in this area. Uygun (2024) explored teachers' perspectives on AI. A sample of 74 educators provided valuable data utilizing the opinion scale on AI in education. The findings revealed that while most teachers hold favorable opinions of AI in education, there are still serious disputes over ethics and privacy. Ampong (2024) investigated the perceptions and recognition of AI among lecturers. The findings showed that about two-thirds (84%) of lecturers showed eagerness and approval to utilize AI tools in their classes whereas 16% did not agree with the application of AI.



3. Research Gap:

In spite of the extensive literature on AI in the education field, very little research emphasizes the attitudes of mathematics teachers toward AI. Considering that mathematics teaching is closely aligned with the capabilities of AI, this gap presents an opportunity to examine in their teaching how mathematics teachers notice the role of AI. Moreover, there is very little research on the professional development as well as training needs of teachers to effectively incorporate AI in their pedagogy.

4. Emergence of the Problem:

4.1 Objectives or Research Questions:

- (i) To examine the level of mathematics teachers' attitudes towards AI in their teaching practices.
- (ii) To find out if there is any significant difference in attitude between the" mathematics teachers about gender.
- (iii) To find out if there is any significant difference in attitude between the mathematics teachers about the type of institution.
- (iv) To find out if there is any significant difference in attitude between the" mathematics teachers about locality.

4.2 Hypothesis:

- (i) There "is no significant difference in attitude between the mathematics teachers towards AI with regard to gender.
- (ii) There is no significant difference in attitude between the mathematics teachers towards AI with regard to type of institution.
- (iii) There is no significant difference in attitude between the mathematics teachers towards AI with regard to" locality.

5. Methodology:

Research Design: The research design utilized for the present investigation was descriptive quantitative research. The researcher firstly conducted a pilot study in one private high school and took interview of 5 mathematics teachers. In the pilot study, the researcher spoke with the 5 teachers regarding their attitude towards AI, usefulness of AI in their teaching, and provision of AI tools in the school. Secondly, the researcher decided how many samples are required for the study. The researcher selected 50 mathematics teachers using simple random sampling. Thirdly the researcher developed a tool and administered it to the selected samples and subjected for further analysis of the collected data



5.1 Population and Sample: The study's population like includes all the secondary school mathematics teachers in Dimapur District of Nagaland. Simple Random Sampling method has been employed for the selection of 50 mathematics teachers teaching in both Government and private schools from the population.

5.2 Research Tool Used: The researcher firstly selected the dimensions and constructed the items and validated it with the help of experts. A five-point Likert self-developed questionnaire consisting 25 items was for the collection used of data. The hypotheses had been examined at the 0.05 level of significance by applying the t-test. The score ranges from 25 to 125. Hence, any obtained score will occur in between this given range, i.e. $25 < x < 125$, where 'x' implies 'obtained score'.

6. Study Conducted:

This study has been conducted to examine the attitude of secondary school mathematics teachers towards use of AI tools with regard to mathematics teaching.

7. Analysis of Collected Data/ Collected Information:

Objective 1: To examine the level of mathematics teachers' "attitude towards AI in their teaching practices.

Table 1: Frequency and Percentage Distribution of mathematics teachers' attitude towards AI in their teaching practices (N=50)

Sl. No.	Level of Scores	Attitude towards AI Level	Frequency	Percentage (%)
1.	100-125	High	29	58%
2.	60-99	Moderate	17	34%
3.	25-59	Low	4	8%
Total			50	100

58% of math teachers have been a high attitude toward AI in their practices of teaching, 34% have an average attitude, and 8% have a high attitude toward AI in their teaching practices, according to the frequency and percentage distribution of their attitude toward AI in their teaching practices. Overall, secondary school mathematics educators have a favorable disposition in the direction of the integration of AI in their teaching methodologies.

Objective 2: To find out if there is any significant difference in attitude between the mathematics teachers with regard to gender.

Table 2: Mathematics Teachers' Attitude towards AI with respect to Gender.

Gender	No. of Teachers (N=50)	Mean	Standard Deviation (SD)	Calculated t-value	Degree of freedom (df)	P value	S/NS at 0.05 level
Male	31	93.903	15.6744	1.67	44	0.576	Not Significant
Female	19	93.263	11.483				



Table 2 indicates that at 0.05 level of significance, there is no substantial difference in mean scores of male and female math teachers' attitudes towards AI.

We thus agree with the null hypothesis that "There is no significant difference in attitude between the mathematics teachers towards AI with regard to gender."

Objective "3: To find out if there is any significant difference in attitude between the mathematics teachers with regard to type of institution.

Table 3: Mathematics Teachers' Attitude towards AI with the respect to Type of institution.

Type of Institution	No. of Teachers (N=50)	Mean	Standard Deviation (SD)	Calculated t-value	Degree of freedom (df)	P value	S/NS at 0.05 level
Private	41	94.829	13.928	1.78	12	0.836	Not Significant
Government	9	94.111	10.763				

Table 3 indicates that at 0.05 level of significance, there is no substantial difference in the mean scores of math teachers' attitudes about AI from government and commercial institutions. We thus agree with the null hypothesis that "There is no significant difference in attitude between the mathematics teachers towards AI with regard to type of institution".

Objective "4: To find out if there is any significant difference in attitude between the mathematics teachers with regard to locality.

Table 4: Mathematics Teachers' Attitude towards AI with respect to Locality

Locality	No. of Teachers (N=50)	Mean	Standard Deviation (SD)	Calculated t-value	Degree of freedom (df)	P value	S/NS at 0.05 level
Urban	39	93.153	15.116	1.72	20	0.635	Not Significant
Rural	11	95.454	10.103				

Table 4 illustrates that for $df=20$, the mean scores of the mathematics teachers' attitudes towards AI among the urban teachers and rural teachers do not differ significantly at 0.05 level of significance. We thus accepted null hypothesis that "There is no significant difference in attitude between the mathematics teachers towards AI with regard to locality".

8. Interpretation of Results/ Findings revealed from the Data Analysis:

The data analysis reveals that most of the mathematics teachers in Dimapur district have a high level (58%) of attitude towards AI with regard to teaching. They found AI tools are useful in teaching practices. Most of the teachers with positive attitude towards the utilization of AI which



is in line with studies conducted by Polak et al.'s (2022), Porn et al (2024), Uygun (2024) and Belgaid and Larbi's (2022) research which also identified that few teachers have a favorable attitude towards AI although they have faced lack of infrastructure. Moreover, it was also found that most teachers have a favorable attitude towards AI which agrees with the findings observed in the current study. Ampong (2024) opined that these days a lot of teachers seem interested in including AI in their classrooms, which shows that AI is given due importance by most teachers from different backgrounds. The final outcomes of the current research don't agree with the research performed by Wardat, Tashtoush & Alali (2024) which states that due to the additional effort required to use AI systems as well as applications, along with various pressures, hinders teachers from integrating AI into their teaching.

The high level of attitude towards AI among mathematics teachers could be attributed to the recent COVID-19 pandemic, during which most educators across the globe were bound to make use of technology in their teaching practices, which also has had an equally positive impact on the teachers in Dimapur district. The findings also show 38% of mathematics teachers have a moderate attitude toward AI. This may be due to many elderly mathematics teachers who have been teaching with traditional methods. They are not very comfortable in using technology and do not wish to implement any new methods into their teaching practices.

The results of the study also found that mathematics teachers do not differ in attitude towards AI concerning gender. Earlier, it was seen that teachers (male) were more skilled and advanced in the application of technology. However, with changing times, female also tend to acquire the required knowledge and skills towards technology, thus making application of instruments like AI in their teaching. Over the years, female teachers have come at par with male teachers in the utilization of technology named AI in the teaching process. This final outcome is not in line with the findings of (Mauritz & Wattenberg, 2020; Kaspersky, 2020; & Franken & Mauritz, 2021) who opined that men are more in favour of AI development as compared to women, owing to the men high level of education and income, and that women give themselves a lower rating than men for knowledge and comprehension of the term AI.

The outcomes of the data analysis show no significant difference in attitudes towards AI among government and private mathematics teachers. This could be due to equitable access to the internet and technology which makes the teachers more aware of AI technologies in this fast-changing world. Another probable reason could be that government schools in Dimapur district also receive good infrastructure facilities with good access to the internet, being mostly covered by urban areas. The mathematics teachers however feel the need to enhance their skills and knowledge about AI to be more effective in their classroom practices.



Though most of the teachers show positive attitude towards use of AI, it is not very convenient for the teachers to get access to the required AI tools. Also, they have no or little professional training on how to use the AI tools in their teaching. This, it is recommended that educational policymakers should emphasize on encouraging teachers to make use of freely available AI tools in the Open resources, as well as encourage schools to provide proper orientation and training for the teachers

9. Comments/ Conclusion:

Teachers of mathematics must be proficient in the utilization of AI software and technology to meet the expectations of current education. To accomplish learning goals, they must stay up to date with the newest computer software and programs, smartphone applications, and instructional games. Incorporating artificial intelligence (AI) into teaching math necessitates technological literacy and a thorough comprehension of how to best utilize AI technologies for the improvement of student learning. The final outcomes of the investigation showed that most of the mathematics teachers have positive attitude for applying AI applications in their classrooms. Embracing the power of AI in the mathematics education may transform the teaching as well as the learning experiences of students.

10. Suggestions:

- (i) **Professional Development and Training:** There is an importance for comprehensive training programs and adequate learning and teaching environments to promote a reflective approach to AI integration despite concerns and challenges.
- (ii) **Access to AI Tools and Resources:** Teacher's ought to be provided access to AI-driven tools that simplify complex tasks like automated grading systems, personalized learning platforms, and content recommendation systems to get acquainted including AI applications in teaching practices.
- (iii) **Promote a growth mindset:** Teachers around the world typically worry about when incorporating AI into their teaching. There might be some mathematics teachers who have attended workshops and training on the application of AI tools in teaching, however very few are seen to actually implement those in their class. Thus, it is important to support math teachers in utilizing the most recent techniques and approaches.
- (iv) **Provide Technical Support:** As integration of AI in teaching is new to many teachers, technical support should be offered quickly to teachers so that they don't get discouraged by technical hurdles.



11. Delimitation of the Study

The study is delimited to secondary school mathematics teachers in Dimapur district of Nagaland.

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