

## AVAILABILITY AND TEACHERS' AWARENESS OF THE EXISTENCE OF SOFTWARE PACKAGES FOR DEVELOPING PHYSICS INSTRUCTION FOR SECONDARY SCHOOL STUDENTS IN MINNA, NIGERIA

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**Abstract.** Students' performance in Secondary School Physics Examinations has been unsatisfactory in Minna, Nigeria. Some of the reasons adduced to such poor performance are teachers' lack of awareness and incompetence in the utilization of appropriate instructional media and tools. This investigation was therefore carried out to determine the level of awareness of physics teachers on the existence of computer software packages for developing physics instruction for secondary school students in Minna, Nigeria. The study also investigated whether these software are available at physics teachers' disposal in secondary schools in the area. Purposive sampling procedure was employed to select a total of 93 physics teachers from 53 secondary schools in the study area. A questionnaire was used to elicit responses from the samples based on 22 electronic software packets that are adaptable in the development of secondary school physics instruction. The questionnaire was validated by two instructional systems design specialists, two physics education experts and two test and measurement experts. To determine the reliability of the questionnaire, it was administered twice on 10 physics teachers within the population of the study and a reliability coefficient of 0.89 was obtained. Data gathered from the study were analyzed using percentage and report method. Findings revealed that only 13.87% of the teachers are aware of the existence of computer software packages that can help them develop instruction. Also, findings revealed that only 8.02% of the teachers responded that they have these software packages available at their disposal in their respective schools. Based on these findings, it was recommended that in-service training in form of workshops should be organized to improve and update physics teachers' awareness and competence in the use of software packages; relevant government and school managers should equip schools with required software packages and other technological tools that can assist physics teachers in the teaching of their subject in order to improve students' performance in physics; practical activities that bother on utilization and application of software packages for developing physics instruction should also be inculcated in the curriculum of teachers in training.

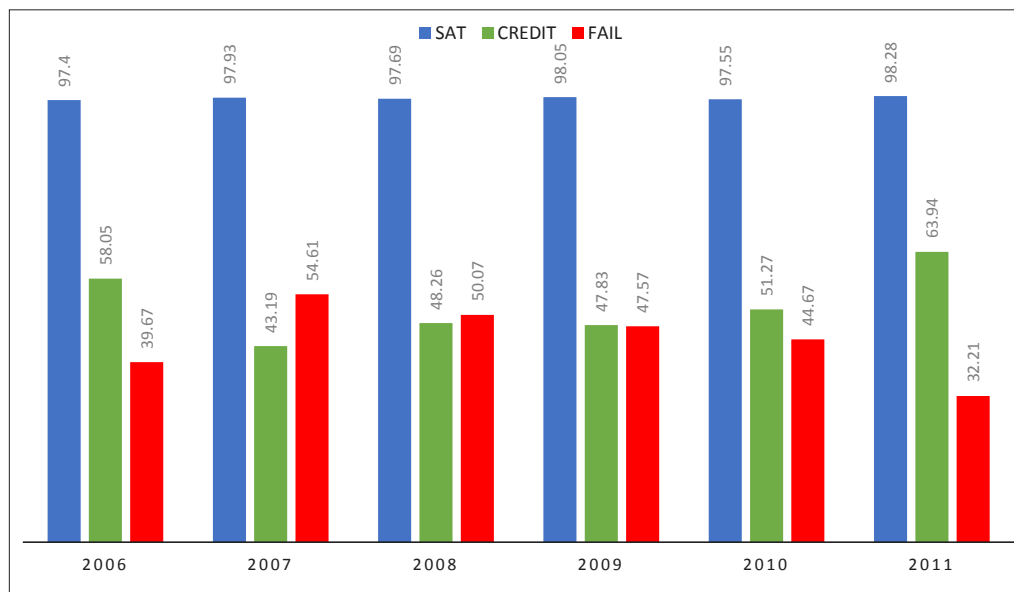
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### Introduction

The technological development of any nation lies in the study of science. Science is the foundation upon which global technological breakthroughs and innovations are built. Today, the impact of science is felt in every human sector and key among them is the education sector. Science comprises of basic disciplines such as physics, chemistry, biology and mathematics. Essentially, science and technology would be incomplete without physics. The subject has proven its benefits to mankind as almost every human activity and virtually every profession involves some element of physics (Gambari, 2010).

The fields of medicine, engineering, communication technology, architecture, geophysics, biophysics, material sciences, nuclear physics, and agronomy among several others are based on the fundamental principles of physics. Therefore, the inclusion of physics in the Nigerian senior secondary school curriculum for science-oriented students (to build strong technological foundation) cannot be over-emphasized.

However, despite of the importance of physics as a requirement for many specialized science and engineering courses at the universities and other tertiary institutions, students' performance in the subject at the Secondary School Certificate Examination (SSCE) is not encouraging (Gambari, 2010; Owolabi, 2004). Fig. 1 reveals the percentage enrolment



**Fig. 1.** Graphical representation of students' enrolment and performance in SSCE physics conducted by WAEC (May/June) from 2006-2011

and performance of Nigeria students in senior secondary school physics examination conducted by West Africa Examination Council (WAEC) between 2006 and 2011.

It can be deduced from the figure than the average failure rate of students in the subject from 2006-2011 is more than 40%. Idris (2011) and Gambari & Gana (2005) attributed poor performance of students in the subject to lack of qualified teachers, poor instructional strategies, poor infrastructure, non-availability of standard laboratory and poor utilization of instructional media.

Information and Communication Technology (ICT) is one of the most efficient tools for advancing knowledge and skills and it is necessary for quality education in Nigerian secondary schools. ICT tools help to accelerate the learning process, increase teachers efficiency and effectiveness and provide remedial instruction and enrichment of material, thus guaranteeing higher quality standards in secondary schools (Osakwe, 2012). To buttress this, the Federal Republic of Nigeria (FRN, 2004) through National Policy on Education posits that the government should provide facilities and necessary infrastructure for the promotion of ICT at all levels of education. Importantly, educational software packages which are products of ICT have proliferated in virtually every academic discipline, levels and with the rapid development of computer technology, these software packages have been greatly improved to cater for a wide range of teaching and learning experiences (Le & Le, 2007). As computers have become more rapid and powerful, educational software has flourished and teachers can make an appropriate choice of the software which reflects their educational principles and which is appropriate in the development of subject content (Le & Le, 2007).

Some of the software packages that are applicable to the development of physics instruction for secondary school students in Nigeria are Physlets, Physiki, Focus on Physics, Making Waves, Physics Tutor Excalibur, Animations for Physics, BearEdu Technologies Science Software, Easy Java Simulation, Electrostatics 3D, Interactive Physics, Gravity Simulator, High School Physics Software, Ottisoft Ripple Tank, Physics Academic Software, PhysicsLab Computer Simulation, Redusoft, Virtual Physics, Science Teacher Help, Micosoft PowerPoint, Camstudio, Audacity, Macromedia Flash.

Abdul-Salaam (2011) in a study assessed school teachers' use of relevant educational ICT packages in Oyo metropolis, Nigeria. Findings revealed that ICT facilities are not readily available in schools and those that are available are not being utilized due to incompetence and lack of ICT knowledge by teachers. Egomo et al. (2012) in another study observed that low utilization of ICT tools among teachers in Nigerian schools is as a result of low availability of these resources in schools and not because teachers are unaware of the existence of these tools. Oladosu (2012) in another investigation revealed that secondary school teachers in Nigeria are uninformed and unaware of the methodologies of using computer hardware and appropriate software for instructional purposes.

### **Statement of the problem**

Despite the importance of physics to nation building, secondary school students' failure in examinations being conducted by standard examination bodies in Nigeria remain unsatisfactory (Gambari, 2010; Olorukooba, 2007). To buttress this, the Chief Examiners' report of the West African Examination Council (WAEC) revealed that only 40% of the students that sat for SSCE physics in 2005, 56% in 2006, 42% in 2007, 47% in 2008 and 46% in 2009 passed at credit level in the subject while the rest failed. Poor performance in the subject have been attributed to poor teaching methodology, unavailability of instructional materials, lack of qualified physics teachers, and low awareness of physics teachers on existence of relevant instructional media (Gambari & Gana, 2005; Idris, 2011; Taysuz, 2010).

With varieties of educational software packages in existence, physics teachers can adopt or adapt physics instructions and students' performance in the subject will greatly improve. Thus, this investigation sought to determine if physics teachers in Minna, Nigeria are aware of the existence of these software packages and also if they are available for teachers' use in secondary schools in the area.

### **Purpose of the study**

The specific purpose of this investigation was to determine physics teachers' awareness of the existence of software packages for developing physics instruction and also to determine if these packages are available for physics teachers' usage in secondary schools in Minna, Nigeria.

### **Research questions**

(1) Are physics teachers aware of the existence of software packages that can be utilized in developing physics instruction for secondary school students in Minna, Nigeria? (2) are software packages for developing physics instruction available at teachers' disposal in secondary schools in Minna, Nigeria?

### **Methodology**

Descriptive research type was employed for the study and it entails the use of researcher-designed questionnaire for data collecting needed data from samples. Purposive sampling technique was employed to select ninety-three (93) physics teachers from fifty three (53) secondary schools (both private and public) in Minna metropolis. A list, comprising twenty-two (22) computer software packages adaptable for developing physics instruction for secondary school students in Nigeria were identified and the research instrument sought if teachers are aware of their availability.

The research instrument (questionnaire) which was validated by two physics experts, two instructional system specialists and two test and measurement experts at Federal

University of Technology Minna comprises of three sections (Sections A, B & C). Section A was designed to obtain physics teachers' demographic data, Section B was designed to obtain physics teachers' responses on their awareness (aware or unaware) of the existence of software packages for developing physics instruction while Section C was designed to obtain responses which bothers on availability (available or unavailable) of these software packages in secondary schools in the area.

To determine the reliability of the instrument, it was administered twice on ten physics teachers who are part of the population of this investigation (but were not employed for the real study) and a test-retest reliability coefficient of 0.89 was obtained. Data gathered were analyzed using percentage and report method.

## Results

### *Research question one*

**Table 1.** Physics teachers' awareness of the existence of software packages for developing physics instruction in Minna, Nigeria

S/N	Software	Aware	%	Unaware	%
1	Physlets	5	5.38	88	94.62
2	Physiki	4	4.30	89	95.70
3	Focus on Physics	10	10.80	83	89.20
4	Making Waves	12	12.90	81	87.10
5	Physics Tutor Excalibur	6	6.45	87	93.55
6	Animations for Physics	15	16.13	78	83.87
7	BearEdu Technologies Science Software	11	11.83	82	88.17
8	Easy Java Simulation	7	7.53	86	92.47
9	Electrostatics 3D	8	8.60	85	91.40
10	Interactive Physics	13	14.00	80	86.00
11	Gravity Simulator	8	8.60	85	91.40
12	High School Physics Software	10	10.80	83	89.20
13	Ottisoft Ripple Tank	9	9.70	84	90.30
14	Physics Academic Software	6	6.50	87	93.50
15	PhysicsLab Computer Simulation	3	3.20	90	96.80
16	Redusoft	0	0.00	93	100.0
17	Virtual Physics	18	19.40	75	80.60
18	Science Teacher Help	14	15.10	79	84.90
19	Micosoft PowerPoint	38	40.90	55	59.10
20	Camstudio	22	23.70	71	76.30
21	Audacity	25	26.90	68	73.10
22	Macromedia Flash	15	16.13	78	83.87

Table 1 reveals that only 13.87% of the teachers are aware of the existence of software packages that can be useful in developing their instruction. The table also reveals that Microsoft Powerpoint is the only package that 38 physics teachers (representing 41% of the respondents) have awareness of.

*Research question two*

**Table 2.** Physics teachers’ response on the availability of software packages for developing physics instruction at their disposal in secondary schools in Minna, Nigeria

S/N	Software	Available	%	Unavailable	%
1	Physlets	1	1.075	92	98.92
2	Physiki	0	0.000	93	100.0
3	Focus on Physics	6	6.452	87	93.55
4	Making Waves	5	5.376	88	94.62
5	Physics Tutor Excalibur	3	3.226	90	96.77
6	Animations for Physics	12	12.90	81	87.10
7	BearEdu Technologies Science Software	7	7.527	86	92.47
8	Easy Java Simulation	5	5.376	88	94.62
9	Electrostatics 3D	7	7.527	86	92.47
10	Interactive Physics	9	9.677	84	90.32
11	Gravity Simulator	4	4.301	89	95.70
12	High School Physics Software	6	6.452	87	93.55
13	Ottisoft Ripple Tank	3	3.226	90	96.77
14	Physics Academic Software	2	2.151	91	97.85
15	PhysicsLab Computer Simulation	1	1.075	92	98.92
16	Redusoft	0	0.000	93	100.0
17	Virtual Physics	10	10.75	83	89.25
18	Science Teacher Help	8	8.602	85	91.40
19	Micosoft PowerPoint	29	31.18	64	68.82
20	Camstudio	15	16.13	78	83.87
21	Audacity	19	20.43	74	79.57
22	Macromedia Flash	12	12.90	81	87.10

Table 2 reveals that averagely, 91.98% of the teachers do not have these software packages at their disposal in schools. From the table, it was discovered that Microsoft PowerPoint is the most available software package to teachers (available to 31.18% of the teachers) for developing physics instruction.

**Discussion**

The findings of this study on physics teachers’ awareness of the existence of software packages for developing physics content reveals that majority of the teachers are not

aware of the existence of these software packages. This finding is in agreement with the earlier findings of Abdul-Salaam (2011) that teachers' awareness and competence in the use of ICT tools for teaching and learning activities is low. The finding also agrees with the findings of Oladosu (2012) that secondary school teachers in Nigeria are uninformed and unaware of the methodologies of using computer hardware and appropriate software for instructional purposes. However, this finding is not in agreement with the earlier findings of Egomo et al. (2012) who observed that low utilization of ICT tools among teachers in Nigerian schools is not as a result of teachers' unawareness of the existence of such tools.

The finding of this study on availability of software packages for developing physics instruction to teachers in schools reveals that majority of the teachers do not have these software available to them in schools. This finding agrees with the earlier findings of Abdul-Salaam (2011) that incompetence and non-utilization of ICT tools in Nigerian schools is as a result of non-availability of such resources. It also agrees with the findings of Egomo et al. (2012) that low utilization of ICT tools among teachers in Nigerian schools is as a result of low availability of these resources.

### **Conclusion**

Physics is one of the major science subjects whose role cannot be over-emphasized. Learners need the knowledge of the subject at the secondary level of education in Nigeria to prepare them for further studies in sciences at advance stages. Teachers awareness and availability of modern software packages that can enrich, facilitate and aid dissemination of physics lesson in schools are very essential for students' understanding of the subject and for their performance in the subject to be satisfactory enough.

### **Recommendations**

Based on the findings of this investigation, the following recommendations are made: (1) In-service training in form of workshops should be organized to improve and update physics teachers' awareness and competence in the use of software packages that can help enhance the teaching of their subject; (2) Relevant government and school managers should equip schools with required software packages and other technological tools that can assist physics teachers in the teaching of their subjects as this will in turn have positive effects on students' performance in the subject; (3) Practical activities that bother on utilization and application of software packages for developing physics instruction should be inculcated in the curriculum of trainee teachers.

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