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TEACHERS' PERCEPTION OF THE USE OF ARTIFICIAL INTELLIGENCE IN TEACHING BASIC MATHEMATICAL SKILLS AMONG SECONDARY SCHOOL STUDENTS IN ONDO STATE

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ABSTRACT
The study examined the Teachers' Perception of the use of Artificial Intelligence in teaching Basic Mathematical Skills among Secondary School students in Ondo state. A descriptive research design of the survey type was used for the study. The population of the study comprised all Mathematics teachers in secondary schools in Ondo state. The sample size for the study was one hundred and fifty (150) respondents selected, through a purposive sampling technique. A self-developed questionnaire tagged "Questionnaire on Teachers Perception of the Use of Artificial Intelligence" (QTPUAI) was used to collect data. The face and content validity was ensured while the reliability of the instrument was determined through test-retest method which yielded a coefficient of 0.70. Data obtained on the study were analysed using, descriptive statistics of simple percentages, frequency counts and mean. The finding of the study revealed that, AI could adequately equip students with the mathematical skills of carrying out addition and subtraction and also, AI was the best strategy that could enable students in Mathematics learning to overcome challenges of learning the basic Mathematical concepts. Based on the findings of this study, it could be concluded that, teachers were of the opinion that AI has significant impact in assisting and equipping students with acquisition of skills to carry out the basic Mathematical operations. Based on the findings of this study, it was recommended that, AI usage should be stressed in Mathematics curriculum for secondary education and AI devices should be allowed at Mathematics classroom.

Keywords: Artificial Intelligence, Basic Mathematic Skills, Perception, Teachers, Teaching

Introduction

Mathematics connects everything around us, in our world and even our world with others. If there is an alien civilization that visits our planet, it is likely that they would not understand our language or customs but the fundamental concepts of Mathematics will probably hold things that our societies may have in common (Hwang and Tu, 2021). Mathematics is one of the core subjects in secondary schools' curriculum in Nigeria. It is a major subject which students must offer in respects to the areas of their study whether Arts, Social Sciences and Sciences. Hence, the curriculum for secondary education makes it a compulsory subject for students. Mathematics deals with numbers and their operations (Yadav, 2020). Mathematics is a subject which everybody needs its skills to solve human daily challenges. Mathematics is the study of numbers, shapes, patterns and how they relate to each other. Mathematics is not just about solving equations nor doing calculations; it is a way of finding solutions and making sense of the world. The above explanation or definition ascribes to Mathematics make it a universal subject all around the world. Mathematics is a science of reasoning and computation. Bello (2012) defines Mathematics as the language that helps us to describe ideas and relationships drawn from environment.

Poor performance in sciences has also been attributed to poor performance of students in Mathematics. The discouraging students' performance in Mathematics according to Mabula (2012) can be attributed to poor teacher-student relationship in Mathematics classroom. He stated that, inappropriate teaching methods do results to failure in core subjects, Mathematics inclusively. Other factors identified by Mathematics scholars are: lack of motivation and interest from the students, home factors, lack or inadequate teaching materials and so on. Isaac (2015), states that lack of pedagogical skills acquisition by Mathematics teacher is a set-back to the teaching and learning of Mathematics.

Artificial intelligence simply means intelligent machines or systems. These systems are considered intelligent for efficiently performing tasks that would normally require human intelligence, such as recognizing speech, understanding natural language, and making decisions based on complex data (Baker and Smith, 2019). It is a field that encompasses machine learning as well as other approaches to structure smart systems used in a wide variety of applications. Creating systems with advanced understanding of natural language or images, which require complex internal rules beyond manual design capabilities.

Following the endorsement by the National Council of Teachers of Mathematics (2011) on the use of educational technology in Mathematics education stating that "Technology is essential in teaching and learning of Mathematics; it influences the Mathematics that is taught and enhances students' learning". Educational technology is making a modest difference in learning of Mathematics. It is a support, yet not a breakthrough. However, the evidence to date does not show satisfaction but rather projects that new and better tools are needed to harness the power of technology to enhance Mathematics achievement for all. Ji, Han, and Ko, (2023) assessed how different types of technology can enhance student involvement in learning Mathematics.

Artificial Intelligence (AI) is a set of technologies that enables computers to perform a variety of advanced functions including the ability to see, understand, and translate spoken and written language, analyse data, make recommendation and move. Artificial Intelligence is a field of science concerned with building computers and machines that can reason, learn and act in such a way that would normally require human intelligence or that involves data whose scale exceeds what humans can do or analyse. Holman (2023), that Artificial Intelligence has significant impact on Mathematics learning by students in the classroom and that it has transformed the technology of Mathematics teaching and has become invaluable in helping students to learn and understands complicated Mathematical problems. Coursera Staff (2024) defines Artificial Intelligence as a hypothetical type of intelligence agent that has the potential to accomplish any intellectual task that humans can. The identified gap in

respects of Mathematics and Artificial Intelligence usage thus, motivated the research of this present study to carry out the study.

AI and its applications are been used in different areas of life and have taken vital roles in improving efficacy and effectiveness through the development of computer systems, to operate with superior efficiency similar to the efficiency of an expert human being. AI has become an applied science revolving the day-to-day activities affecting humans' present and future reality with incredible technical advancements (Mahmoud, 2020). AI plays a crucial part in many sensitive fields like medical, legal, education, and also security and military fields. AI can conduct scientific research and provide easy access to more discoveries. For Mathematics, Jauhiainen and Garagorry (2023) showed the positive impact AI tools or applications exhibited in enhancing students' understanding of mathematical concepts through the utilization of mobile applications, educational games, interactive systems, lesson design tools in customizing educational materials and creating tailored educational experiences, and using student data analysis and automatic recommendations in teaching and learning of Mathematics.

Statement of the Study

Mathematics is a powerful tool for self-reliance, enabling individuals to make informed decisions and solve problem in various aspects of life. Despite the great importance attached to mathematics in Nigeria. However, the performance of students in the subject is appalling, this has been traced to diverse factors and it has also been a source of carrying out studies by researchers, particularly in Mathematics Education.

The researchers of this study being classroom teachers observed that, study on teachers' perception on the acquisition of basic mathematical skills through the use of Artificial Intelligence (AI) has not been seriously focused on. It is on this basis that this study examines the Teachers' Perception of the use of Artificial Intelligence in teaching Basic Mathematical Skills among Secondary School students in Ondo state.

Purpose of the Study

The main purpose of the study was to examine the Teachers' Perception of the use of Artificial Intelligence (AI) in teaching Basic Mathematical Skills among Secondary School students in Ondo state.

Specifically, the study sought to:

1. examine teachers' opinion on efficiency of using Artificial Intelligence (AI) on carrying out addition and subtraction
2. determine the perception of teachers' on using Artificial Intelligence on performing percentages and Algebra.

Research Questions

The following research questions were raised to guide the study.

1. Can Artificial Intelligence usage help students to carry out addition and subtractions?
2. Does the use of Artificial Intelligence the best method to master the skills of carrying out simple percentage and Algebra?

Methodology

The study adopted a descriptive design of survey type. The research adopted this type of design because the existing situation as regards learning variables as they influence the students' performance and attitude towards Mathematics. The design is suitable because it allowed the researcher to gather information relating to learning on students' performance and attitude towards Mathematics. The population for the study consisted of all mathematics teachers in public secondary schools in Ondo state. The sample for the study was 150 mathematics teachers, who were selected from twelve secondary schools in Ondo state using multistage sampling procedure. The first stage involved the use of simple sampling technique to select five out of eighteen local government areas in Ondo state. The second stage involved the selection of three schools in each of the local government using stratified sampling

technique. The third stage involved the use of purposive sampling technique to select ten mathematics teachers from each school. In all 150 mathematics teachers were used for this study. A self-developed questionnaire tagged "Questionnaire on Teachers Perception of the Use of Artificial Intelligence" (QTPUAI) was used to collect data. The face and content validity of the instrument was done by the experts in Mathematics departments and it was also presented to Test Measurement and Evaluation experts. While the reliability was determined by using test re-test method and analysed by using Pearson's Product Moment Correlation Analysis, which yielded 0.70 reliability coefficients. The research assistants were employed to administer the instruments and collected the data. The data collected were analysed using descriptive statistics of simple percentages, frequency count and mean.

Results

Research Question One: Can Artificial Intelligence (AI) usage help students to carry out addition and subtraction?

Table 1: Table showing simple Percentage, Frequency Counts and Mean (X) on can Artificial Intelligence (AI) usage help students to carry out Addition and Subtraction.

		N = 150		C = 2.5				
	ITEMS	**SA**	**A**	**D**	**SD**	**N**	**MEAN (X)**	**DECISION**
1	AI usage assist students to solve questions on addition better than using their own intelligence	11	9	19	111	**150**	**1.46**	**Disagreed**
2	Using AI will not enable students to be able to carry out addition independently	117	11	9	13	**150**	**3.54**	**Agreed**
3	AI enable students to know practical way of carrying out addition	8	12	16	114	**150**	**1.53**	**Agreed**
4	It will be difficult for students to practically carry out simple addition	122	19	3	6	**150**	**3.71**	**Agreed**
5	AI makes it faster for students to know how to carry out subtraction	2	9	23	116	**150**	**1.31**	**Disagreed**
6	AI does not enhance students' ability in carrying out subtraction.	114 76	19 12.66	16 10.66	1 0.66	**150**	**3.64**	**Agreed**
7	AI encourages laziness among students in carrying out subtrction	133	6	7	4	**150**	**3.78**	**Agreed**
8	AI makes students to be more active and well engaging while doing subtraction	5	2	25	118	**150**	**1.29**	**Disagreed**
	Total Weight	**512**	**87**	**118**	**483**		**2.53**	**Agreed**

Table 1 above shows the findings on research question one as follows:

On item 1, responses obtained indicated 11, 9, 19 and 111 for strongly agreed, agreed, disagreed and strongly disagreed respectively. On item 2 the following responses were gotten; 117, 11, 9 and 13 for strongly agreed, agreed, disagreed and strongly disagreed. Also, on item 3, responses revealed 8, 12, 16 and 114 for strongly agreed, agreed, disagreed and strongly disagreed, as well. On item (4), the following responses were gotten 122, 19, 3, 6 for strongly agreed, agreed, disagreed and strong disagreed. On item 5 responses revealed that 2, 9, 23 and 116 for strongly agreed, agreed, disagreed and strongly agreed, respectively. On item 7, responses got showed 133, 6, 7, and 4 for strongly agreed, disagreed, agreed and

strongly disagreed, also Finally, on item 8, the following responses were obtained; 5, 2, 25 and 118 for strongly disagreed, as well.

On a general note, the average rating scale of four (x = 2.5) was lesser than the mean of average rating scale of four (x = 2.53), thus, portrays that AI usage could help students to carry out addition and subtraction.

Research Question Two: Will the use of Artificial Intelligence be the best method to master skills of carrying out simple percentages and Algebra by the students?

Table 2: Table showing simple percentages, frequency counts and mean (X) on will the use of Artificial Intelligence be the best method to master skills of carrying out simple percentages and Algebra by the students.

		N = 150		C = 2.50				
	ITEMS	**SA**	**A**	**D**	**SD**	**N**	**MEAN (X)**	**DECISION**
9	The best way which students can know how to calculate simple percentage is by using AI	6	4	13	127	**150**	**1.26**	**Disagreed**
10	AI usage will not enable students to know how to carry out simple percentage	124	13	11	2	**150**	**3.72**	**Agreed**
11	Encouraging students to use AI will enable them to develop interest in simple percentage	3	9	21	117	**150**	**1.30**	**Disagreed**
12	Students using AI will never know how to compute simple percentage	113	16	13	8	**150**	**1.36**	**Disagreed**
13	The use of AI will equip students better with skills of solving Algebra questions	5	9	22	114	**150**	**1.36**	**Disagreed**
14	Using AI may not equip students with the practical skill to solve Algebra questions.	129	11	9	1	**150**	**3.78**	**Agreed**
	Total Weight	**380**	**62**	**89**	**469**		**2.50**	**Disagreed**

The findings on research question two as indicated in table 2 above, shows the following: on item 9 it was revealed that 6, 4, 13 and 127 were gotten for strongly agreed, agreed, disagreed and strongly disagreed respectively. On item 10 the following responses were also got; 124, 13, 11 and 2 for strongly disagreed. On item 11 the following responses

were got; 3, 9, 21 and 117 for strongly agreed, agreed, disagreed and strongly disagreed, also on items 12 responses obtained indicated 113, 16, 13 and 8 for strongly agreed, agreed, disagreed and strongly disagreed respectively.

On item 14 responses got were 129, 11, 9 and 1, strongly agreed, agreed, disagreed and strongly disagreed, also. The total weight of the findings revealed that the rating scale of four (x = 2.5) was greater than the mean of average rating scale four (x = 2.5), also it could therefore be deciphered through result that AI was the best strategy to the skills of solving simple percentages and Algebra questions by the students.

Discussion

The results of research question showed that AI could adequately equip students with the mathematical skills of carrying out addition and subtraction. The result aligns with the opinion of Holman (2023), that Artificial Intelligence has significant impact on Mathematics learning by students in the classroom and that it has transformed the technology of Mathematics teaching and has become invaluable in helping students to learn and understands complicated Mathematical problems. Further, that AI could automatically solve any equation or problem and provide students with quick and accurate answer while Isaac (2015), states that lack of pedagogical skills acquisition by Mathematics teacher is a set-back to the teaching and learning of Mathematics.

The result on research question two also indicated that, AI was the best strategy that could enable students in Mathematics learning to overcome challenges of learning the basic Mathematical concepts such as simple percentages, Algebra, addition and subtraction, and so on. The result agrees with the position of Mahmoud (2020) that, AI is a good tool that could be used to generate multiple explanations for Mathematics concepts. Further, Jauhiainen and Garagorry (2023) showed the positive impact AI tools or applications exhibited in enhancing students' understanding of mathematical concepts through the utilization of mobile applications, educational games, interactive systems, lesson design tools in customizing educational materials and creating tailored educational experiences, and using student data analysis and automatic recommendations in teaching and learning of Mathematics.

Conclusion

Based on the findings of this study, it could be concluded that, teachers' were of the opinion that AI has significant impact in assisting and equipping students with acquisition of skills to carry out the basic Mathematical operations in secondary schools in Ondo state which are addition, subtraction, Division, Algebra, simple percentages, ratio and so on.

Recommendations

Based on the conclusion the following recommendations were made by the researchers;

1. AI usage should be stressed in Mathematics curriculum for secondary education.
2. AI devices should be allowed at Mathematics classroom.
3. Secondary schools should be well equipped with AI devices for teaching and learning purposes.

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