Basic Science and Technology Teachers' Attitude and Intention-To-Use AI for Lesson Planning and Delivery: The Narratives in Oyo State, Nigeria

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ABSTRACT

Basic Science and Technology (BST) is a subject that emanated from Integrated Science, which aims at laying solid foundation in scientific skills and thoughts. The aim is to provide learners with the initial practical frameworks which are inevitable for understanding scientific concepts, principles, theories and laws. It is also to serve as pre-requisites for future study of core science subjects at the senior secondary and tertiary institution, needed for the societal development. Due to the adoption of the generalized teaching system at pre and primary education levels, whereby qualified but non-professional teachers teach BST, there have been low functional and ineffective teaching and learning of BST at the early years educational levels. This has been denying the learners from enjoying BST, and bring in their innovative ideas into their education. As a result of this, the idea of adopting ICT in BST education evolves, whereby ICT can be used to demystify the teaching and learning of BST. The latest ICT in education around the world today is Artificial Intelligence (AI). AI has been adopted to solve several educational challenges around the world but there is no empirical evidence about the pre and primary school BST teachers' attitude and intention to adopt AI in lesson planning and delivery in Nigeria, hence this study. Descriptive survey design was adopted and multi-stage sampling approach was used to select 318 teachers (public school – 32.1%; private school – 59.4% and demonstration school – 8.5%) in Oyo State. Data gathered were analyse using descriptive and inferential statistics. It was found out that early years teachers had positive attitude towards lesson planning and delivery among others. The study has paved way for teacher trainers in Nigeria to decide 'when', 'how' and 'with what' to train early years teachers on the use of AI for BST lesson planning and delivery, which will improve the effectiveness of BST education.

Keywords: Basic science and technology education, Pre and primary education, Teachers' attitude and intension to use AI, Scientific skills and thoughts

INTRODUCTION

The attitude of a teacher, content delivered and mode of teaching any school subject have the potential of influencing the learning acquired by the recipients of the lesson. The attitude of a teacher is capable of dictating how the teaching will go; content delivered depends on the subject matter knowledge (SMK) of the teacher and the learners' engagement during the lesson also depends on the instructional strategy adopted by the teacher. Kenedi et al. (2019) identifies primary schools as one of the formal institutions that aim to develop basic concepts, skills and knowledge. These skills and knowledge are developed into something valuable that can be applied in the processes of everyday life. According to Akinbote (2007), the primary

school years are principal years in a child's intellectual and all-round development, therefore all primary school teachers should be intellectually sound to teach the school children with diverse interests, and capabilities. A teacher is the central point of learning in a classroom situation, most especially, of some rule-governed subjects like Mathematics and Basic Science and Technology.

Basic Science and Technology (BST) has been identified as one of the school subjects in basic education that has not been enjoying enough learners' engagement during lesson. The subject emanated from Integrated Science, which aims at laying solid foundation in science at primary and junior secondary school levels (FRN, 2013). BST has two major subjects merged together namely, Basic Science and Basic Technology. This study is more on Basic Science. Basic Science (BS) is a learning related to natural phenomena that is studied through scientific methods such as experimentation and observation (Kenedi, Chandra and Fitria, 2019; Amini and Fitria, 2019). This statement proves that science learning can be carried out through the investigation process, that fully engage the pupils in the process of teaching/learning activities.

BS curriculum was drawn from major science disciplines such as Physics, Chemistry, and Biology, which expresses the fundamental unity of scientific thought (Jorge, 2017). The aim is to provide students with the initial practical frameworks which are inevitable for understanding scientific concepts, principles, theories and laws. It is meant to serve as pre-requisite for future study of core science subjects at the senior secondary school and higher levels.

Our future depends on a society that can use science for personal decision-making and to contribute meaningfully to the development of socio-economic and technology advancement of the society. Though, there are national goals for Basic Science education in Nigeria, but it has been observed that teaching and learning of the subject is often pushed to the side, particularly at the primary school level. This can be seen in the qualification and professionalism of BST teachers as well as number of times the subject is taught per week. BST is one of the compulsory subjects at primary level of education because of the knowledge and skills it could impact on the pupils. Some of these skills and knowledge are useful in the further education as well as contributions to the development of the society.

According to Baumbach (2023), understanding the world around us is at the heart of science education. Traditionally, the learning approach has been teacher-centred, with pupils sitting in a classroom, scribing notes, and taking tests to demonstrate their scientific knowledge. Lately, however, an increasing number of educators are advocating for better instructional strategies that will engage the pupils in doing science (sciencing) (Jorge, 2017; Amini & Fitria, 2019; Baumbach, 2023).

At the primary school level in Nigeria, a teacher teaches all the subjects irrespective of his/her area of specialization. This, according to Ndhlovu et al. (2021), is known as Generalized Teaching System (GTS) whereby, a teacher is assigned a class and teaches all the subjects. In another hand, Ndhlovu et al. (2021) describes specialized teaching as a situation whereby different teachers teach different core subjects based on their professional training. A National Certificate of Education (NCE) holder who specialises in English and Yoruba Languages for example, might not be able to teach Mathematics and Basic Science and Technology effectively if employed to teach all subjects in a GTS schools.

Perhaps the most significant difference between primary school and secondary school teaching is the relationship between teachers and the learners. In primary schools, each class has a teacher who stays with the pupils for most of the week and teaches the whole curriculum, since GTS is adopted. However, in secondary schools, where specialized system of teaching is adopted, teachers teach different subjects based on their areas of specialisations.

It is worth noting that the teaching methodology of a teacher influences pupils' interest in that particular

subject (Ohiwerei & Nwosu 2009). Due to the adoption of the generalized teaching system, whereby qualified but non-professional teachers teach BST in primary level of education, there have been inefficient teaching and learning of the subject at both pre and primary education levels. The generalized teaching system made the pupils not to enjoy the teaching and learning of BST, bring in their innovative ideas, and manipulate scientific materials.

One factor in teaching and learning of Basic Science and Technology is the competency of the teacher and this can be achieved through effective lesson planning and delivery. However, research by Oyetunde (2015) shows that Basic Science and Technology teachers tend to teach without effective lesson preparation and this affects effective lesson delivery. As a result of this, it was thought of that Information and Communication Technology (ICT) can be adopted, that is, ICT could be adopted in our educational system to solve educational problems.

ICT is an important part of most organizations these days (Zhang & Aikman, 2009). Computers began to be used in schools in the early 1980s, and several scholars suggest that ICT will be an important part of education for the next generation (Bransford, Brown, & Cocking, 2000; Grimus, 2000; Yelland, 2001). Up-to-date technology offers many methods of enhancing classroom teaching and learning (Ghavifekr et al., 2014). Dawes (2001) stated that new technologies have the potential to upkeep education across the curriculum and deliver opportunities for efficient student-teacher communication in ways not possible before. ICT in education has the potential to transform teaching.

The latest form of ICT in the world as at today is Artificial Intelligence (AI), which can be adopted in many areas of teaching and learning in our educational system. The expression *Artificial Intelligence* (AI) as first coined by John McCarthy at the Dartmouth Artificial Intelligence Conference in 1956. In recent years, it has often been claimed that Artificial Intelligence (AI) is the 'new oil' (Palmer, 2006) that is making every sector work. More recently, it has even been claimed (Lemoine, 2022), that one AI system, the LaMDA dialogue system developed by Google, has become sentient. Whatever the reality, there have been massive investments in AI technology around the world (as much as US$ 94 billion in 2021 alone; as well as high-profile policy statements about the need to promote and regulate this emerging technology (UNESCO, 2021; Statista, 2022).

The potential of AI for education and learning (that is, the *application* of AI in education), and the role of education in developing what has become known as AI literacy (the *teaching* of AI in education), have also received increased attention, and are fast becoming hot topics in policy debates (Miao & Holmes, 2021). In many developed countries, AI has been increasingly propagated as having strategic value for education. AI has been an effective learning tool that lessens the burdens of both teachers and students and offers effective learning experiences for students. AI has transformed the educational system of such countries into knowledge and information society (Baumbach, 2023). It has become an integral part of the today's teaching and learning process. The use of AI in the classroom is very important for giving pupils and students opportunities to learn and apply the 21st century skill. With the world moving into the digital media and information, the role of AI in education is becoming more and more important (Holmes and Tuomi, 2022).

The achievement in education with the adoption of AI into the school system has not been fully harnessed in Nigeria where teaching of BST is still in the hands of unprofessional teachers because of GTS that is being adopted, compared to what obtain in the developed countries. Several types of AI are available, but there are some that can be used to ease the lesson planning and delivery. Past literatures on teaching and learning of Basic Science in Nigeria generally and Oyo State in particular, have been looking into the use of child-centred methods of teaching, the use of instructional resources, characteristics of school facilities and so on, but none of the literature in Oyo State, to the best knowledge of these researchers, has gone into the adoption of AI platforms to ease the lesson planning and delivery of Basic Science. Hence, the need for this

study.

Objectives of the study

The aim of the study is to determine the attitude as well as the intention to use AI by Basic Science and Technology teachers for lesson planning and delivery at primary school level. Specifically, the objectives are to:

1. Determine the Basic Science and Technology teachers' attitude to adoption of AI for:
    a. Lesson planning
    b. Lesson delivery
2. Determine the Basic Science and Technology teachers' intention to use AI for
    a. Lesson planning
    b. Lesson delivery

Research questions

1. What is the attitude of BST teachers towards the adoption of AI for lesson planning?

2. What is the attitude of BST teachers towards the adoption of AI for lesson delivery?

3. To what extent do BST teachers have intention to use AI for lesson planning?

4. To what extent do BST teachers have intention to use AI for lesson delivery?

5. Is there significant influence of teachers' area of specialisation on their attitude and intention-to-use AI for lesson planning and delivery?

MATERIALS AND METHODS

The study adopted descriptive survey research design. This is to enable the researchers describe the attitude and intention-to-use AI by the early years teachers to enhance their lesson planning and delivery skills. The population of the study is the entire pre and primary school teachers in Oyo State. To select the schools and the teachers, the study leverage ICT using google form to collect the data across the state. The platform of OMEP Oyo State Chapter and Early Childhood Association of Nigeria (ECAN), Oyo State Chapter which have school owners and teachers of both pre and primary schools were used to disseminate the link to the google form questionnaire. At the end, 318 teachers responded to the questionnaire, where 32.1% were from public schools, 59.4% were from private schools, 7.5% were from demonstration schools and only 0.9% of them failed to indicate their school type. Majority of the teachers were Social Sciences specialists – 45.3%, followed by those that were Arts specialists – 32.1% while those science specialists were the lowest – 20.8%.

Data were gathered using a questionnaire title, 'In-service Primary Teachers' Adoption of AI for Lesson Planning and Delivery Questionnaire' (IsPT_AILPDQ). IsPT_AILPDQ has two sections namely; Section A and B. Section A contains the demographic data with seven items. Section B contains four parts. Part I measures teachers' attitude towards adoption of AI for lesson planning and it has eight items; Part II measures teachers' attitude towards adoption of AI for lesson delivery and it has seven items; Part III measures teachers' intention-to-use AI for lesson planning and it has eight items while Part IV measures teachers' intention-to-use AI for lesson delivery and it has six items. IsPT_AILPDQ was validated and the reliability coefficient obtained is 0.79.

Data collection took two weeks and the obtained data were vetted and descriptive analysis of frequency count, percentage, mean and standard deviation were used to answer the research questions 1 to 4 while research question 5 was answered using Analysis of Variance (ANOVA) at 0.05 level of significance.

RESULTS

Research question 1: What is the attitude of BST teachers towards the adoption of AI for lesson planning?

Table 1: The Attitude of BST Teachers towards the Adoption of AI for Lesson Planning

S/N	Items	N	Mean	Std. D	Remark
Attitude to AI for Lesson Planning					
1	Artificial Intelligence (AI) is another form of ICT that can enhance primary education	318	3.434	.660	Agreed
2	AI can equip a teacher to plan a good lesson in any subject	318	3.425	.566	Agreed
3	AI can be a source of effective instructional materials to be used	318	3.293	.599	Agreed
4	The best way to evaluate a particular lesson can be suggested by AI	318	2.887	.745	Agreed
5	How best a lesson could be evaluated can be suggested by AI	318	2.915	.716	Agreed
6	AI gives answer to all learners' questions; hence it does not promote thinking	318	2.726	.928	Agreed
7	AI will consume teachers' resources like data and time, therefore, adding unnecessary expenses.	318	2.651	1.048	Agreed
8	AI will destroy education than making it better	318	1.991	.820	Disagreed
Weighted Average			**2.915**	**+ve Attitude**	

Table 1 shows that the teachers agreed with the following: that Artificial Intelligence (AI) is a form of ICT that can enhance primary education (mean = 3.43); that AI can equip a teacher to plan a good lesson in any subject (mean = 3.43); that AI can be a source of effective instructional materials to be used (mean = 3.29); that the best way to evaluate a particular lesson can be suggested by AI (mean = 2.89) and that how best a lesson could be evaluated can be suggested by AI (mean = 2.92). The teachers also disagreed that AI will destroy education than making it better (mean = 1.99). However, the teachers had some reservations for the adoption of AI for lesson planning. For instance, they agreed that AI gives answer to all learners' questions; hence it does not promote thinking (mean = 2.73) and that AI will consume teachers' resources like data and time, therefore, adding unnecessary expenses (mean = 2.65).

The weighted average of the table is 2.92, with the threshold of 2.5, therefore, the teachers had positive attitude towards adoption of AI for lesson planning.

Research question 2: What is the attitude of BST teachers towards the adoption of AI for lesson delivery?

Table 2: Attitude of BST Teachers towards the Adoption of AI for Lesson Delivery

S/N	Items	N	Mean	Std.D	Remark
Attitude to AI for Lesson Delivery					
1	Artificial Intelligence (AI) is another form of ICT that can enhance lesson delivery	318	3.415	.565	Agreed
2	AI can equip a teacher with how to deliver lessons of any subject in primary school	318	3.236	.576	Agreed

3	AI can be a source of effective way of teaching that will engage the pupils	318	3.038	.701	Agreed
4	AI can suggest items for diagnostic and formative questions to be used while teaching	318	3.094	.709	Agreed
5	AI can equip primary teachers with better pedagogical knowledge of every primary subject	318	3.113	.650	Agreed
6	AI cannot help in teaching delivery since it is just a browsing platform	318	2.198	.896	Disagreed
7	A good teacher does not need AI to deliver a good lesson	318	2.264	.956	Disagreed
Weighted average			**2.908**	**+ve attitude**	

Table 2 shows that the teachers agreed with the following: that Artificial Intelligence (AI) is another form of ICT that can enhance lesson delivery (mean = 3.42); that AI can equip a teacher with how to deliver lessons of any subject in primary school (mean = 3.24); that AI can be a source of effective way of teaching that will engage the pupils (mean = 3.04); that AI can suggest items for diagnostic and formative questions to be used while teaching (mean = 3.09) and that AI can equip primary teachers with better pedagogical knowledge of every primary subject (mean = 3.11). But the teachers disagreed that AI cannot help in teaching delivery since it is just a browsing platform (mean = 2.20) and that a good teacher does not need AI to deliver a good lesson (mean = 2.26).

The weighted average is 2.91 which indicates positive attitude. Therefore, BST teachers have positive attitude towards the adoption of AI for lesson delivery.

Research question 3: To what extent do BST teachers have intention to use AI for lesson planning?

Table 3: BST Teachers' Intention to use AI for Lesson Planning

S/N	Items	N	Mean	Std.D	Remark
Intention-to-use AI for Lesson Planning					
1	I will like to know more about AI platforms that can help with lesson planning	318	3.236	.785	Agreed
2	I want to use AI to plan lessons of subjects I am not its specialist	318	3.066	.718	Agreed
3	I will like to use AI to generate objectives that are holistic development focused	318	3.104	.777	Agreed
4	Using AI will enable me to have content of the subject that is universal in nature	318	3.293	.741	Agreed
5	I will like to use AI to generate instructional materials for difficult contents	318	3.226	.692	Agreed
6	AI will enable me to generate appropriate activities that will engage the pupils	318	3.142	.747	Agreed
7	I am not interested in using AI for lesson planning	318	1.745	.716	Disagreed
8	AI will not allow me to think as I used to, so I will not like to use it for lesson planning.	318	2.057	.868	Disagreed
Weighted average			**2.859**	**High intention**	

Table 3 shows that BST teachers agreed with the following: that they will like to know more about AI platforms that can help with lesson planning (mean = 3.24); that they want to use AI to plan lessons of

subjects they were not its specialist (mean = 3.07); that they will like to use AI to generate objectives that are holistic development focused (mean = 3.10); that using AI will enable them to have content of the subject that is universal in nature (mean = 3.29); that they will like to use AI to generate instructional materials for difficult contents (mean = 3.23) and that AI will enable them to generate appropriate activities that will engage the pupils (mean = 3.14). The teachers also disagreed that they were not interested in using AI for lesson planning (mean = 1.75) and that AI will not allow them to think as they used to, so they will not like to use it for lesson planning (mean = 2.06).

The weighted average is 2.86 which indicates positive attitude. Therefore, BST teachers have high intention to use AI for lesson planning.

Research question 4: To what extent do BST teachers have intention to use AI for lesson delivery

Table 4: BST Teachers' Intention to use AI for Lesson Delivery

S/N	Items	N	Mean	Std.D	Remark
Intention-to-use AI for Lesson Delivery					
1	I want to use AI platforms that can help with lesson delivery	318	3.151	.627	Agreed
2	I believe that AI can suggest good way of delivering lessons.	318	3.123	.611	Agreed
3	I want to use AI to generate appropriate questions for pupils when teaching.	318	3.038	.701	Agreed
4	Using AI will make me a better teacher, so I want to start using it.	318	2.915	.838	Agreed
5	Making my lesson more pupil-centered can be achieved with the use of AI.	318	2.9623	.753	Agreed
6	Both outdoor and indoor lessons will be fully adopted with the use of AI	318	3.0755	.762	Agreed
Weighted average			3.044	High intention	

Table 4 shows that BST teachers agreed with all the items: They agreed that they wanted to use AI platforms that can help with lesson delivery (mean = 3.15); that they believe that AI can suggest good way of delivering lessons (mean = 3.12); that they want to use AI to generate appropriate questions for pupils when teaching (mean = 3.04); that Using AI will make me a better teacher, so I want to start using it (mean = 2.92); that making their lessons more pupil-centered can be achieved with the use of AI (mean = 2.96) and that Both outdoor and indoor lessons will be fully adopted with the use of AI (mean = 3.08).

The weighted average is 3.04 which indicates high intention. Therefore, the BST teachers had high intention to use AI for lesson delivery.

Research Question 5: Is there significant influence of teachers' area of specialisation on their attitude and intention-to-use AI for lesson planning and delivery?

Table 5a: Teachers' Area of Specialisation and their Attitude towards the Adoption of AI for Lesson Planning

Title	Variable	N	Mean	Std.D	Df	F	Sig.	Remark
Attitude towards Adoption of AI for Lesson Planning	Arts	102	22.5588	2.72710	2;309	8.467	.000	Significant
	Science	66	22.7273	3.55850				

	Social Sciences	144	23.9792	2.69801				
	Total	**312**	**23.2500**	**2.97822**				

Table 5a shows that BST teachers who were Social Sciences specialists had the highest attitudinal mean score (23.98) followed by those who were science specialists (22.73) while those who were Arts specialists had the lowest (22.56). The difference among these groups of teachers in their attitude towards the adoption of AI for lesson planning is significant ($F_{(2;309)}$ = 8.47; p<0.05). Therefore, Social Sciences teachers had better attitude towards the adoption of AI for lesson planning than teachers in Sciences and Arts.

Table 5b: Teachers' Area of Specialisation and their Attitude towards the Adoption of AI for Lesson Delivery

Title	Variable	N	Mean	Std.D	Df	F	Sig.	Remark
Attitude towards Adoption of AI for Lesson Delivery	Arts	102	19.824	2.773	2; 309	6.654	.001	Significant
	Science	66	19.909	1.821				
	Social Sciences	144	20.875	2.480				
	Total	**312**	**20.327**	**2.506**				

Table 5b shows that BST teachers who were Social Sciences specialists had the highest lesson delivery attitudinal mean score (20.88) followed by those who were science specialists (19.91) while those who were Arts specialists had the lowest (19.82). The difference among these groups of teachers in their attitude towards the adoption of AI for lesson delivery is significant ($F_{(2;309)}$ = 6.65; p<0.05). Therefore, Social Sciences specialised BST teachers had better attitude towards the adoption of AI for lesson delivery than teachers in Sciences and Arts.

Table 5c: Teachers' Area of Specialisation and their Intention-to-Use AI for Lesson Planning

Title	Variable	N	Mean	Std.D	Df	F	Sig.	Remark
Intention-to-Use AI for Lesson Planning	Arts	102	22.441	2.476	2; 309	9.866	.000	Significant
	Science	66	21.773	2.313				
	Social Sciences	144	23.500	3.167				
	Total	**312**	**22.789**	**2.866**				

Table 5c shows that BST teachers who were Social Sciences specialists had the highest intention-to-use mean score (23.50); followed by those who were Arts specialists (22.44) while those who were Science specialists had the lowest (21.77). The difference among these groups of teachers in their intention-to-use AI for lesson planning is significant ($F_{(2;309)}$ = 9.87; p<0.05). Therefore, Social Sciences teachers had better intention-to-use AI for lesson planning than teachers in Arts and Sciences.

Table 5d: Teachers' Area of Specialisation and their Intention-to-Use AI for Lesson Delivery

Title	Variable	N	Mean	Std.D	Df	F	Sig.	Remark
Intention-to-Use AI for Lesson Delivery	Arts	102	17.5882	3.47367	2; 309	2.918	.056	Not Significant
	Science	66	18.4091	3.12300				
	Social Sciences	144	18.6250	3.41915				
	Total	**312**	**20.327**	**2.506**				

Table 5d shows that BST teachers who were Social Sciences specialists had the highest intention-to-use mean score (18.63) followed by those who were science specialists (18.41) while those who were Arts specialists had the lowest (17.59). The difference among these groups of teachers in their intention-to-use AI for lesson delivery is not significant ($F_{(2;309)} = 2.92$; $p > 0.05$). Therefore, there is no significant difference among Social Sciences, Sciences and Arts specialists BST teachers in their intention-to-use AI for lesson delivery.

SUMMARY OF FINDINGS

1. Basic Science and Technology (BST) teachers had positive attitude towards adoption of AI for lesson planning.

2. BST teachers have positive attitude towards the adoption of AI for lesson delivery.

3. BST teachers have high intention to use AI for lesson planning.

4. BST teachers had high intention to use AI for lesson delivery.

5a. Social Sciences teachers had better attitude towards the adoption of AI for lesson planning than teachers in Sciences and Arts.

5b. Social Sciences specialised BST teachers had better attitude towards the adoption of AI for lesson delivery than teachers in Sciences and Arts.

5c. Social Sciences teachers had better intention-to-use AI for lesson planning than teachers in Arts and Sciences.

5d. There is no significant difference among Social Sciences, Sciences and Arts specialists BST teachers in their intention-to-use AI for lesson delivery.

DISCUSSION OF FINDINGS

The first finding of this study is that Basic Science and Technology (BST) teachers had positive attitude towards adoption of AI for lesson planning. This might be as a result of the wide adoption of AI to many other human endeavours and the general awareness about AI and its benefits. This finding corroborates the submissions of UNESCO (2021) and Statista (2022) that in reality, there have been massive investments in AI technology around the world as well as high-profile policy statements about the need to promote and regulate this emerging technology.

The second finding is that BST teachers have positive attitude towards the adoption of AI for lesson delivery. Just as discussed above, this could be as a result of the fact that many people who are familiar with the use of internet and mobile phones, including the teachers, are now familiar with what AI can be used to do. This accounted for the attitude of the teachers towards the use of AI for lesson delivery. Miao and Holmes (2021) reiterated the potentials of AI for teaching and learning and the role of education in developing what is known as AI literacy and submitted that AI has been receiving increased attention, and are fast becoming hot topics in policy debates.

The third and the fourth findings are that, BST teachers have high intention to use AI for lesson planning and for lesson delivery respectively. This is expected because of their attitude towards the adoption of AI for

lesson planning and delivery. However, the BST teachers agreed that AI will consume teachers' resources like data and time, therefore, adding unnecessary expenses to them. This should be noted for proper implementation of AI in Nigerian educational system. Already, there is a poor remuneration of teachers in the country so if a strategy that will consume more money from them is introduced, then, the government must be ready to cushion the pain of additional resources expenditure from the side of the teachers. It is expected that government should not discourage the use of AI because the teaching of science to the pupils should be through the use of several learning resources. Kenedi, Chandra and Fitria (2019) and Amini and Fitria (2019) submitted that BST is a subject that is related to natural phenomena which must be studied through scientific methods such as experimentation with learning resources and observation.

The next findings of this study reveal that Social Sciences teachers had better attitude towards the adoption of AI for lesson planning and delivery than teachers in Sciences and Arts. This finding should not be jettisoned because it could be as a result of the fact that the Social Sciences BST teachers are those teachers who had social sciences subjects as their teaching subjects while in training. These teachers had little or no knowledge and pedagogical skills for BST. But because of generalised teaching system adopted in Nigeria primary education system, any teacher employed to teach at primary school class, is meant to teach all the school subjects, hence they become BST teachers. So, it is expected that teachers who are in this category might want to adopt any ICT facility that will make the teaching of BST easier, effective and more functional. Meanwhile, those teachers who had science course as their teaching subject while in training might demonstrated less attitude and intention-to-use AI for the lesson planning and delivery because of their subject matter knowledge (SMK) and Pedagogical Content Knowledge (PCK) in Basic Science and Technology. According to Balanskat, Blamire, and Kefala (2006), teachers appear to acknowledge the value of ICT in the teaching and learning in schools, because it has been enhancing the learning outcomes in the part of the learners.

The last finding of this study is that there is no significant difference among Social Sciences, Sciences and Arts specialists BST teachers in their intention-to-use AI for lesson delivery. This might mean that all the BST teachers, irrespective of their original area of specialisation would like to adopt AI for lesson delivery. This reason might be that the teachers were looking for a lesson delivery that will be more child-centred which deviate from the current teacher-centred they were used to. AI is capable of suggesting pupils' activities that will be more engaging during lesson, which, ordinarily, the teacher might not be able to think of.

CONCLUSION

This study on Basic Science and Technology teachers' adoption of AI for lesson planning and delivery has revealed a positive attitude towards the adoption and the intention-to-use, knowing the benefits and ease of use. Any attempt to equip the teachers, either pre-service or in-service, on the use of AI for lesson planning and delivery, will help to improve the teaching and learning of the subject at primary school level.

RECOMMENDATIONS

1. Government, through Universal Basic Education Board (UBE) as well as other teacher training experts should provide training for in-service and pre-service primary teachers on the use of AI for lesson planning and delivery. This will provide support to fully harness AI's potential or to enhance the teachers' use of AI platforms for educational purpose. This could be achieved through the training-the-trainers approach whereby experts in the use of AI for education could be first contacted to teach selected scholars who will then train the teachers.
2. Provision of necessary resources that will enhance the adoption of AI for teaching and learning should be provided. This can be achieved if the primary school teachers are given phone and data allowances

as well as functional internet facility.

3. During training on AI adoption for lesson planning and delivery, Sciences specialists BST teachers should be encouraged to see the additional benefits AI can give to their existing Science subject matter knowledge and pedagogical skills. However, Arts specialist BST teachers should be made to realise the need for AI in the teaching of the subject.

REFERENCES

1. Akinbote, O. (2007). Problems of Teacher Education for Primary Schools in Nigeria: Beyond Curriculum Design and Implementation, *International Journal of African & African American Studies, VI*(2). Retrieved 10 May, 2024 from https://openriver.winona.edu/eie/vol22/iss1/4

2. Amini, R., & Fitria, Y. (2019). The development of performance assessment based on integrated model on static electrical in elementry school. *Journal of Physics: Conference Series, 1317*(1) Pp. 012167. IOP Publishing.

3. Balanskat, A., Blamire, R., & Kefala, S. (2006). *A review of studies of ICT impact on schools in Europe*: European Schoolnet. Retrieved May 10, 2024 from https://www.semanticscholar.org/paper/The-ICT-Impact-Report-%3A-A-review-of-studies-of-ICT-Balanskat-Blamire/628863abac8753bcb827f641f596f9e6e2ad5ab7

4. Baumbach, T. (2023). 10 Benefits of Doing Hands-On Science for Students. Retrieved May 10, 2024 from https://www.tokyoacademics.com/blog-10-benefits-of-doing-hands-on-science-for-students/

5. Bransford, J., Brown, A. L., & Cocking, R. R. (Eds.). (2000). *How people learn: brain, mind, experience, and school* (2nd ed.). Washington, D.C.: National Academy Press.

6. Grimus, M. (2000). *ICT and multimedia in the primary school.* Paper presented at the 16th conference on educational uses of information and communication technologies, Beijing, China.

7. Dawes, L. (2001). *What stops teachers using new technology?* In M. Leask (Ed.), Issues in Teaching using ICT (pp. 61-79). London: Routledge.

8. Federal Republic of Nigeria, (2013). National Policy on Education. NERDC, Ikeja, Lagos State.

9. Ghavifekr, S., Kunjappan, T. Ramasamy, L. and Anthony, A. (2016). Teaching and Learning with ICT Tools: Issues and Challenges from Teachers' Perceptions. *Malaysian Online Journal of Educational Technology, 4*(2); 38 – 58.

10. Holmes, W. and Tuomi, I. (2022). State of the art and practice in AI in education. *European Journal of Education, 57; 542 – 570.* DOI: 10.1111/ejed.12533

11. Jorge, M. P. (2017). What is Basic Science. Retrieved May 24, 2024 from https://www.researchgate.net

12. Kenedi, A. K., Chandra, R., & Fitria, Y. (2019). Problem based learning: a way to improve critical thinking ability of elementary school students on science learning. In *Journal of Physics: Conference Series* 1424(1) Pp. 012037. IOP Publishing.

13. Lemoine, B. (2022, June 14). *Scientific data and religious opinions*. Blogtext. Medium. Retrieved 6 May, 2024 from https://cajundiscordian.medium.com/scientific-data-and-religious-opinions-ff9b0938fc10

14. Miao, F., & Holmes, W. (2021). *AI and education: Guidance for policy- makers*. UNESCO. https://unesd oc.unesco.org/ ark:/48223/ pf0000 376709

15. Ndhlovu, Z. B., Nkhata, B., Chipindi, F. M.,Kalinde, B., Kaluba, C., Malama, E., Mambwe, R., Bwalya, K. Lufungulo, E. S. and Chipande, H. (2021). Subject Specialisation in Primary School: A Theoretical Review and Implications for Policy and Practice in Zambia. *Journal of Curriculum and Teaching, 10*(4); 13 – 24.

16. Ohiwerei, F.O. & Nwosu, B.O. (2009). Vocational Choices among Secondary School Students: Issues and Strategies in Nigeria. *Asian Journal of Business Management, 1*(1): 1-5, 2009.

17. Oyetunde, T. O. (2015). *Effective lecturing and teaching: preparing today's students for tomorrow's role*. Jos Lecaps publishers Plateau State.

18. Palmer, M. (2006). *Data is the new oil*. Blogtext. ANA Marketing Maestros. Retrieved 5 May, 2024

from https://ana.blogs.com/maest ros/2006/11/ data_is_the_new.html

19. Statista. (2022). *Total global AI investment 2015– 2021*. Retrieved 5 May, 2024 from https://www.statista.com/statistics/ 94113 7/ai-investment-and-funding-worldwide/Statista

20. UNESCO. (2021). *Recommendation on the ethics of artificial intelligence*. Retrieved 5 May, 2024 from https://unesd oc.unesco.org/ark:/48223/ pf0000 379920

21. Yelland, N. (2001). *Teaching and learning with information and communication technologies (ICT) for numeracy in the early childhood and primary years of schooling*. Australia: Department of Education, Training and Youth Affairs.

22. Zhang, P. and Aikman, S. (2007). Attitudes in ICT acceptance and use. Conference Proceedings. DOI: 10.1007/978-3-540-73105-4_112. Retrieved on 5 May, 2024 from https://www.researchgate.net/publication/221099754_Attitudes_in_ICT_Acceptance_and_use