Evaluating the Perceptions of Mathematics Educators and Students Regarding the Integration of Artificial Intelligence in Mathematics Education at Colleges of Education in Anambra State.

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ABSTRACT

The study evaluated the Perceptions of Mathematics Educators and Students Regarding the Integration of Artificial Intelligence in Mathematics Education at Colleges of Education in Anambra State. The research design was descriptive survey research design. The study was guided by five research questions and two null hypotheses. The population of the study was 221, which consists of mathematics lecturers and students from all the government colleges of Education in Anambra; 118 from Federal College of Education (Technical), Umunze and 103 from Nwafor Orizu College of Education Nsugbe. Purposive and Simple random sampling technique were used. Purposive sampling technique was used to select all the 30 lecturers because their population is small, while simple random sampling technique was used to select 150 students from the 191 students’ population. To ensure the validity of the instrument the researcher submitted the questionnaire to two experts in mathematics and measurement and evaluation, in Nsugbe and Umunze. The reliability coefficient was established as 0.72 using test-retest method. Mean and standard deviation was used to answer the five research questions, while chi-square was used to answer the two null hypothesizes at 0.05 level of significance. The findings of this study among others showed that mathematics lecturers are familiar with the concept of artificial intelligence (AI). Also, integrating AI into mathematics courses enhances students overall learning experience. Additionally, students are concerned that relying on AI might reduce the need for human mathematics teachers. Furthermore, lecturers are concerned that AI might replace the role of mathematics teachers. Recommendations made among others is that the perceptions and mindsets of lecturers should be positively changed to accept AI. Students should also be enlightened that just like mathematical software packages, AI tools and technologies have come to assist them and the teachers to enhance teaching and learning of mathematics and not to take their teachers role. In addition, both lecturers and students should be guided on the ethics of using AI, so as not to misuse it or be overly dependent on it.

Key words: Artificial Intelligence, AI, Integration, Perception, colleges of education, Survey, Questionnaire, Teaching and Learning.

Introduction

In recent years, the field of education has witnessed a significant transformation driven by rapid advancements in technology. Among these technological advancements, Artificial Intelligence (AI) has emerged as a game-changer with the potential to revolutionize teaching and learning across various disciplines, including mathematics. As Anambra State strives to provide a high-quality education system, it becomes imperative to explore the perceptions and attitudes of mathematics teachers and students regarding the integration of AI in the teaching and learning of mathematics at colleges of education.

Anambra State, like many other regions, faces the challenge of improving the quality of mathematics education at all levels. According to Ezenwobodo (2023), Mathematics is a foundational subject, and its mastery is crucial for students pursuing careers in science, technology, engineering, and mathematics (STEM) fields. However, it is often perceived as a challenging subject, leading to high dropout rates and low achievement levels among students. Azuka (2013) asserted that the decline in the teaching of mathematics in colleges of education is highly contributed to the unavailability and use of technology in the teaching and learning process. This decline in the educational standard is not only affecting the colleges of education but also the basic and secondary schools as well. Because students at colleges of education are being trained to be teachers. Busari (2016) is of the view that poor reading skills of science and technology students, the state of laboratory facilities, and dearth of science text books affect effective teaching and learning of science subjects.

AI technologies have the potential to address some of the long standing issues in mathematics education. AI-powered tools can adapt to individual learning styles, provide real-time feedback, and offer personalized learning experiences. Additionally, AI can assist teachers in designing more engaging and effective instructional materials.
However, the successful integration of AI in education depends on the acceptance and readiness of educators and students to embrace these technologies. Their perceptions, attitudes, and familiarity with AI will play a pivotal role in determining the effectiveness of its integration into mathematics education.

**What is Artificial Intelligence (AI)?**

Artificial Intelligence, often abbreviated as AI, is a multidisciplinary field of computer science that focuses on creating machines, systems, or software capable of performing tasks that typically require human intelligence. These tasks encompass a wide range of activities, from problem-solving and decision-making to understanding natural language and recognizing patterns in data.

**Types of AI:**

Narrow AI (Weak AI): This type of AI is designed to perform a specific task or a narrow range of tasks. Examples include voice assistants like Siri, chatbots, and recommendation algorithms used by streaming services.

General AI (Strong AI): General AI, often portrayed in science fiction, refers to machines or systems that possess human-like intelligence and can understand, learn, and adapt to a wide variety of tasks and domains. This level of AI remains a subject of ongoing research.

According to Okoye (2022), AI has seen rapid advancements in recent years and has the potential to transform various sectors, including education. In the context of education, AI can be a powerful tool for personalizing learning experiences, automating administrative tasks, and providing intelligent feedback to both teachers and students. Molokwu (2021), asserted that AI offers the promise of addressing some of the challenges faced in mathematics education, such as individualized instruction and assessment.

**AI Tools for Teaching and Learning Mathematics:**

1. **Chatbots:**
   - Real-Time Assistance: AI-powered chatbots are available 24/7 to assist students with math-related queries. These chatbots can engage in natural language conversations, making them accessible and user-friendly. They can explain mathematical concepts and provide solutions to problems.
   - Practice and Revision: Chatbots can also generate math problems for students to solve, helping them practice and reinforce their skills.

2. **Data Analytics:**
   - Performance Tracking: AI-driven data analytics can track students' progress and performance in real-time. Teachers can use this data to identify areas where students are struggling and need additional support.
   - Personalized Recommendations: Based on a student's past performance, AI can recommend specific learning resources or activities to address their weaknesses.

3. **Machine Learning Algorithms:**
   - Adaptive Learning: Machine learning algorithms can analyze a student's performance and adapt the difficulty level of exercises accordingly. This ensures that students are challenged at an appropriate level, neither too easy nor too difficult.

4. **Educational Games and Gamification:**
   - Engagement: AI-powered educational games can make learning mathematics more engaging and enjoyable. They often incorporate elements of competition and reward, motivating students to practice and improve their math skills.

This study aims to fill a critical knowledge gap by conducting a comprehensive assessment of the perceptions of mathematics teachers and students regarding AI integration in mathematics education at colleges of education in Anambra State. By understanding their attitudes towards AI, we can identify potential barriers and facilitators for successful implementation. This knowledge can inform educational policymakers, curriculum developers, and educators about the best practices for harnessing AI's potential in mathematics education.

The findings of this study may have far-reaching implications for the future of mathematics education in Anambra State and beyond. It has the potential to guide the development of AI-enhanced educational tools, teacher training programs, and curriculum reforms aimed at improving mathematics instruction and enhancing student outcomes. Moreover, it contributes to the broader conversation about the role of AI in education, aligning with global trends in leveraging technology to enhance learning and teaching processes.
Statement of the Problem

Mathematics education in Anambra State, Nigeria, faces a series of multifaceted challenges that have the potential to hinder the quality of instruction and student learning outcomes. Despite its foundational role in the education system, mathematics education grapples with several issues that need careful examination and potential solutions. This study seeks to address the following key problems:

1. Quality of Mathematics Instruction: There is a concern about the quality of mathematics instruction in colleges of education in Anambra State. Variations in teacher qualifications, teaching methodologies, and resources can impact the effectiveness of mathematics education.

2. Student Performance in Mathematics: Student performance in mathematics at both the college level and in primary and secondary schools remains a significant concern. Low achievement levels and high failure rates in mathematics assessments raise questions about the effectiveness of current instructional approaches.

3. Limited Integration of Educational Technology: The adoption and integration of educational technology, particularly Artificial Intelligence (AI), into mathematics education are relatively limited. There is a lack of comprehensive strategies for leveraging AI tools to enhance the teaching and learning of mathematics.

4. Perceptions of Stakeholders: The perceptions and attitudes of mathematics educators and students regarding the integration of AI in mathematics education have not been thoroughly explored. Understanding these perceptions is crucial for the successful implementation of AI-enhanced mathematics education.

5. Inadequate Teacher Professional Development: The continuous professional development of mathematics educators is essential to keep them updated with modern teaching techniques, including those involving AI. However, there is a need to assess the extent of professional development opportunities in this regard.

6. Resource Constraints: Colleges of education may face resource constraints, including limited access to modern AI tools and technology infrastructure, which can impact the feasibility of AI integration in mathematics education.

7. Equity in Mathematics Education: There may be disparities in access to quality mathematics education, with marginalized communities potentially facing greater challenges. Investigating these disparities is essential for promoting equity in mathematics education.

In light of these complex challenges, this research aims to provide insights into the perceptions of mathematics educators and students concerning the integration of AI in mathematics education within colleges of education in Anambra State. By addressing these problems, this study seeks to contribute to the improvement of mathematics education in the state, ultimately benefiting both educators and students.

Significance of the Study

The proposed research on the integration of Artificial Intelligence (AI) in mathematics education in Anambra State, Nigeria, holds significant importance due to its potential to address pressing educational challenges and bring about transformative improvements. The study's significance encompasses various aspects:

Educational Enhancement: This study has the potential to enhance the quality of mathematics education in Anambra State's colleges of education. By exploring the integration of AI tools, it can provide valuable insights into innovative teaching and learning methods that can significantly benefit both educators and students.

Improved Student Learning Outcomes: Understanding the perceptions of students and educators regarding AI integration can lead to the development of more effective instructional strategies. AI-powered tools can personalize learning experiences, identify areas of weakness, and provide immediate feedback, potentially leading to improved student performance in mathematics.

Teacher Professional Development: The findings of this research can inform the design of teacher professional development programs. Educators can be equipped with the knowledge and skills necessary to leverage AI tools effectively, keeping them at the forefront of modern pedagogical practices.

Policy and Curriculum Development: The study's insights can inform the development of educational policies and curriculum adjustments at both the institutional and state levels. This can lead to the integration of AI tools into official curriculum frameworks, making AI-enhanced mathematics education a standard practice.

Research Advancement: The study contributes to the growing body of research at the intersection of AI and education. It can serve as a foundation for future research endeavors, guiding researchers in exploring similar topics in different educational contexts.

Global Relevance: As AI integration in education is a global trend, the findings of this study have broader implications beyond Anambra State. Lessons learned can be applied in other regions facing similar challenges and considering AI as an educational innovation.

Competitive Advantage: Producing graduates with strong mathematics skills and familiarity with AI can give Anambra State an edge in the global job market, where AI-related skills are increasingly in demand.
Research Questions:

1. What are the attitudes and perceptions of mathematics teachers towards the integration of Artificial Intelligence (AI) in the teaching of mathematics within colleges of education in Anambra State?
2. How do mathematics educators perceive the potential benefits and challenges of incorporating AI into mathematics education at the college level in Anambra State?
3. To what extent are mathematics educators in Anambra State's colleges of education familiar with AI technologies, and how does this familiarity influence their views on its integration into mathematics instruction?
4. What are the attitudes and perceptions of students studying mathematics at colleges of education in Anambra State regarding the use of AI as a teaching and learning tool in their mathematics courses?
5. How does the level of exposure and experience with AI technologies among students impact their receptiveness to AI integration in mathematics education within colleges of education in Anambra State?

Research Hypothesis

1. There is no significant difference in the attitudes and perceptions of mathematics educators towards the integration of AI in the teaching of mathematics within colleges of education in Anambra State.
2. There is no significant difference in the attitudes and perceptions of students studying mathematics at colleges of education in Anambra State regarding the use of AI as a teaching and learning tool in their mathematics courses.

Method

The study employed descriptive survey research design. The area of study is Anambra State, Nigeria. The study covers all Government Colleges of Education in the state. There are two government owned colleges of Education in Anambra State; Nwafor Orizu College of Education Nsugbe, and Federal College of Education (Technical), Umunze. Private Colleges of Education was not included. The population of the study was 221, which consists of both lecturers and students from all the government colleges of Education in Anambra; The population of the study was 221, which consists of mathematics lecturers and students from all the government colleges of Education in Anambra; 118 from Federal College of Education (Technical), Umunze and 103 from Nwafor Orizu College of Education Nsugbe. Purposive and Simple random sampling technique were used. Purposive sampling technique was used to select all the 30 lecturers because their population is small, while simple random sampling technique was used to select 150 students from the 191 students' population. The lecturers and the students are the respondents. Structured Questionnaires constructed in a 4-point Likert scale format was used as instrument for collecting data from the respondents. Mean and standard deviation was used to answer the research questions. Chi-square was used to test the hypotheses at 0.05 level of significance. The mean value of 2.50 and above was accepted while mean value below 2.50 was rejected.

Presentation and Analysis of Data

Research Question 1: What are the attitudes and perceptions of mathematics teachers towards the integration of Artificial Intelligence (AI) in the teaching of mathematics within colleges of education in Anambra State?

Table 1: Table 1 shows the responses of lecturers on their perceptions towards the integration of artificial intelligence (AI) in the teaching of mathematics within colleges of education in Anambra State.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Items</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>N</th>
<th>X</th>
<th>S.D</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>AI technology can enhance the effectiveness of teaching mathematics</td>
<td>10</td>
<td>13</td>
<td>5</td>
<td>2</td>
<td>30</td>
<td>3.03</td>
<td>0.87</td>
<td>Accepted</td>
</tr>
<tr>
<td>2.</td>
<td>I am concerned that AI might make lecturers to be lazy</td>
<td>12</td>
<td>11</td>
<td>4</td>
<td>3</td>
<td>30</td>
<td>3.07</td>
<td>0.95</td>
<td>Accepted</td>
</tr>
<tr>
<td>3.</td>
<td>I believe AI integration will make mathematics education more engaging for students</td>
<td>11</td>
<td>10</td>
<td>5</td>
<td>4</td>
<td>30</td>
<td>2.93</td>
<td>1.04</td>
<td>Accepted</td>
</tr>
<tr>
<td>4.</td>
<td>I am concerned that AI might replace the role of mathematics teachers</td>
<td>15</td>
<td>8</td>
<td>2</td>
<td>5</td>
<td>30</td>
<td>3.1</td>
<td>1.11</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

From item 1, we can see that all the items have a mean of over 2.50; this means that lecturers are of the opinion that AI technology can enhance the effectiveness of teaching mathematics. However item 4, shows that they are concerned that AI might replace the role of teachers.
Research Question 2: How do mathematics educators perceive the potential benefits and challenges of incorporating AI into mathematics education at the college level in Anambra State?

Table 2: Table 2 shows the mean responses of lecturers on possible potential benefits and challenges of incorporating AI into mathematics education at the college level.

<table>
<thead>
<tr>
<th>Items</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>N</th>
<th>X</th>
<th>S.D</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI can help individualize mathematics instruction for students</td>
<td>12</td>
<td>10</td>
<td>5</td>
<td>3</td>
<td>30</td>
<td>3.03</td>
<td>0.99</td>
<td></td>
</tr>
<tr>
<td>The use of AI in mathematics education can enhance problem-solving</td>
<td>8</td>
<td>13</td>
<td>3</td>
<td>6</td>
<td>30</td>
<td>2.77</td>
<td>1.05</td>
<td>Acceptance</td>
</tr>
<tr>
<td>AI may lead to increased students' engagement in mathematics classes</td>
<td>6</td>
<td>6</td>
<td>11</td>
<td>7</td>
<td>30</td>
<td>2.37</td>
<td>1.04</td>
<td>Rejected</td>
</tr>
<tr>
<td>One challenge of AI integration is the potential loss of personal</td>
<td>10</td>
<td>10</td>
<td>4</td>
<td>6</td>
<td>30</td>
<td>2.8</td>
<td>1.11</td>
<td>Acceptance</td>
</tr>
<tr>
<td>interaction between lecturers and students</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AI can assist in assessing and tracking students progress effectively</td>
<td>9</td>
<td>12</td>
<td>5</td>
<td>4</td>
<td>30</td>
<td>2.87</td>
<td>0.98</td>
<td>Acceptance</td>
</tr>
</tbody>
</table>

Item 5, 6, and 9, reveals that lecturers are of the opinion that AI can enhance the teaching and learning of mathematics at the college level. Nevertheless, item 7, shows that they are equally concerned that AI may lead to a decrease in students' engagement in mathematics classes.

Research Question 3: To what extent are mathematics educators in Anambra State's colleges of education familiar with AI technologies, and how does this familiarity influence their views on its integration into mathematics instruction?

Table 3: Table 3 shows the mean responses of lecturers on the extent mathematics educators in Anambra State's colleges of education are familiar with AI technologies, and how this familiarity influences their views on its integration into mathematics instruction.

<table>
<thead>
<tr>
<th>Items</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>N</th>
<th>X</th>
<th>S.D</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics lecturers are familiar with the concept of artificial</td>
<td>7</td>
<td>15</td>
<td>4</td>
<td>4</td>
<td>30</td>
<td>2.83</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>intelligence (AI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have used AI tools in my mathematics teaching</td>
<td>4</td>
<td>8</td>
<td>10</td>
<td>8</td>
<td>30</td>
<td>2.27</td>
<td>0.99</td>
<td>Rejected</td>
</tr>
<tr>
<td>I believe that my familiarity with AI positively influences my</td>
<td>10</td>
<td>12</td>
<td>6</td>
<td>2</td>
<td>30</td>
<td>3</td>
<td>0.89</td>
<td>Accepted</td>
</tr>
<tr>
<td>perspective on its integration into mathematics instruction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecturers are enthusiastic about using AI for enhancing mathematics</td>
<td>5</td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>30</td>
<td>2.3</td>
<td>1.12</td>
<td>Rejected</td>
</tr>
<tr>
<td>instruction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the table above, lecturers believe that their familiarity with AI positively influences their perspective on its integration into mathematics instruction and that they are familiar with the concept of artificial intelligence (AI). Nonetheless, items 11 and 13, show that lecturers don’t use AI tools in teaching mathematics and are not enthusiastic about using it.

Research Question 4: What are the attitudes and perceptions of students studying mathematics at colleges of education in Anambra State regarding the use of AI as a teaching and learning tool in their mathematics courses?

Table 4: Responses of Mathematics students on their attitudes and perceptions regarding the use of AI as a teaching and learning tool in their mathematics courses.

<table>
<thead>
<tr>
<th>Items</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>N</th>
<th>X</th>
<th>S.D</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>I believe AI is an essential and effective tool for learning</td>
<td>70</td>
<td>40</td>
<td>18</td>
<td>22</td>
<td>150</td>
<td>3.05</td>
<td>1.09</td>
<td>Accepted</td>
</tr>
<tr>
<td>mathematics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would like my mathematics courses to incorporate more AI based</td>
<td>66</td>
<td>48</td>
<td>27</td>
<td>9</td>
<td>150</td>
<td>3.14</td>
<td>0.92</td>
<td>Accepted</td>
</tr>
<tr>
<td>tools and resources.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Integrating AI in mathematics courses enhances students' overall learning experience.

Students are concerned that relying on AI might reduce the need for human mathematics teachers.

AI in education prepares students for future technological advancements.

From the table above, the students believe that AI is an essential and effective tool for learning mathematics, and that it can make learning mathematics more enjoyable. They also showed concern over the possibility of over-relying on AI thereby reducing the need for human mathematics teachers.

**Research Question 5:** How does the level of exposure and experience with AI technologies among students impact their receptiveness to AI integration in mathematics education within colleges of education in Anambra State?

**Table 5:** Mean responses of students on how the level of exposure and experience with AI technologies among students impact their receptiveness to AI integration in mathematics education within colleges.

<table>
<thead>
<tr>
<th>Items</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>N</th>
<th>X</th>
<th>S.D</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have prior experience using AI tools for learning mathematics</td>
<td>19</td>
<td>32</td>
<td>44</td>
<td>55</td>
<td>150</td>
<td>2.10</td>
<td>1.04</td>
<td>Rejected</td>
</tr>
<tr>
<td>My previous exposure to AI in education has positively influenced my perception of its use in mathematics instruction</td>
<td>24</td>
<td>36</td>
<td>48</td>
<td>42</td>
<td>150</td>
<td>2.28</td>
<td>1.05</td>
<td>Rejected</td>
</tr>
<tr>
<td>Students who have used AI for mathematics learning are more likely to excel in mathematics</td>
<td>52</td>
<td>54</td>
<td>27</td>
<td>17</td>
<td>150</td>
<td>2.94</td>
<td>0.99</td>
<td>Accepted</td>
</tr>
<tr>
<td>I am open to exploring new AI technologies for learning mathematics</td>
<td>72</td>
<td>45</td>
<td>21</td>
<td>12</td>
<td>150</td>
<td>3.18</td>
<td>0.95</td>
<td>Accepted</td>
</tr>
<tr>
<td>My familiarity with AI in mathematics has made me more receptive to its integration in college course</td>
<td>26</td>
<td>41</td>
<td>53</td>
<td>30</td>
<td>150</td>
<td>2.42</td>
<td>1.01</td>
<td>Rejected</td>
</tr>
</tbody>
</table>

From the table above, item 19 shows that many students don’t have prior experience using AI tools for learning mathematics. Item 21, also shows that the majority of the respondents are of the opinion that students who uses AI for mathematics learning are more likely to excel in mathematics.

**Research Hypothesis 1:** There is no significant difference in the attitudes and perceptions of mathematics educators towards the integration of AI in the teaching of mathematics within colleges of education in Anambra State.

**Table 6:** Summary of research hypothesis 1, using chi-square analysis.

<table>
<thead>
<tr>
<th>Number of lecturers</th>
<th>DF</th>
<th>X²Cal</th>
<th>X²Crit</th>
<th>Level of Sign.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>9</td>
<td>5.3332</td>
<td>16.919</td>
<td>0.05</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

From table 6 above, the critical chi-square value at 9 d.f and 0.05 level of significance is 16.919, which is greater than the calculated value (x²cal). Therefore we accept the null hypothesis. Hence, there is no significant difference in the attitudes and perceptions of mathematics educators towards the integration of AI in the teaching of mathematics within colleges of education in Anambra State.

**Research Hypothesis 2:** There is no significant difference in the attitudes and perceptions of students studying mathematics at colleges of education in Anambra State regarding the use of AI as a teaching and learning tool in their mathematics courses.

**Table 7:** summary of research hypothesis 2, using chi-square analysis

<table>
<thead>
<tr>
<th>Number of Students</th>
<th>DF</th>
<th>X²Cal</th>
<th>X²Crit</th>
<th>Level of Sign.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>12</td>
<td>58.8877</td>
<td>21.026</td>
<td>0.05</td>
<td>Rejected</td>
</tr>
</tbody>
</table>
From table 7 above, the critical chi-square value (x\(^2\)crt) at 12 d.f and 0.05 level of significance is 21.026, which is less than the calculated value (x\(^2\)cal) of 58.8677. Therefore the null hypothesis was rejected. Hence, there is a significant difference in the attitudes and perceptions of students studying mathematics at colleges of education in Anambra State regarding the use of AI as a teaching and learning tool in their mathematics courses.

Summary of Findings

From the study, the following findings were made:

1. Mathematics lecturers are familiar with the concept of artificial intelligence (AI)
2. The use of AI enhances the teaching and learning of mathematics.
3. Integrating AI into mathematics courses enhances students overall learning experience
4. Students are concerned that relying on AI might reduce the need for human mathematics teachers
5. Lecturers are concerned that AI might replace the role of mathematics teachers
6. Lecturers don’t use AI tools in teaching mathematics in colleges of Education in Anambra State.

Discussion of the findings

The findings in research question 1, shows that lecturers accepted that AI technology can enhance the effectiveness of teaching mathematics. Also they are concerned that AI might replace the role of teachers. The research hypothesis 1 was tested against research question 1, and the result showed that there is no significant difference in the attitudes and perceptions of mathematics lecturers towards the integration of AI in the teaching of mathematics within colleges of education in Anambra State.

Findings from research question 2, shows that AI can enhance the teaching and learning of mathematics at the college level. This is in line with (Ezenwobodo, 2023) who opined that the introduction of technology into mathematics instruction will enhance problem-solving skills of students and improve the overall teaching and learning of mathematics. Nevertheless, Lecturers are also concerned that AI may lead to a decrease in students’ engagement in mathematics classes.

The findings from research question 3 clearly showed that lecturers believe that their familiarity with AI positively influences their perspective on its integration into mathematics instruction and that they are familiar with the concept of artificial intelligence (AI). Nonetheless, they don’t use AI tools in teaching mathematics and are not enthusiastic about using it.

Findings from research 4, shows that the students believe that AI is an essential and effective tool for learning mathematics, and that it can make learning mathematics more enjoyable. They also showed concern over the possibility of over relying on AI, thereby reducing the need for human mathematics teachers. Research hypothesis 2 was tested against research question 4. The result showed that there is a significant difference in the attitudes and perceptions of students studying mathematics at colleges of education in Anambra State regarding the use of AI as a teaching and learning tool in their mathematics courses.

The findings from research question 5 revealed that, many students don’t have prior experience using AI tools for learning mathematics and few who have used AI for mathematics learning likely excelled more in mathematics.

Implications of the Findings

The educational implications of the findings are stated as follows:

a. Integrating AI into education prepares students for future technological advancements.

b. By implementing AI in teaching and learning of mathematics, students are willing to attempt solving problems and enjoy doing mathematics.

c. The use of AI offers the learners the opportunity to be creative, imaginative and positioned to acquire reasonable knowledge hence enabling them solve difficult and complex problems easily.

d. AI will assist in assessing and tracking students progress effectively

Conclusion

The results drawn from this study has shown that artificial intelligence (AI) are seldomly used in the teaching and learning of mathematics in colleges of Education in Anambra State. Also the study showed that the use of AI enhances the teaching and learning of mathematics in colleges of education in Nigeria. The study also revealed that the introduction of AI tools and technologies into mathematics instruction will enhance problem-solving skills of
students and improve the overall teaching and learning of mathematics. The study also revealed that lecturers are highly concerned that AI will replace the role of mathematics teachers and that AI may lead to a decrease in students’ engagement in mathematics classes.

The adoption and use of AI tools in colleges of Education have a positive impact in teaching, learning and research. Despite the roles AI play in education, colleges of Education in South Eastern Nigeria are yet to extensively adopt it for teaching and learning processes. This is to some extent as a result of AI policy project implementation strategy/awareness.

In order to ensure that AI technologies are widely adopted and used in Nigeria higher education system, efforts should be made by government and school authorities to ensure that all the possible factors affecting access to the use of AI in schools are eliminated.

Recommendations

The following recommendations were made based on the findings:

1. AI has come to stay; therefore lecturers should be trained and motivated on how to competently use AI tools to enhance their mathematics teaching.
2. The perceptions and mindsets of lecturers should be positively changed to accept AI.
3. Students should be enlightened that just like mathematical software packages, AI tools and technologies have come to assist them and the teachers to enhance teaching and learning of mathematics and not to take their teachers role.
4. Both lecturers and students should be guided on the ethics of using AI, so as not to misuse it or be overly dependent on it.
5. Educational stakeholders should organise conferences for students where they’ll be taught AI and its tools and the positive effects of it to education.
6. The world is changing and there will be continuous evolution of technologies, hence the perceptions of teachers should improve to accept changes and not be dogged in their traditional pedagogy.

Limitations of the Study

In the execution of this project, the Researcher experienced insecurity challenges on the way; this is as a result of the high level of insecurity in Southern Nigeria. Negative attitude of students and indifference attitude of lecturers to the questionnaire was another constraint of the study.

Suggestions for Further Studies

Based on the findings of this work the following suggestions were made for subsequent research work:

2. The effect of the use of AI in teaching mathematics in secondary schools in Anambra
3. Evaluating the Ethical issues associated with the use of AI and how it influences its integration into the teaching and learning of mathematics in colleges of education in Anambra State

References

Azuka, D.S. (2013) Journal of Educational Psychologist Volume 26, 3-4


