AI Adoption for Teaching and Learning of Physics

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Abstract

This study examined the determinants of Artificial Intelligence (AI) adoption for teaching physics in senior secondary schools in Ibadan North Local Government Oyo State, Nigeria. A sample of one hundred (100) teachers was randomly selected from randomly selected senior secondary schools in Ibadan North L.G.A. Physics Teachers Artificial Intelligence Adoption Questionnaire (PTAIAQ) r=0.50 was used to collect data for the study. Four research questions were answered, and data collected were analysed using frequency counts, percentages and mean. The results indicated that most physics teachers are of the view that AI would make their work easier and most teachers know how to make us of AI tools in teaching of physics. Perceived usefulness of ICT is a major predictor for teachers' adoption of AI. Similarly, the results showed that perceived ease of use is also a significant variable of AI adoption. It is therefore recommended that teachers should be provided with the relevant AI tools by the school or the government for the effective teaching of physics. Teachers should be motivated to use the available AI resources for the teaching of physics. They should be adequately trained to be able to make judicious use of the available AI tools/resources at their disposal. The school environment, structures and composition should be AI accommodating. Word count: 211.

Keywords: Artificial Intelligence adoption, teaching of physics, perceived ease of use of ICT, perceived usefulness

1. Introduction

Interdisciplinary Physics, the study of energy and its interaction with matter, is one of the prerequisite subjects for the study of engineering, medical and other applied science courses in the university. Physics as a subject is related to other subjects and fundamental to technological development; hence, the need to lay a good foundation by using Artificial Intelligence (AI) to enhance the pedagogies and to develop learning activities for teaching and learning of physics. According to Physics is the bridge between science and technology because many of the tools on which the scientific and technological advancement depends are the direct products of physics. The position of physics as a necessity for the understanding of the complexities of modern technology and the essential role it plays in the technological advancement of a nation cannot be overemphasized. Physics has contributed immensely to the development of the society. These contributions can be seen in the development of electronic devices such as diodes, transistors, resistors, and integrated circuits, which are vital components of radio transmitters and receivers, computers, televisions, modern machines such as x-rays machines used in the health sector for taking the images of the internal structures of patients and treatment of cancer. Solar energy, which involves preservations and utilization of sun light for electric power generation was developed from the knowledge of physics.

The objectives of teaching physics as contained in the senior secondary school curriculum [1] is to acquire proper understanding of basic principles and application of physics; to develop scientific skills and attitude as prerequisite for further scientific activities; to recognised the usefulness and limitations of scientific methods in order to appreciate its applicability to other disciplines and in everyday life; to develop abilities attitude and skills that encourage efficient and safe practice; to develop scientific attitudes such as accuracy, precision, objectivity, integrity and creativity. But most students describe physics as abstract and most difficult subject to learn among other science subjects. The reason most students describe physic this way could be because of the nature of the subject and the methods the teachers are using to teach the subject.

The submission of [2] explained nature of an object to means characteristics of that object that could be used to describe the object and nature of physics means some features of the subject that could be used to describe it. She listed five nature of physics to include; abstract nature, mathematical nature, full of formulae, full of laws and principles and physics is very wide. On abstract nature of physics, she highlighted two reasons physics appears abstract. Firstly that a good number of things considered in physics cannot be seen with the naked eyes. For example the atom, energy levels, force and so on, so most people outside the field may describe physics as an abstract subject because of this. And secondly,

terms used to describe concepts in physics are not usually familiar terms and when they are familiar could have different meanings, for example, the term work. Many new comers in physics are familiar with the term work but are dismayed when work is defined as force applied and it moves a body through a certain distance meaning without the force moving the body through a distance, work is not done. This is different from the common meaning of work, so they find this confusing.

Physics concepts are used to explain what everybody does and experience in nature, so the point here is that everybody experiences physics and does physics even though they do not know those actions are based on physics principles. For instance, frictional force enables animals to walk without falling. It equally enables animals to climb trees. When an object is thrown up, gravitational force acts on the object to fall back to the ground. Sports men and women throw javelin without knowing that, that is a sort of motion and when concepts such as trajectory is raised in class, students become confused without knowing that trajectory is just a description of the movement of objects in air, such as javelin. These are just very few physics concepts which students encounter in their everyday activities and which they struggle to grasp when presented wrongly in physics classrooms.

The teacher plays a vital role in enabling the students to understand the link between their everyday activities and classroom physics knowledge [3]. There is need here for the physics teacher to come to terms with this nature of the subject and to think of how he could help his students learn by connecting what he does in class to everyday activities of the students. He could also do this through using examples of concepts from the immediate environment of the students and involving the students in hands-on activities for them to experiment to confirm that physics is real. Also where concepts appear abstract, models could be used to explain them to avoid creating misleading images in the minds of the students and terms where common meaning is different from scientific meaning should be properly explain and distinguished to avoid the confusion [2].

Considering another nature of physics, physics is characterized by laws and formulae as listed by [2], physics observe how events occur in nature, if any variations is noticed, measurements are done and data collected are studied to see if any relationship exists and the pattern of the relationship. If this relationship is consistent, then some statement could be made to show this relationship which if proofed with enough experimental evidence, could be accepted as a principle and with further experimental proofs could be accepted as a law (the process of doing this is more complex and rigorous than what has been simplified here). All concepts in physics have underlining principle(s) and law(s) but these should not be a problem to the learning of physics. The problem here is that most learners try to cram the principles and laws without understanding the relation that established the law. If the relation is understood, it could be easier to understand and to remember the laws.

The teacher as advised by [2], could help the students learn physics easier by making the teaching of physics practical based and during the practical, the relationship that brings about the laws should be explained to the students, and they should be allowed to make the observations themselves. Also, physics practical should be done simultaneously with the theory so that the practical will enforce the understanding of the theory and students should be taught to have correct understanding of the law not cramming the laws. Unfortunately, in most Nigerian physics classes, practicals are not done as the theoretical part are being taught until few days to the final examinations. The usual complain is that there are no equipment for practicals and most schools borrow these equipment to be used during the final and external examinations so the teachers will just use the borrowed materials to demonstrate the practicals to the students maybe a day before the exam.

Meaning that the teacher, most often than not, does not link the practicals to the theory he has taught so most students do not see the link between the practical they do and the theory they have learnt earlier. In fact most students see physics practicals as another subject because it has its separate note that is the practical notebook with graph and practical guides and it is usually done separately in the laboratory. One way to handle this problem of lack of practical materials is through AI adoption. Virtual laboratory could be used to supplement the limited laboratory equipment so that the students could at least have practical experience of all physics concepts taught and this will make the learning of the subject easy and meaningful and science process skills could be acquired in the process. The theory and the practical should be taught simultaneously.

From the preceding discussion on the nature of physics, one could see that the role of the physics teacher here is crucial. He has the task of putting the subject in the right perspective first, to alleviate the initial fear in the students and work to address misconceptions which could constitute learning huddles that impede learning. This does not only call for the teacher's competence in effective deployment of appropriate pedagogical skills of being able to select appropriate instructional strategies and instructional materials for him to be able to realize the objectives of physics education but also require equipping the teacher with adequate teaching tools. One of such teaching tools is artificial intelligence. Before going to what AI is all about, we want to say that as a nation, the Covid-19 pandemic met teachers in Nigeria at all levels of education, unprepared in

terms of ICT skills, tools and not ready for online teaching. As [4] reported that though students where fascinated about the use of technology by their teachers to deliver instruction during the pandemic lockdown, they were not prepared for its use at that time and even up till now. Not to talk about the enabling environment, specifically power, internet facilities and ICT devices. The online classes teachers in Nigeria were made to do could not have been anything better because not up to 5% of both public and private schools have what it takes to run an online education successfully.

AI has been defined by numerous scholars in the field in different ways but its definition in literature is described as complex, multidimensional, and contested [5]. However, we will consider few of these definitions to form the bases for this work. Starting with [6] definitions, who defined AI as a field and as a theory, as a field of study, they define AI as a study area in computer science whose concerns are aimed at solving different cognitive problems commonly associated with the human intelligence, such as learning, problem solving, and pattern recognition, and subsequently adapting [6] and as a theory, they defined AI as a theoretical framework guiding the development and use of computer systems with the capabilities of human beings, more particularly, intelligence and the ability to perform tasks that require human intelligence, including visual perception, speech recognition, decision-making, and translation between languages [6]. While [7] define AI as "the combination of cognitive automation, machine learning, reasoning, hypothesis generation and analysis, natural language processing, and intentional algorithm mutation producing insights and analytics at or above human capability" [8] they bring out the different sub-fields and their functions while analysing human capability. Also [9] did after looking at other scholars definitions defined AI as a field of study that combines the applications of machine learning, algorithm productions and natural language processing meaning a technology that builds systems to think and act like humans with the ability of achieving goals.

But [10], being more specific to education sector explained that AI is as a results of many decades of research and development bringing together system designers, data scientists, product designers, statisticians, linguists, cognitive scientists, psychologists, education experts and many others to develop education systems with some level of intelligence and ability to perform different functions, including to help teachers and support learners to develop their knowledge and flexible skills for a constantly changing world. These definitions are all similar although in different forms because they are all emphasising the development of machines to use programs and software that have some level of humanlike intelligence and abilities to perform human

like functions as high as cognitive, learning, decision making, and adapting to the environment. AI involves using computers to do things that traditionally requires human intelligence [11].

The incorporation of AI in education has begun a long time ago in developed world and has gone through a lot of developmental stages and there are undeniable evidence of the numerous benefits administrators, teachers and learners are enjoying from this integration. There are many forms in which AI integration in education takes; As webbased teaching and learning platforms, like instructions leveraging technologies such as virtual reality, gamification, animation, web-based platforms, interactive video, simulations, robotics, video conferencing, audio visual files, and 3-D technology, virtual labs, computer programmes, facial recognition systems, social media-social network sites, micro blogging systems, and mobile applications. Such as the work of [12] while pointing out that teachers have so much to choose from social media listed 26 social media tools for education (see Table 1)

Table 1. Listed 26 Social Media Tools

The Connected Educator	Twitter,
WordPress	Instagram
Google+	ResearchGate
Facebook	YouTube
Blogger	LinkedIn
Pinterest	Skype
HootSuite	DailyMotion
Vimeo	CultureInside
LabforCulture.org	Academia.edu
LabRoots,	Sgrouples
Infonomics-society.org	TeacherTube
GogoYoko	RebelMouse
Edmodo	TedEd

The above list is not exhaustible as there are other ones like schoology, WhatsApp, Telegram, and many others while research into new ones are ongoing and new ones are being rolled out every day.

The benefits of AI in education is enormous but we will just discuss some of them. AI makes inclusive and global classroom possible [13]: with AI, instruction is placed on-line and made web-based which make learning available to all, overcoming social, physical, race, gender, international boundaries. For instance, virtual reality facilitates the learning process beyond the learning space to create a global classroom since AI can connect students to the virtual classroom. Teachers are assisted to make good lesson planning, preparation and equipped with appropriate learning materials to facilitate learning optimally [14]. Personalised instruction: AI in education help students in less time to achieve interactive and personalized learning [9].

Differentiated instruction is facilitated with AI since individual learners' learning needs could be identified and captured through customised and personalised instruction enabling mixed ability classroom. Detailed and timely feedback for students and teachers as enough data about the students, teacher and the teaching process could be monitored and captured, and the analysis of these data provide adequate information for accurate and effective management of the system.

AI enhances learners' engagement and interactions with learning materials which is particularly very helpful in making the abstract nature of the subject real and also physics being a practical subject, through virtual labs, games, virtual realities, students could have hands-on learning that improves learning experiences and subsequently learning. Situate learning in the domain of interest of the learners; 21st century learners are technology natives and the use of AI for instruction is locating learning where they are and what they love, so they are highly motivated, and they enjoy the process of learning alleviating boredom and negative attitude. AI provides good learning support for social and cognitive development of the teachers and students. Tracking and assessment of learning could also be done much easier and effective with AI tools.

The adoption of AI for understanding of the complexities of teaching physics in secondary schools in Nigeria and the essential role AI plays in the technological advancement of the society cannot be overemphasized. With all the benefits of AI to the technological advancement of the society, Nigeria has not really enjoyed much of it, especially in the area of adopting AI for teaching and learning physics. This is because knowledge of artificial intelligence has not been fully localized and utilized. Adoption of artificial intelligence for teaching and learning physics in some Nigerian secondary schools is still at its early stage. Hence, students' learning outcomes in physics is just on the average. This has been a source of worry to stake holders of education in Nigeria. Many previous studies have examined the causes of students' poor learning outcomes in physics. These studies highlighted among other things, teachers' centred instructional strategy, social economic situation of the parents, teachers' knowledge of AI and students' attitude to the use of AI. Also, some literature has further revealed that there are some secondary schools who have not adopted AI for teaching and learning of physics yet. The present study assumed that there might be some major factors that are hindering the use or adequate use of artificial intelligence in secondary schools around Ibadan North Local Government Area and these factors includes level of teachers' awareness of AI, availability of AI tools, inclination of teachers to adopt AI and level of utilization of AI tools for instruction and these are the factors this study will be considering.

Specific Objectives

- Find out the level of AI adoption among some selected Secondary Schools in Ibadan North.

- To assess teachers' willingness to adopt AI in the teaching and learning of physics.

- To identify the critical factors that influence teachers' adoption and integration of AI in the teaching of physics.

Research Questions This study answered the following research questions

- What is the level of teachers' awareness of AI?

- What is the level of availability of AI tools for teaching physics?

- What is the rate of inclination by teachers to adopt AI in the teaching and learning of physics?

- What is the level of utilization of AI tools for teaching physics?

Research Design

This study adopted the descriptive survey research design. This research work is investigatory in that it sought the responses of teachers on the determinants of Artificial intelligence (AI) adoption in all public senior secondary schools in Ibadan North Local Government Area.

Population of the Study

The population of the study consists of all physics teachers in public senior secondary schools in Ibadan North Local Government Schools of Oyo State.

Sample and Sampling Techniques

Simple random sampling technique was used to select a total of one hundred (100) physics teachers from the study population.

Research Instrument

The instrument used in this study has sections A and B. In section A, personal data was the focus so the interpretation was done on number and percentage basis. In section B, there were six (6) sub-divisions namely,

Teachers' awareness of AI which consist of 10 items, Teachers' AI Literacy which consist of 10 items, Teachers' inclination to adoption of AI which consist of 5 items, Teachers' computer self-efficacy which consist of 5 items, availability of AI tools for

teaching of physics which consist of 5 items, utilization of AI tools for teaching of physics in which consist of 6 items making a total of (41) items on a questionnaire which respondents or physics teachers are to respond to with either Strongly, Agree, Agree, Disagree, Strongly Disagree. Face and content validity was carried out and Split-Half Reliability gave correlation coefficient of 0.5.

2. Method of Data Analysis

The data collected were analyzed using descriptive statistics and T-test. The results were presented using percentage frequency count, mean, standard deviation, and weighted mean.

3. Result and Discussion

Responses to the questionnaires by the teachers are presented in accordance with the research questions.

Research question 1: What is the level of teachers' awareness of AI? (see Table 2: Showing frequency distribution on the level of AI adoption).

Table 2 shows the frequency distribution on the level of teachers' awareness of AI tools among some secondary schools in Ibadan North. I am of the view that AI would make our daily work more easier and simpler (x =3.31) was ranked highest by the mean score rating on teachers' awareness of AI tools among some secondary schools in Ibadan North and was followed in succession by phone, tablet and computer are part of AI tools (x =3.26), I am aware that there is a possibility that AI will overtake human jobs (x =3.18I), believe AI is the next big thing to provide solutions to existing educational problems (x =3.06), I have a good knowledge of what Artificial intelligence (AI) is (x =3.00), I have a good knowledge the components of AI (x = 2.98), I have used AI tools several times in teaching physics (x = 2.78), I am familiar with software tools used in teaching physics (x = 2.64), I have attended an AI training for teaching several times (x = 2.62) and I have a proper understanding of how AI works (x =2.55) respectively. Table 2 shows the weighted mean of 2.90 which is greater than the standard mean of 2.50. This implies that the level of teachers' awareness of AI in secondary schools in Ibadan North is high.

Research question 2: What is the rate of availability of AI tools for teaching physics? (see Table 3: Showing frequency distribution on the rate of availability of AI tools for teaching physics).

Table 3 shows the frequency distribution on the level of availability of AI tools for teaching physics.

There is need to increase the number of available AI tools in your school (x =3.03) was ranked highest by the mean score rating and was followed in succession by I usually improvise AI tools in the absence of none for the smooth teaching of physics (x =2.95), We have AI tools in our school for teaching (x =2.71), I believe the current AI resources in our school are sufficient enough for the teaching of physics (x =2.63) and We have AI tools in our classroom dedicated to teaching of physics alone (x =2.43) respectively. Table 3 shows the weighted mean of 2.75 which is greater than the standard mean of 2.5. This implies that the level of availability of AI tools for teaching physics is high.

Research question 3: What is the level of willingness by teachers to adopt AI in the teaching and learning of physics? (see Table 4: Showing frequency distribution on the rate of willingness by teachers to adopt AI in the teaching and learning of physics).

Table 4 shows the frequency distribution on the level of willingness by teachers to adopt AI in the teaching and learning of physics. I regularly use word processors (e.g. Microsoft Word, Open Office Writer) for preparing test materials and lesson notes. (x =3.26) was ranked highest by the mean score rating on the rate of willingness by teachers to adopt AI in the teaching and learning of physics and was followed in succession by I regularly use the Internet (e.g. Google) to search and download videos, notes and practice examples to use in my lessons. (x =3.28), I regularly use spreadsheet applications to capture learners' marks and to analyze their strengths and weaknesses (x =3.09), I often keep a computer database of lesson examples and exercises on a personal computer. (x =3.08) and I regularly use online games to make my word problems lessons exciting. (x =2.96) respectively. Table 4 shows the weighted mean of 3.13 which is greater than the standard mean of 2.50. This implies that the level of willingness by teachers to adopt AI in the teaching and learning of physics is high.

Research question 4: What is the level of utilization of AI tools for teaching physics? (see Table 5: Showing frequency distribution on the factors responsible for adoption of AI by school teachers).

Table 5 shows the frequency distribution on the level of utilisation of AI by school teachers. I make sure the students have a hands-on experience of AI in every lesson I deliver (x =2.96) was ranked highest by the mean score rating on the adoption of AI by school teachers and was followed in succession by I make use of AI tools for teaching of physics (x =2.80), I use AI tools to prepare my lesson note (x =2.78), I give report and feedback on students' progress using AI tools (x =2.76), I usually ask my

Table 2. Showing frequency distribution on the level of AI adoption

S/N	STATEMENT	S A	A	D	S D	Mean	S D
	Teachers' Awareness of AI						
1	I have a good knowledge of what Artificial intelligence (AI) is.	34 34.0%	34 34.0%	30 30.0%	2 2.0%	3.00	.853
2	I have a proper understanding of how AI works.	24 24.0%	31 31.0%	21 21.0%	24 24.0%	2.55	1.104
3	I have a good knowledge of the components of AI	39 39.0%	26 26.0%	29 29.0%	6 6.0%	2.98	.964
4	I am of the view that AI would make our daily life easier and simpler	51 51.0%	33 33.0%	12 12.0%	4 4.0%	3.31	.837
5	I have used AI tools several times in teaching physics	33 33.0%	32 32.0%	25 25.0%	10 10.0%	2.78	1.021
6	Phone, tablet and computer are part of AI tools	49 49.0%	33 33.0%	13 13.0%	5 5.0%	3.26	.827

S/N	STATEMENT	SA	A	D	SD	Mean	SD
7	I am familiar with software tools used in teaching physics	11 11.0%	50 50.0%	31 31.0%	8 8.0%	2.64	.785
8	I have attended an AI training for teaching several times	15 15.0%	39 39.0%	39 39.0%	7 7.0%	2.62	.826
9	I believe AI is the next big thing to provide solutions to existing educational problems	30 30.0%	49 49.0%	18 18.0%	3 3.0%	3.06	.776
10	I am aware that there is a possibility that AI will overtake human jobs	48 48.0%	27 27.0%	20 20.0%	5 5.0%	3.18	.925
Weighted mean = 2.90							

Table 3. Showing frequency distribution on the rate of availability of AI tools for teaching physics

S/N	STATEMENT	SA	A	D	SD	Mean	SD
	Availability of AI tools for Teaching Physics						
1	We have AI tools in our school for teaching	29 29.0%	17 17.0%	50 50.0%	4 4.0%	2.71	.953

S/N	STATEMENT	SA	A	D	SD	Mean	SD
2	There is need to increase the number of available AI tools in your school	38 38.0%	30 30.0%	29 29.0%	3 3.0%	3.03	.893
3	We have AI tools in our classroom dedicated to teaching of physics alone	20 20.0%	15 15.0%	53 53.0%	12 12.0%	2.43	.946
4	I usually improvise AI tools in the absence of none for the smooth teaching of physics	20 20.0%	58 58.0%	19 19.0%	3 3.0%	2.95	.716
5	I believe the current AI resources in our school are sufficient enough for the teaching of physics	32 32.0%	24 24.0%	19 19.0%	25 25.0%	2.63	1.178
Weighted mean = 2.75							

Table 4. Showing frequency distribution on the rate of willingness by teachers to adopt AI in the teaching and learning of physics

S/N	STATEMENT	SA	A	D	SD	Mean	SD
	Teachers' Inclination to Adoption of AI						
1.	I regularly use spreadsheet applications to capture learners' marks and to analyze their strengths and weaknesses	24 24.0%	61 61.0%	13 13.0%	1 1.0%	3.09	.637
2	I regularly use online games to make my word problems lessons exciting.	35 35.0%	33 33.0%	25 25.0%	7 7.0%	2.96	.942

| 3 | I regularly use word processors (e.g., Microsoft Word, Open Office Writer) for preparing test materials and class notes. | 4
3
43.0% | 4
3
43.0% | 1
1
11.0% | 3

3.0% | 3.26 | .774 |

Table 5. Showing frequency distribution on the factors responsible for adoption of AI by school teachers

	Utilization of AI tools for Teaching Physics						
1	I make use of AI tools for teaching of physics	26 26.0%	34 34.0%	34 34.0%	6 6.0%	2.80	.899
2	I make sure the students have a hands-on experience of AI in most lesson I deliver	18 18.0%	61 61.0%	20 20.0%	1 1.0%	2.96	.650
3	I usually ask my students to submit their assignments over the internet	18 18.0%	31 31.0%	49 49.0%	2 2.0%	2.65	.796
4	I use AI in preparing my lesson note	14 14.0%	61 61.0%	14 14.0%	11 11.0%	2.78	.824
5	I give report and feedback on students' progress using AI tools	14 14.0%	59 59.0%	16 16.0%	11 11.0%	2.76	.830
6	I do not use any AI tool in teaching physics	7 7.0%	40 40.0%	39 39.0%	14 14.0%	2.40	.816
Weighted mean = 2.73							

students to submit their assignments over the internet (x =2.65) and I do not use any AI tool in teaching physics (x =2.40) respectively. Table 5 shows the weighted mean of 3.13 which is greater than the standard mean of 2.50. This implies that the level of adoption of AI by school teachers is high

4. Discussion

The result showed that most physics teachers in the study are aware of AI as instructional tools, and they view AI as tools that would make their work easier and simpler if effectively used. It was also observed that phone, tablet and computer are part of AI tools they use but most of it are personal devices. The result also indicated the need for training in the use of AI for instruction so that the teachers will have proper and adequate knowledge of AI tools they could use to teach and skills of using AI to facilitate learning. Such as Watson [15] stated that it is teachers' ability, skills and competencies in using computer technology for AI-related tasks that render its usage much easier.

Their findings indicated that teachers' perceived ease of use of AI was a highly determining factor in respect to the preparation of teaching materials in school. In the same vein, other research findings show that in order to integrate ICT successfully in education, educators must first perceive technology as helpful in teaching and easy to deploy [16].

The result revealed that most physics teachers to some extent know how to make us of AI tools in teaching of physics. This may be due to the fact that the teachers are familiar with such tools as word processor, email, spreadsheet, presentation software, search engine like google but there still remain much to be desired considering where the world is today in AI integration in education. Imagine if these teachers will have access to virtual labs, simulations, interactive videos, social media platforms, YouTube, and many more, the impact they could have on the learning of physics. It is reasonable to also consider the fact that if these teachers are equipped with appropriate ICT tools and skills that they will be confidence in adopting AI in executing their jobs. Several past studies have revealed that there is a significant positive relationship between educators' AI skills and the extent to which they are ready to adopt these technologies within the teaching learning process [17]. These studies point out that perceived usefulness of AI could be one of the major predictors for teachers' adoption of AI within the teaching and learning of physics. Similarly, the results showed that perceived ease of use could also be a significant explanatory variable of AI as stated by [18], which stipulated that perceived ease of use played a key role in teachers' acceptance of technology concerning availability of AI tools for teaching, result indicate high level of availability but teachers raising concern for increasing the number of AI tools in school seems to be contradictory but the explanation here is that teachers response to the research instrument is based on their personal devices they use for teaching that is the reason they are asking for more devices that would solely be dedicated for teaching and also available for the students use also. Because from observation in the field, the devices most teachers use are their personal devices. Teachers in the study showed high level of willingness to adopt AI for instruction and assessment. This would be because they appreciate the benefits of AI integration in education. This result collaborated with the findings of [4] that science teachers and students in Nigeria are willing and ready to use ICT tools in teaching if the stakeholders in the sector will make the tools and accompanying facilities like power and internet ready. It is also shown from the result that physics teachers utilise AI in teaching the subject. They use AI in lesson preparation, delivery, assessment, and feedback even though it is their personal devices. Another thing one could deduce here is the level of commitment of these teachers as they do not mind using personal belongings to make sure they do their work well. The findings of the study are:

i. Most physics teachers are of the view that AI would make their daily work easier and simpler.

ii. A higher percentage of the teachers agreed that there is a need to increase the number of available AI tools in their schools.

iii. The study revealed that most teachers are familiar with some AI tools and most of the teachers regularly use word processors (e.g. Microsoft Word, Open Office Writer) for preparing test materials and lesson notes.

iv. The finding further revealed that most teachers make sure their students have a hands-on experience with AI in lessons they deliver.

5. Recommendation

From the findings, the study recommends the followings in order to increase the rate of adoption of AI for teaching of physics in senior secondary schools:

- Teachers should be provided with the relevant AI tools by the school or the government for the effective teaching of physics

- Teachers should be motivated or encouraged to use or improvise the available AI resources for the teaching of physics.

- Teachers should be adequately trained to be able to make judicious use of the available AI tools/resources at their disposal.

- The school environment, structures and composition should be AI compliance.

- Teachers should encourage their students to interact with AI tools during classes in physics.

- School administration should establish laboratories which are well equipped with learning materials to facilitate interactive approach by students during practical lessons to improve performance.

6. Conclusion

This study established that physics teachers are awareness of AI as an instructional tool and they make use of these tools as they prepare and deliver their lessons and also use them for assessment and feedback to the students. Some AI tools are availability in most of the classes and the teachers regularly use word processors (e.g. Microsoft Word, Open Office Writer) for preparing test materials and lesson notes but the devices they use are personal, so

the teachers are calling for provision of these facilities as it would make their work easier.

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