Ordeals of Physics Instruction in Nigerian Secondary Schools: Way Forward for the Attainment of Global Competitiveness

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Abstract
Physics instruction in secondary schools is a fundamental panacea towards achieving scientific knowledgeable citizens which can propel a nation in the realization of a sustainable economic force. This paper therefore x-rayed ordeals of physics instruction in Nigerian secondary schools and the way forward for the attainment of global competitiveness. The research has descriptive survey design. Ninety-two (92) physics teachers and eight secondary schools (four in each Local Government Area) were selected using a purposive sampling technique for the study. The research instruments used for the study were "Questionnaire on Ordeal in Physics Instruction in Secondary School (QOPISS) and Physics Practical Apparatus Checklist (PPAC). Using a test-retest method and Pearson Product Moment Correlation, a reliability coefficient of 0.83 was obtained for QOPISS. The data were analyzed according to research questions using the frequency count, percentage, mean, standard deviation and ranking. The study revealed that qualified physics teachers are not adequate for proper teaching of physics, laboratory apparatus are insufficient for effective practical activities in physics teaching and learning in both rural and urban schools, the lecture and problem solving methods are the most applied instructional strategy employed during physics instruction and physics teachers do not utilize ICT tools in teaching physics. Based on the findings of the study, it was recommended that qualified physics teachers should be employed in the secondary schools, all physics laboratories both in the urban and rural secondary schools should be well equipped by relevant authorities and stake holders, appropriate teaching methodologies and ICT tools integration in the teaching and learning of physics should be employed by physics teachers during physics instruction.
Keywords: Physics instruction, laboratory apparatus, physics teachers, ICT tools.

1. Introduction

We live in a world where science has taken a predominant role, permeates our lives and informs our actions. Science is a body of empirical, theoretical and practical knowledge about the natural world produced by consistent and cumulative process which emphasize on observation, explanation and prediction of real world phenomena using experiment (Mishra and Yadav, 2013). Though speculations and conjecture also have a place in science, ultimately scientific theories are acceptable when verified by relevant observation and experiment. Today, different branches of science investigate almost everything that can be observed or detected and science as a whole shape the way we understand the universe, the planet, ourselves and other living things (Ogunleye and Adepeju, 2011). Science has become an integral part of human culture. Countries that ignore this significant truism are risking the potential aspiration of their future generation. It is therefore worthy to note that development of any nation depends to a large extent on the level of scientific education of her citizens.

Dienye and Gbamanja (1990) defined science education as the study of the interrelationships between science as a discipline and the application of educational principles to its understanding, teaching and learning. Basically, science education subject comprises biology, chemistry, mathematics and physics. Physics is a science subject that studies properties of matter and its interaction with energy. It is typically an experimental subject. Principles and concepts generated from physics are very useful in interpretation of natural phenomena in sciences. The focus of physics instructions is to guide students to an understanding of physics concepts and to have the ability to apply this knowledge. It is a field specifically concerned with two basic aims; in the production of a scientifically literate society and the development of potential scientific and technological manpower (Ogunniyi, 1986). Little wonder the FGN (2004) expressed explicitly in the secondary school physics curriculum its objectives as:

(i) provide basic literacy of physics for functional living in the society,
(ii) acquire basic concepts and principles of physics as a preparation for further studies,
(iii) acquire essential scientific skills and attitudes as a preparation for the technological applications of physics, and
(iv) stimulate and enhance creativity.

The above objectives entail indispensable and laudable expressions that can cause fundamental changes to our national development if all collaborating factors shown in figure 1 below are put in place.

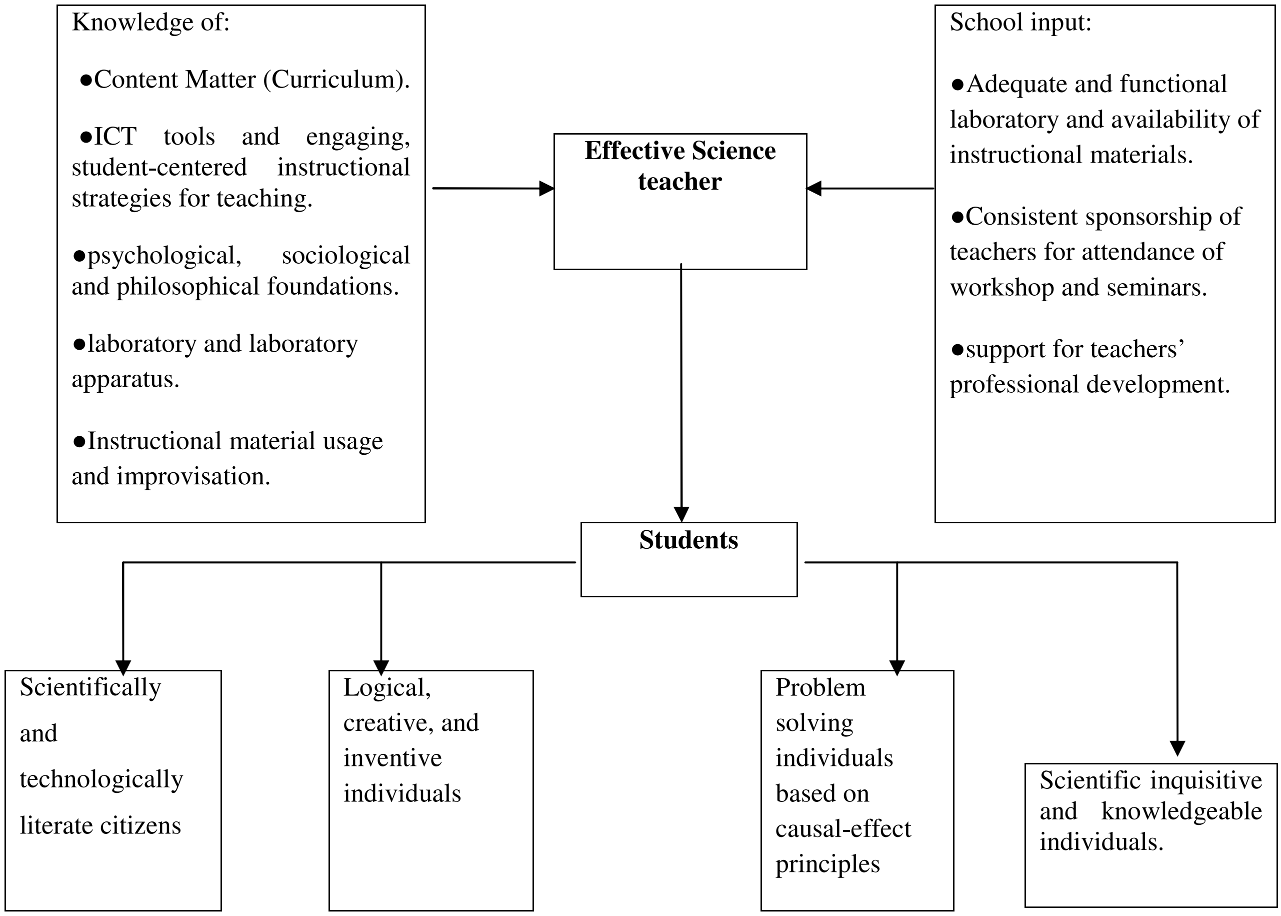

Fig 1: Input-Output science pedagogy model, Aderonmu & Obafemi (2015).

In all educational system, there is a place designed as school where activities of teacher-students interactions takes place (Duru, 2011). Both the teacher and students will be helpless if certain fundamental policies and facilities are not in place to activate conducive teaching and learning environment. Issues that might have lead to ordeal in physics instruction in secondary are availability and functional laboratory and practical apparatus in the physics laboratories. Adegoke and Chukwunenye (2013) stressed that lack of functional physics laboratory and inadequate equipment for physics practical in most Nigerian secondary schools is hampering laboratory activities and these may be contributing to low level of performance of students in physics. Several researches have revealed that no meaningful science instruction can be taught without resources and the laboratory (Ergin & Hirvonon, 2005 and Ottander & Grelsson, 2006). Onwioduokit (2013) stated that few secondary schools that have physics laboratory facilities and apparatus hardly put them to use. This could be linked to physics teachers' lack of mastery of subject matter, teaching skills and knowledge of laboratory apparatus usage.

Sullivan in Birabil and Aderonmu (2014) stated an effective teacher is one who demonstrates knowledge of the curriculum provides instruction in a variety of approaches to varied students and measurably increases student's achievement. Such teacher should be one who has gone through a level of professional training and is both certified with a teaching degree. Qualified physics teachers are those who possess professional teaching certificates in physics while unqualified physics teachers are those who do not possess specific professional teaching qualifications in physics. The American Association of Physics Teachers (2009) identified six important attributes of a physics teacher such as the following;

- The teacher believes in active learning. Teachers know effective instructional practices and will help their students learn science content through the processes of inquiry.
- The teacher has an interest in physics. Teachers are passionate about their subject matter and possess knowledge of the curriculum.
- The teacher has good interpersonal skills. Teachers are good communicators; good interpersonal skills are a prerequisite for good teaching.
- The teacher believes all students can learn. Teachers understand that students will learn in relation to the expectations set for each of them.
- The teacher is conscientious. Individuals who are committed to their students and their work make the best teachers.
- The teacher is a leader. Good teachers will lead by example and encourage students to strive for excellence.

A qualified teacher is one who can provides an environment that allows students to attain their potentials, disseminate effectively physics instructions and develop students intellectually in confronting challenges that requires physics reasoning. Since teaching is a dynamic profession, contemporary means of knowledge acquisition and teaching skills are emergent and not absolute. Therefore quality professional development is critical to the retention and improvement of any teacher in the classroom. Due to the importance professional development in the teaching profession, it was stated in the National Policy of Education, FGN (2004) that teachers shall continue to take cognizance of changes in methodology and in the curriculum of subjects taught in our schools. It further states that teachers shall be regularly exposed to innovations in their profession and also in-service training shall be developed as an integral part of continuing teacher education.

The changing nature of knowledge acquisition and passage as prompted the need for Information and Communication Technology (ICT) integration in teaching physics instructions in the secondary schools. Omingi (2009) said that this is a digital world, this calls for a digital thinking and acting; you cannot apply manual methods in a digital world and expect yourself to flourish. Use of ICT such as Internet applications, CD-ROMs, video technology and various computer attachments and software programs have caused many progressive changes in several societies. Application of ICT in physics instructions help expand learning opportunities, access to educational resources, expedite and facilitate the education process (Jalali and Abbasi, 2004; Yaqma, 2001). Mbata (2011) stressed that ICT integration in teaching has the capacity to provide higher order interactive potentials and develop both the teacher and students intellectual and creative abilities. Yazón, Mayer-Smith, & Redfield, (2002) indicated that the use of technology promotes a different way of thinking about teaching and learning provided that it is genuinely student-centered learning, and not treated just as a simple reprise of the "old model" (directed by the teacher) in a new technological environment.

Due to the immense benefits associated with the integration of ICT into the pedagogical process in secondary schools in Nigeria, the Federal Government of Nigeria stated in the National Policy of Education that “government shall provide necessary infrastructure and training for the integration of ICT in the school system in recognition of the role of ICT in advancing knowledge and skill in the modern world” (FGN, 2004). If properly employed in physics instructions in secondary schools, there will certainly be a shift from the traditional approach of physics teaching to a more friendly approach that will encourage the learners’ divergent thinking paradigm and problem solving skills which is fundamental for high performance in the subject. Okoye (2014) classify ICT tools usage in the classroom into three; multimedia teaching packages, information resource and data. These packages include instructional games, simulations, drills and practice programme, practical demonstration software, Moodle, Spreadsheet applications, internet etc, (Bharatka, 2006). Previous research has suggested that lack of skill and preparation of teachers are the most important barriers to the adoption of ICT in education (Attaran, 2004). The resistance to innovative practices such as ICT usage in physics teaching by teachers could result to not achieving the stipulated physics curriculum objectives as stated above. In the light of the above, the study seeks to examine the ordeal of physics instruction in secondary schools and proffer possible solutions for the attainments of global competitiveness.

2. Purpose of the study

The purpose of the study is to examine certain parameters constitute the ordeals of physics instruction in Rivers State. Specifically, the objectives of the study are to:

(i) ascertain the qualification of secondary school physics teachers considering the location of the school.
(ii) determine the availability and functionality of physics laboratory apparatus
(iii) investigate the prevalent instructional methodology used by physics teachers in the area of study.
(iv) assess the extent of physics teachers' application of ICT tools for physics instructions.

3. Research Questions

(i) What are the qualifications of secondary school physics teachers considering the school location?
(ii) To what extent is physics practical apparatus available and functional in the physics laboratories considering the location of the schools?
(iii) Which instructional methods are mostly used for secondary school physics instructions?
(iv) To what extent do physics teachers apply ICT tools during physics instruction?

4. Methodology

The study has a descriptive survey design. The population of the study consisted of all public and private secondary schools physics teachers in the schools in Port Harcourt and Ikwerre Local Government Areas of Rivers State. A purposive sampling technique was used to determine the sampling size of the study. The criteria for selection includes (i) a secondary school with a physics laboratory (ii) Senior Secondary School Certificate Examination on physics has been taken for the past ten (10) years in the school (iii) there should be ICT laboratory in the school (iv) the teachers should have at least five (5) years teaching experience. Based on the above criteria, Ninety-two (92) physics teachers and eight secondary schools (four in each Local Government Area) were selected based on the above sampling technique.

The instruments for data collection were developed by the researchers and titled "Questionnaire on Ordeal in Physics Instruction in Secondary School" (QOPISS) and "Physics Practical Apparatus Checklist" (PPAC). QOPISS was used to elicit information from the respondents designed based on three sections. Section A was focused on physics teachers' qualification; Section B was focused on Instructional methodology employed by physics teachers while Section C was focused on application of ICT usage in physics instruction. Responses to QOPISS were categorized according to four point Likert scale of Very High Extent (VHE), High Extent (HE), Low Extent (LE) and Very Low Extent (VLE) which were scored 4, 3, 2 and 1 point respectively. Physics Practical Apparatus Checklist (PPAC) consists of the physics practical apparatus expected to be available and functional in the physics laboratory of the schools. This instrument was employed to determine the extent of availability and functionality of the physics practical apparatus in the secondary schools physics laboratory. For the practical apparatus, a bench mark of 160 in quantity was used for the secondary schools in each location. This is in line with the statement of the National Policy of Education in FGN (2004) which proposes a teacher – student ratio of 1:40. Therefore, forty sets of physics practical apparatus are expected to be in each school to serve each student in a class.

The instruments were validated by two physics education experts. QOPISS was subjected to a pilot test applying the test-retest method for an interval of a week to fifteen (15) physics teachers having same equivalent characteristics with the sample size. The data obtained was analyzed using the Pearson Product Moment Correlation and a reliability index of 0.83 was obtained making the instrument reliable for the study. The data collecting instruments were administered personally by the researchers and 100% return rate was obtained. The data collected for the study were analyzed using the frequency count, percentage, mean, standard deviation and ranking.

5. Results

Research Question 1 : What are the qualifications of secondary school physics teachers considering the school location?

The analysis as presented in **Table 1** revealed physics teachers' qualifications considering the school location. It was indicated that out of a total 39 qualified physics teachers, 28.2% were in the rural schools while 71.8% were in the urban schools. Also presented above are 53 Non-qualified physics teachers both in urban and rural schools. It was shown that 15.1% were located in the rural areas while 84.9% were located in the urban schools.

The findings revealed that there were more physics teachers located in the urban schools than the rural schools and in all, Non-qualified physics teachers were more in the secondary schools.

Research Question 2.: To what extent is physics practical apparatus available and functional in the physics laboratories considering the location of the schools?

The result as shown in **table 2** reveals the extent of Available and Functional (AF), Available Not Functional (ANF) and Not Available (NA) physics apparatus in the sampled schools both in the urban and rural areas of the study. It was established that for the urban schools, the extent at which the physics apparatus were Available and Functional (AF) was 22.2%, Available Not Functional (ANF) was 1.4% and Not Available (NA) was 76.4%. It was also revealed that the extent at which the physics apparatus in the rural schools were Available and Functional (AF) was 10.2%, Available Not Functional (ANF) was 0.7% and Not Available (NA) was 89.1%. The above indicates that there are more available and functional physics laboratory apparatus in the urban schools than the rural schools. Based on the findings above, it also revealed that physics laboratory apparatus for both locations are insufficient for effective practical activities in physics teaching and learning.

Research Question 3 : Which instructional methods are mostly used for secondary school physics instructions?
Table 3 showed the analysis of instructional methods that are mostly employed for secondary school physics instructions. The instructional methods were ranked based on the calculated mean and it was shown that the lecture method ranked 1st, problem solving and discussion methods ranked 2nd and 3rd respectively. Other instructional methods like Just-in-time approach, Individualized and collaborative methods were ranked 14th, 15th and 16th respectively.

Research Question 4: To what extent do physics teachers apply ICT tools during physics instruction?
The result as presented in **table 4** reveals the responses of physics teachers' applications of ICT tools in physics instructions. It was shown that multimedia presentation was one major ICT tool mostly used by physics teachers' during physics instructions with a mean value of 2.62 which higher than the criterion mean of 2.5. However, other ICT tools like simulations and games for physics instructions, Team board, Moodle, science stage, Microsoft excel, Youtube science demonstration clips and other physics instructional software were not usually employed during physics instruction. The finding indicates that physics teachers do not employ most of the ICT tools in teaching physics.

6. Discussion of findings

The research work empirically analyzed ordeals of physics instruction in secondary schools in Rivers State. On the issues of qualification of Qualified Physics Teachers (QPT) and Non-Qualified Physics Teachers (NQPT) in secondary schools in the sample area, it was observed that there were more Non-Qualified Physics Teachers than the Qualified Physics Teachers (QPT). A trained teacher is someone who has completed, in a formal teacher training institution, a planned programme of training, involving principles and methodological foundations and subjected to expert observation for a certain period of internship. Therefore, the teacher is an importance agent in the educational industry. An important factor that determine science students attitude towards the learning of science especially in secondary schools is the quality experience and instruction provided by the teacher. It is on this note that Umoren (2001), stated that a teacher who lacks professional experience or qualification endangers the entire school system. Therefore, in any system of education, teachers as professionals are significant to the survival and purpose of education.

Based on the availability and functionality of physics laboratory, the finding of the study is in line with that of Arokoyu and Aderonmu (2014) where it was indicated that there are no sufficient science laboratory apparatus for science teaching in Rivers State. Bello (2012) on the effect of availability and utilization of physics laboratory equipment on students' achievement in senior secondary school physics, identified that science laboratory with adequate equipment is a critical variable in determining the quality of output from senior secondary school Physics. No meaningful physics principle or concept can be taught without adequate practical activity accompanying such presentation using appropriate practical apparatus. Gbamanja (2002) stated that practical experience in science ensures student – centered learning, allowing effective interaction between the students and the learning materials. Obomanu and Nbina (2009) therefore added that practical experience in science will improve students' cognitive ability and knowledge.

Considering the arguments explicitly highlighted above, the teaching of physics is facing dilemma for teachers as well as students. However, problems in the teaching of physics can be minimizing by selecting suitable teaching method. Vikoo (2003) described instructional methods as a set of deliberately and systematically arranged information that is exchanged between a teacher and learner with a view of causing a predetermined change in the behaviour of the learner. Hussain, Azeem and Shakoor (2011) also explained that one important difference between a victorious teacher and ineffective teacher is the methods and materials they use in creating interest of their students in their subject.

The Fundamentals of physical thinking are formed and developed in specific forms and methods of training. Methodical system of teaching of physics in high school is based on a scientific basis, considering the subject matter of a factual, ideological and methodological point of view (Kerimbayev, 2015). It is the responsibility of the physics teacher to determine and select relevant methods for his teaching. The choice of methods of teaching, certainly will serve as a yardstick in assessing the outcome of students' performance in physics.

On the use of ICT tools in physics instructions, Yusuf and Yusuf cited in Okpurukhre and Esiekpe (2013) mentioned that the potential for ICT to improve the quality of instruction, transform the schools, improve school management, increase access to education, improved in teacher education among others is a major criteria for a dynamic and holistic educational programme. Okorodudu (2010) noted that wide spread availability of the Internet and common access to information, freely available novel technologies and types of social interactions have inevitable impacts in learning and teaching. He asserted that e-learning using electronic devices and new technologies is a modern learning method and that e-learning systems of other learning technologies are used as a supporting tool content delivery in classroom settings.

The research study of Mlambo (2007) on ICT in A-level physics teaching and learning at secondary schools in Manicaland Zimbabwe found the absence of good examples of the best practice in the use of ICT in teaching physics. It was further stated that physics teachers using traditional instructional methods mainly the lecture method and note dictation. This implies that ICT is not effectively used as a pedagogical tool in teaching. Koehler & Mishra (2009) argue that, by their nature, newer digital technologies which are protean, unstable and opaque, present new challenges to teachers who are struggling to use technology in their teaching. Conclusively, Hayes (2007) upheld that, use of technology in teaching doesn't only change the way a teacher teaches, but also the way students learn.

7. Recommendations

Based on the findings of the study above, the following recommendations were posited by the researchers:

1. During employment processes in secondary schools, qualified physics teachers should be considered since they possess sound pedagogical background in the teaching of physics.
2. Effort should be made in ensuring that physics laboratories in urban and rural secondary schools are well equipped by government and private school owners so that both theory and practical aspect of physics are learnt by the students.
3. Physics teachers should ensure that appropriate teaching methodologies which focus on the learner in the achievement of optimum performance are employed during physics instructions.
4. ICT tools integration in the teaching and learning of physics is fundamental and as such, physics teachers should apply these tools when teaching physics.

8. Conclusion

This study identified critical factors and presented possible way forward in curbing the ordeals in physics instructions. Attention must be paid towards the proper development of science and technology which physics is the fundamental pillar.. However certain constraints in physics instructions might impede the path to the realization of the said goals. As such, urgent and appropriate measure which this study has posited must be employed in order to attain global competitiveness in this contemporary era.

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Table 1: Showing physics teachers' qualification.

Qualifications		Location	
		Rural Schools	Urban Schools
Qualified Physics Teachers	NCE	2	-
	B.Ed	3	9
	B.Sc with PGDE	5	11
	M.Ed	1	7
	PhD (Edu)	-	1
	Total	**11 (28.2)**	**28 (71.8)**
Non-qualified Physics Teachers	OND	-	3
	HND/B.Sc	6	13
	B.Engr	2	26
	M.Sc	-	3
	P.hD (other fields)	-	-
	Total	**8 (15.1)**	**45 (84.9)**

Source: Researchers' field work, 2015. Figures in Parentheses are percentages.

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Table 2: Showing physics practical apparatus in the schools.

Apparatus	Qty	Urban Schools			Rural Schools		
		AF	ANF	NA	AF	ANF	NA
Bimetallic strip	160	37(23)	-	123(77)	7(4.38)	-	153(95.62)
Barometer	160	6(3.75)	2(1.25)	152(95)	2(1.25)	-	158(98.75)
Laboratory thermometers	160	9(5.6)	-	151(94.4)	3(1.90)	1(0.60)	156(97.5)
Lever balance	160	16(10)	2(1.25)	142(88.75)	4(2.5)	-	156(97.5)
Vernier calipers	160	24(15)	4(2.5)	132(82.5)	12(7.5)	2(1.25)	146(91.25)
Masses	160	108(67.5)	-	52(32.5)	41(25.6)	-	119(74.4)
Retort stand	160	48(30)	8(5)	104(65)	27(16.9)	13(8.1)	120(75)
Calorimeter	160	10(6.25)	-	150(93.75)	1(0.60)	-	159(99.40)
Micrometer screw gauge	160	16(10)	-	14490)	8(5)	2(1.25)	150(93.75)
Pendulum bob	160	44(27.5)	-	116(72.5)	23(14.4)	-	137(85.6)
Newton spring balance	160	37(23.1)	4(2.5)	119(74.4)	16(10)	2(1.25)	142(88.75)
Bar and gauge apparatus	160	-	-	160(100)	-	-	160(100)
Bunsen Burners	160	42(26.25)	6(3.75)	112(70)	15(9.4)	4(2.5)	141(88.1)
Convex mirror	160	122(76.3)	9(5.6)	29(18.1)	68(42.5)	2(1.25)	90(56.25)
Concave mirror	160	80(50)	6(3.75)	74(46.25)	34(21.25)	-	126(78.75)
Rectangular glass block	160	140(87.5)	-	20(12.5)	68(42.5)	6(3.75)	86(53.75)
Ray box	160	88(55)	6(3.75)	66(41.25)	33(20.6)	-	127(79.4)
Meter rule	160	112(70)	4(2.5)	44(27.5)	72(45)	-	88(55)
Potentiometer	160	56(35)	12(7.5)	92(57.5)	30(18.75	8(5)	122(76.25)
Resistance box	160	32(20)	13(8.1)	115(71.9)	12(7.5)	-	148(92.5)
Galvanometer	160	62(38.75)	3(1.85)	95(59.4)	24(15)	2(1.25)	134(83.75)
Ammeters	160	42(26.25)	-	118(73.75)	17(10.6)	-	143(89.4)
Rheostat	160	16(10)	5(3.1)	139(86.9)	6(3.75)	-	(154)96.25
Accumulators	160	67(41.9)	-	93(58.1)	42(26.25)	-	118(73.75)
Plug keys	160	22(13.75)	-	138(86.25)	8(5)	-	152(95)
Jockey keys	160	29(18.1)		131(81.9)	16(10)	-	144(90)
Crocodile clips	160	18(11.25)	-	142(88.75)	6(3.75)		154(96.25)
Sonometer	160	2(1.25)	-	158(98.75)	-	-	160(100)
Pulleys	160	-	-	160(100)	-	-	160(100)
Force board	160	-	-	160(100)	-	-	160(100)
Voltmeter	160	20(12.5)	2(1.25)	138(86.25)	12(7.5)	-	148(92.5)
Clamp holders	160	56(35)	-	104(65)	26(16.25)	-	134(83.75)
Stop clocks	160	32(20)	3(1.9)	125(78.1)	21(13.1)	3(1.9)	136(85)
Magnetic dip needles	160	-	-	160(100)	-	-	160(100)
Turning fork	160	29(18.1)	-	131(81.9)	14(8.75)	-	146(91.25)
Density bottle	160	17(10.6)	-	143(89.4)	5(3.1)	-	155(96.9)
U- tube	160	-	-	160(100)	-	-	160(100)
Tripod stand	160	13(8.1)	-	147(91.9)	6(3.75)	-	154(96.25)
Semi-circular glass block	160	6(3.75)	-	154(96.25)	-	-	160(100)
Screen	160	25(15.6)	-	135(84.4)			
Hydrometer	160	-	-	160(100)	-	-	160(100)
Meter bridge	160	12(7.5)	2(1.25)	146(91.25)	6(3.75)	-	154(96.25)
Total/ Percentage mean	6720	1495**(22.2)**	91**(1.4)**	5134**(76.4)**	685**(10.2)**	45**(0.7)**	5990**(89.1)**

Source: Researcher's fieldwork, 2015. NOTE: Figures in Parentheses are percentages..

Table 3: Showing physics teachers response on usage of instructional methods.

To what extent do you use the following instructional methodology during physics instructions?	Mean	SD	Rank
Demonstration	2.37	1.78	6th
Individualize	1.62	0.96	15th
Laboratory	2.14	1.32	10th
Problem Solving	2.76	1.20	2nd
Collaborative	1.31	0.83	16th
Lecture	2.92	1.86	1st
Guided discovery	2.31	1.49	8th
Inquiry/Process based approach	2.34	1.52	7th
Project	2.21	1.22	9th
Field trip	1.94	0.61	13th
Excursion	2.07	1.28	12th
Concept mapping	2.10	1.20	11th
Contextual approach	2.48	1.91	4th
Discussion method	2.53	1.66	3rd
Just-in-time approach	1.73	0.86	14th
Analogies	2.43	1.84	5th

Source: Researcher's field work, 2015.

Table 4: Showing physics teachers' response on the applications of ICT tools in physics instructions.

To what extent do you use the following ICT tools during physics instructions?	Mean	SD	Decision
Application of excel in graph plotting during physics instructions	2.31	1.67	LE
Application of multimedia presentation for teaching physics.	2.62	1.34	HE
Application of simulations and games in teaching physics.	2.02	1.12	LE
Application of interactive white board in teaching physics.	1.97	1.09	LE
Application of Team board for physics instruction	1.78	1.01	LE
Applications of Moodle for physics lesson presentations and interactions.	1.83	0.96	LE
Applications of social media tool such as science stage for the purpose of physics project and assignments	2.35	1.47	LE
Applications of Microsoft excel to facilitate information management for physics instructions	2.33	1.66	LE
Applications of Youtube science demonstration clips for content delivery in physics.	1.91	1.94	LE
Application of physics instructional software for the teaching of physics.	2.36	1.72	LE

Source: Researcher's field work, 2015.