TOWARDS ENRICHING NIGERIA'S SENIOR SECONDARY SCHOOL PHYSICS CURRICULUM: PHYSICS EXAMINERS' PERSPECTIVES.

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Abstract
The study identified three (3) knowledge areas deemed necessary for infusion into senior secondary school (SSS) physics curriculum through opinions of physics examiners for improvement of the existing curriculum. The three areas are Information and Communication Technology (ICT), Entrepreneurship Education (E.E) and Harmonisation of Scientific Notations, Standards and Practices (HSNSP). This is with a view to enriching the curriculum with learning experiences which will improve the functionality of the curriculum and make recipients to easily adapt to the scientific and technological demands of a new world order characterised by dynamic changes. Seven (7) research questions were raised and answered while three(3) hypotheses were formulated and tested at a 0.05 level of significance. The population of the study comprised three hundred and five (305) physics examiners in the North Central Zone of the country, while the sample consisted of sixty (60) examiners from the two (2) marking venues in the Federal Capital Territory (FCT), Abuja at Government Secondary School Tudunwada and Government Secondary Gwagwalada. A structured questionnaire was used to collect data. The instrument was validated by three (3) University lecturers from the Science Education Department of the Faculty of Education, University of Ibadan and two (2) Senior Research Officers from the Nigerian Educational Research and Development Council (NERDC), Abuja. The instrument had a reliability index of 0.85 using Cronbach Alpha technique. Results show that respondents were favourably disposed to more than 80% of the identified knowledge areas using an average mean rating greater than 2.5 ($x \geq 2.5$) on a four- point Likert Scale. However, using an average mean rating greater or equal to 3.6 ($x \geq 3.6$) that is 90% of a four –point scale for prioritisation, 20 items out of a total of 60 items (33.33%), 10 for ICT, 10 for entrepreneurship education met the required cut off mark for inclusion. Factors affecting the implementation of desirable changes in our science education programmes in general and physics in particular have also been spotlighted while the need to surmount such constraints has equally been emphasized.

Key words: Curriculum, Entrepreneurship Education, Harmonisation, Perspectives, Information and Communication Technology.

Introduction

The word Curriculum has been used differently bydifferent scholars in different contexts. According to Adikwu (2008), Curriculum as an idea was said to have originated from John Frankline's book 'The Curriculum' written in 1918 where it was referred to as the course of deeds and experiences through which children grow and mature in becoming adults. Maduewesi (1987) quoted in Idoko (2008) defines curriculum as the sum total of what students have learnt at school and what teachers do at school from the day such students are admitted to when they leave. However, in the Nigerian setting the term curriculum is used interchangeably for both the sum total of what is learnt and for each of the subject areas. Hence there is chemistry curriculum, physics curriculum, mathematics curriculum and so on. In 2006, Nigerian Educational Research and Development Council (NERDC), was mandated to develop a 9 -year Basic Education Curriculum (BEC) to meet the ideals of the Universal Basic Education (UBE) programme. The Curriculum accommodated the fundamentals of both the National Economic Empowerment and Development Strategies (NEEDS) and the Millennium Development Goals (MDGs) while the old curriculum was being systematically phased out (NERDC, 2007). However, according to Rukkayatu (2012), feedback received on implementation of the Basic Education Curriculum (BEC) called for an urgent need for the review of the 9 -year BEC to achieve a reduction in subject overload. This shows a situation where curriculum review came earlier than expected. Similarly, new discoveries and new areas of knowledge as well as societal expectations can be valid reasons for changes in a curriculum at any point in time.

Agommuoh and Akanwa (2014) assert that the study of Physics enhances an understanding of the interplay of forces in nature and therefore form veritable armour against superstition. The authors cite Adeyemi (2003) and Oraifo(2005) as saying that physics plays very important role in the scientific and technological advancement that affect the life of mankind and also brought Egbo(2011) into the picture by maintaining that the utmost important goal in Physics education is the functionality and the utilitarian way of preparing the individual for life in the community and reforming the society for relevance, adequacy and competitiveness in the world. Given such invaluable role physics education is expected to play in a world characterised by dynamic changes in science and technology, there is need to continually identify knowledge areas and concepts which would enrich Physics curriculum at relevant areas of the educational system.

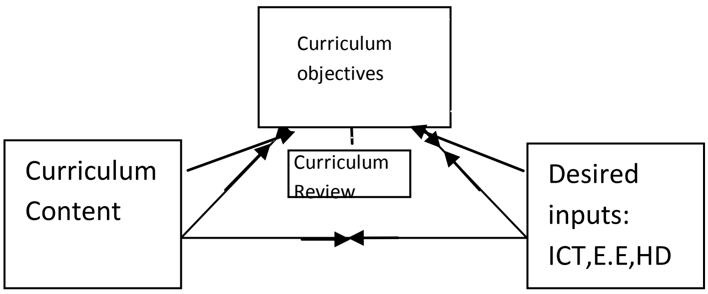
On this premise, the study addresses the inclusion of some areas of knowledge deemed desirable in subsequent reviews of the current Senior Secondary School Physics Curriculum. In order to ascertain the extent to which the areas of knowledge are desirable, the areas have formed a major part of the instrument used for data collection where examiners of the subject at two (2) marking venues in Federal Capital Territory, Abuja, responded to the items in the instrument. As examiners of the subject, the responses have been used as valid responses and reliable data for suggesting changes in physics curriculum.

Theoretical Framework

The theoretical framework of this study is derived from Needs Assessment Evaluation model. According to Gall, Borg and Gall (1996).

> A need can be defined as a discrepancy between an existing set of conditionsand a desired set of conditions.In using Needs Assessment frameworka researcher is implying there is an anomaly between an existing set of curriculumand a desired curriculum. It is believed according to Gall et al, (1996) that 'Because we consider Needs Assessment to be closely related to objective-based models of evaluation, we are treating it as a quantitative approach.' This statement of need reflects a judgement about the present merit of the curriculum.Quantitative research methods enable researchers to measure the precise extent of discrepancy between existing state and a desired state. P698

A Conceptual framework deriving from the above theoretical framework and showing the relationship among the concepts of the study is conjectured below.



Adapted from Needs Assessment Evaluation model in Gall et al (1996)

From the schematic model of the conceptual framework, it can be seen that there is a link among curriculum content as stated by NERDC in Physics for SSS1-3 curriculum, curriculum goals as represented by the themes of the curriculum and the Needs required to be infused into subsequent curriculum review which are represented by the variables of the study namely, Information and Communication Technology (ICT),Entrepreneurship Education(E.E) and Harmonisation of Scientific Definitions, Standards, Notations and Practices (HDSNP). The three components namely, Desired Inputs,Curriculum Content and Objectives of the Curriculum are interrelated and have a bearing on subsequent curriculum review.

Statement of the Problem

Since Curriculum planning, development and dissemination often involve changes while science and technology are areas characterised by dynamic processes, it is expected that stakeholders should be working relentlessly in a bid to ensure growth, development and improvement in various subject areas and disciplines. In the wake of a new world order, characterised by demand for poverty eradication which Entrepreneurship Education can address, keeping abreast of quantum leaps in science and technology by the use of ICT and reducing bottlenecks in lesson delivery by ensuring harmonisation in scientific definitions, notations, standards and practices , some areas of knowledge have been deemed necessary to be included in subsequent review of Senior Secondary School Physics Curriculum. This is the thrust of this study. These areas include: an identification and use of necessary ICT materials, inclusion of strands of relevant entrepreneurship learning experiences and harmonisation of content materials.

Research Questions

The study seeks to answer the following research questions:

1. What areas of knowledge have been articulated for inclusion in a review of SSS PhysicsCurriculum?
2. To what extent do examiners of the subject agree with the infusion of the articulated Information and Communication Technology (ICT)learning experiences in review of SSS Physics Curriculum?
3. To what extent do examiners of the subject agree with the infusion of the articulated Entrepreneurship Education learning experiences in a review of SSS Physics Curriculum?
4. To what extent do examiners of the subject agree with the infusion of the articulated Harmonisation of Scientific Definitions,Notations and Practices (HSDNP) learning experiences in a review of SSS Physics Curriculum?
5. To what extent can the responses on inclusion of the knowledge areas in a review of the curriculum be prioritised?
6. To what extent can identified areas be matched with existing themes?
7. What challenges are likely to militate against the successful infusion of the identified areas in any proposed review?

Hypotheses

H_{01} :There is no significant difference in the mean ratings on the infusion of ICT and E.E learning experiences in subsequent review of SSS Physics Curriculum.

H_{02}:There is no significant difference in the mean ratings on the infusion of ICT and HSDNP learning experiences in subsequent review of SSS Physics Curriculum

H_{03}: There is no significant difference in the mean ratings on E.E and HSDNP learning experiences in subsequent review of SSS Physics Curriculum

Methodology

For the purpose of this study a survey design was used. This is because according to Gall etal (1996), the purpose of survey is to use questionnaire or interviews to collect data from participants in a sample about their characteristics, experiences and opinions in other to generalise the findings to a population that a sample is intended to represent. To this end, 20 items on ICT, 29onEE and 11 on HSDNP constituted the variables of the study.The entire population of National Examination Council (NECO) PhysicsExaminers in North Central Zone of Nigeria which stood at 305 as at 2016 constituted the target population for this study. A Sample of 60 examiners selected from two marking venues in Federal Capital Territory – Abuja (Gwagwalada and Abuja Municipal Area Council) constituted the sample of the study. These two marking venues were used because of their proximityto the researcher and convenience of administration of research instruments.

Respondents were randomly selected and a questionnaire titled ‘Towards Enriching SSS Physics Curriculum Scale’ designed by the researcher was used to elicit information. The curriculum themes as well as extensive literature review formed the basis of the items generated. The questionnaire was made up of two sections A and B. Section A solicited` informationon the respondents' bio-data while section, B elicited information on the respondents'opinions on infusion of identified knowledge areas as per the six (6)themes of the SSS Physics Curriculum namely: theme 1(Interaction ofMatter, Space and Time), theme 2 (Conservation Principles), theme 3(Motion without MaterialTransfer), theme 4(Fields at Rest and in Motion), theme 5 (Energy Quantization) and theme 6 (Physicsin Technology). The instrument was validated by three University lecturers from the Science Education Department of the Facultyof Education, University of Ibadan and two Senior Research Officers from N.E.R.D.C. Corrections in respect office validity and content validity were effected. The reliability of the instrument was determined through a pilot testing which involved 20 examiners made up of two chief NationalExamination Council (NECO) physics examiners and eighteen (18) team leaders of NECO Physics examiners in Oyo state whowere not ` involved in the sample. CronbachAlpha estimation was used for reliability estimation and a 0.85 co-coefficient was obtained. A modified four -point Likert Scaleof Very High Extent (4 points), High Extent (3 points), moderate Extent (2 points), LowExtent(1 point), was used suchthat below 2.5 indicated unfavourable disposition towardsthe item while 2.5 indicated favourable disposition. The hypotheses were tested at a 0.05level of significance using t-test statistical technique.

Results

Results of the study have been presented vis-à-vis research questions and the hypotheses.

Research Question 1: what areas of knowledge have been articulated for inclusion in a review of SSS Physics Curriculum?

In order to answer this research question, extensive literature review was undertaken in respect of some of the themes of the Science Teachers Association of Nigeria (STAN) Conference Proceedings in the areas of Curriculum reforms and Science, Technology, Engineering and Mathematics (STEM) Education.

Notable among such themes are shown table 1.

Table 1:Sources in Science Education Literature showing Need for infusion of ICT,E.E HSNDP in Science Delivery.

Author/Yr	Tittle of Study	Findings/Conclusion	Publisher/Journal
Agommuoh Patience C/2015	Enhancing the teaching of the Physics through the use of ICT in Senior Secondary Schools	The application of ICT in Physics can improve students' academic performance in physics (p.281)	56th Annual Conference Proceedings of Science Teachers Association of Nigeria (STAN)
Ezemduka,C.U and Achufusi J.N /2013	Level of SechoolBiologyTeachers' ICT literacy and utilization in Anambra State: Implication for MDGs Attainment	The efforts and intervention put in place by government and professional bodies to provide Biology teachers with Skills and Competencies to integrate ICT in lesson delivery is still low and not enough (p.330)	54th Annual Conference Proceedings of STAN
MojisolaOmonikeAdegboye/ 2009	Stirring Entrepreneurial Skills through Knowledge Acquired in Physics.	The Curriculum should be reviewed to broaden the scope.(p.302)	50th Annual Conference Proceedings of STAN

Patrick, J.Uko and Utiba,Uduak James/ 2009	Creating Entrepreneurial Skills through Physics Education	The teaching of physics in Senior Secondary should be model led to promote the development of entrepreneurial skills inherent in the curriculum.(p310)	54th Annual Conference Proceedings of STAN
MalachyN.Ogu/2008	Problems of Physics Education	Physics teachers should emphasize hands-on activities and de-emphasize the acquisition of basic physics theories(p257)	49th Annual Conference Proceedings of STAN
Usman E. Ochayi and Anthony J. Ukwumonu/2008	Integration of ICT in Senior Secondary School Curriculum in Nigeria: Problems and Prospects	Information and Communication Technology integration into Senior Schools Curriculum in Nigeria will provide a fundamental shift in the way teachers teach and students learn. (P210)	49th Annual Conference Proceedings of STAN
MalachyN.Ogu/2003	Popularising the use of computer as an Instructional Tool in Secondary School Physics in Nigeria.	Use of computers as an instructional tools has been shown to encourage students to become actively involved in learning process and hence serve as a motivational tool (p243).	44th Annual Conference Proceedings of STAN

Based on the paper presentations and conclusions/recommendations it can be seen among others that knowledge areas that could enrich SSS Physics Curriculum are :
i) Information and Communication Technology (ICT);
ii) Entrepreneurship Education (E.E), and
iii) Harmonisation of Scientific Practices (HDSNP)

Aspects of ICT highlighted in the studies include use of over head projectors, computeraided instruction (CAI),development of a software package etc. On Entrepreneurship Education, some elements of trade subjects tangential to Physics such as Electronics, Basic Electricity, Auto mechanics have been spotlighted for inclusion while on Harmonisation of Scientific Practices, the need for harmonising scientific concepts,standards and notations such as Gas laws, measurement of Pressure, measurement of temperature across science and technology disciplines has been identified.

Research Question 2: To what extent do examiners of the subjects agree with the infusion of the articulated ICT learning experiences in a review of SSS Physics Curriculum?

Table 2.0: Meanratings of respondents on infusion of the articulated ICT learning experiences in review of SSS Physics Curriculum?

S/N	Physics Themes	ICT Statements	Mean($\bar{x}$)	S.D
1.	Theme 1:Interaction of Matter,Space and Time	Use of over head projectors to show fundamental quantities e.g. mass, length	3.4	.45
2.		Use of computers simulation to differentiate between vectors and scalars	3.8	.34
3.		Use of computer simulation to demonstrate types of motion e.g. oscillatory motion ,random motion	3.6	.48
4.	Theme2:Conservation Principle	Use of computer animation to demonstrate energy conversion e.g. .kinetic energy to potential energy.	3.4	.68
5.		Use of computers for simulating conversion of energy to work.	3.6	.62
6.		Use of computer simulation to demonstrate change of state of matter.	3.8	.68
7	Theme3: Fields at Rest and in motion	Use of computer animations to visualise wave concepts	3.4	.45
8		Gather data using sensors linked to data loggers	3.6	.36
9		Use of computer software to present information on screen	3.8	.38
10	Theme 4: Waves (motion without material transfer)	Use of animations from computer projector to differentiate types of fields e.g. gravitational fields, magnetic fields	3.4	.45
11		Use of animations to demonstrate electrical conduction through liquids and gases	3.6	.48
12		Use of audio-visual to demonstrate Faraday's laws of electrolysis.	3.3	.34
13	Theme 5:Energy Quantization	Use computer animations to differentiate atom as a wave and as wave.	3.4	.45
14		Use computer animation to demonstrate Bohr's model of atom	3.6	.48
15		Use of computer animation to demonstrate Rutherford model of atom	3.3	.34
16	Theme6: Physics in Technology	Use of computer animations to show parts of a satellite	3.2	.34
17		Use of computers to demonstrate coupling of satellite to television set	3.0	.68
18		Use of computers to demonstrate faults detection in circuits	3.6	.65
19		Use of internet to source information for alternative integrated circuits (IC) where original IC cannot be found	3.8	.69
20		Use of Over Head Projector to demonstrate production of hydro-electric power	3.0	.56
			Grand mean =3.5	Grand S.D =.25

From table 2 above, it can be seen that the sectional mean for infusion of ICT learning experiences is 3.5 on a 4-point Likertscale.This is a welcome development and in general tends to point to the fact that ICT infusion into subsequent review of SSS Physics Curriculum is desirable.

Research question 3: To what extent do examiners of the subjects agree with the infusion of the articulated entrepreneurship education learning experience in review in a review of SSS Physics Curriculum?

Table 3: Mean ratings of respondents on infusion of the articulated E.E learning experiences in review of SSS Physics Curriculum?

S/N	Physics Themes	E.E Statements	Mean($\bar{x}$)	S.D
1.	Theme 1:Interaction of Matter,Spa	Ability to use measuring tape to approximate measurement of lengthy materials	3.4	.68
2.		Ability to apply measuring instruments for accurate measurements e.g. stop clock, ammeter	3.6	.65

3.	ce and Time	Ability to detect/troubleshoot faults in laboratory measuring instruments	3.8	.62
4.		Ability to carry out maintenance service in faulty measuring instruments e.g. faulty stop watch	3.0	.56
5.	Theme2:Conservation Principle	Use of spreadsheets and other software to process data.	2.6	.76
6.		Identify energy efficient component users e.g. use of energy saver bulbs instead of tungsten electric bulb.	3.0	.48
7.		Use of freeloader that uses rays of sun to charge laptop, gaming devices	3.6	.32
8.		Detect fault in freeloader	3.0	.46
9.		Ability to construct transformer for use in electrical appliances	3.6	.48
10.		Ability to construct an inverter that converts solar energy to electrical energy	3.8	.56
11.	Theme3: Fields at Rest and in motion	Use of computer to video record teaching procedures	2.6	.46
12.		Ability to service microwave oven	3.8	.56
13.		Ability to identify microwave oven components such as magnetron, wave guide	3.2	.43
14.		Ability to couple microwave oven components	3.5	.34
15.		Ability to have knowledge of micro oven functional parts .	3.0	.35
16.	Theme 4: Waves (motion without material transfer)	Ability to electroplate household materials	3.8	.38
17.		Ability to use oscilloscope to determine potential difference between two points in a circuit	2.6	.58
18.		Ability to service oscilloscope	3.5	.64
19.		Ability to observe some precautionary measures when handling oscilloscope	3.0	.46
20.		Ability to handle soldering iron and lead to fix a electrical components to a circuit	3.4	.45
21.	Theme 4: Energy Quantization	Ability to write simple programme to solve numerical problems involving nucleons numbers, protons and number of atoms	3.8	.38
22.		Ability to run the written programme	3.5	.58
23.		Ability to test the programme real data	3.4	.64
24.		Ability to simulate a physical task	3.0	.46
25.		Ability to improve models of atoms	3.4	.45
26.	Theme6: Physics in Technology	Ability to identify satellite dish components	3.2	.68
27.		.Ability construct simple dish	3.6	.56
28.		Ability to carry out maintenance service in satellite dish	3.6	.45
29		Ability to establish a link between a television set and a satellite system	3.4	.36
			Grand mean =3.3	Grand S.D =.36

In respect of research question 3, a sectional mean of 3.3 gives a high mean rating on the infusion of the entrepreneurship education into any subsequent review of the Physics Curriculum.

Research question 4: To what extent do examiners of the subjects agree with the infusion of the articulated Harmonisation and Definition of Scientific Notation Practices learning experience in review in a review of SSS Physics Curriculum?

Table 4 Mean ratings of respondents on infusion of the articulated HDSNP learning experiences in review of SSS Physics Curriculum?

S/N	Physics themes	HDSNP Items	Mean($\bar{x}$)	S.D
1	Theme1:Interaction of Matter,Space and Time	Ability to adopt uniform format in reporting results of experiments	2.8	.78
2		Maintaining uniformity in definitions e.g. use of time rate of change	2.6	.96
3		Using same units/ compounds in allied subjects/ disciplines e.g. g/mol	2.4	.89
4	Theme2: Conservation Principle	Maintaining uniformity in definitions ,standards and practices	2.2.	.78
5	Theme 3: Fields at Rest and in Motion	Maintaining uniformity in definitions	3.0	.36
6		Using same units/ compounds in allied subjects/ disciplines	3.4	.46
7	Theme4: Waves (Motion without material transfer)	Maintain uniformity in definition	2.3	.58
8		Using same units/ compounds in allied subjects/ disciplines	3.4	.46
9	Theme 5: Quantization of Energy and Duality of matter	Maintaining uniformity in definitions	2.3	.58
10		Using same units/ compounds in allied subjects/ disciplines	2.4	.68
11	Physics in Technology	Maintaining uniformity in colour codes of wires e.g. red colour for brown colour	2.5	.89
			Grand mean=2.6	Grand S.D=.35

With regard to research question 4, the mean ratings in respect of the need to harmonise scientific notations and principles in a subsequent review of SSS Physics Curriculum as shown on table 4 gives a sectional mean rating of 2.6.This is just slightly above the mean divide line of 2.5, suggesting that harmonisation of standards may have to be looked into before embarking upon. However,it also shows that the respondents are slightly positive to the need to harmonise principles and practices of sciences education.

Research Question 5: To what extent can the responses on inclusion of the articulated knowledge areas in a review of SSS Physics Curriculum be prioritised?

Table 5Prioritised mean ratings of proposed knowledge areas for enrichment of SSS Physics Curriculum

$\bar{X}$ (mean) ≥3.6 (90%)

Area/Theme	Information and Communication Technology (ICT)	Entrepreneurship Education (E.E)	Harmonisation of Definitions, Standards,Notations and Practices (HDSNP)
Theme 1	2 (20%)	2 (20%)	Nil (0 %)
Theme 2	2 (20%)	3(30%)	Nil (0%)
Theme 3	1 (10%)	2 (20%)	Nil (0%)
Theme 4	1 (10%)	2 (20%)	Nil (0%)
Theme 5	1(10%)	2 (20%)	Nil (0%)
Theme 6	2(20%)	2(20%)	Nil (0%)
Total	10 (16.69)	10 (16.67%)	Nil

However, in prioritising the mean responses of the themes, research question 3 and table 2 refer:
Table 5 shows the prioritised mean ratings of proposed areas for enrichment of SSS Physics Curriculum. x (– mean) ≥3.6 (90% value on 4 point Likert scale). From table 2, the two items on ICT (item 2,3) have favourable prioritisation and 2 items on entrepreneurship education (item 5 and 6) are also prioritised in theme 1. There are 2 such items on ICT in theme 2 while there are 3 such items on entrepreneurship education in the same theme. In theme 3, there are 2 similar items on ICT and 2 items on entrepreneurship education and theme 4, there is 1 item on ICT and one item on entrepreneurship education. In theme 5, there is 1 item on ICT and 1 on entrepreneurship education while in theme 6, there are 2 items on ICT and 2 items on entrepreneurship education.
On the whole, there are 10 highly prioritised items on ICT and 10 items entrepreneurshipeducation which can serve as a basis for inclusion in the proposed review of SSS PhysicsCurriculum .Though the areas on harmonisation of definitions, standards, notations andpractices did not meet with the prioritisation requirements, this does not detract fromincluding some of the items especially the positively disposed ones.

ResearchQuestion 6: To what extent can identified areas be matched with existing themes?
Table 6 show item distribution among the six (6) themes of SSS Physics curriculum

Area/Theme	Information and Communication Technology (ICT)	Entrepreneurship Education (E.E)	Harmonisationof Definitions ,Standards, notations and Practices (HDSNP)
Theme 1	3(30%)	4(40%)	3 (30%)
Theme 2	3(30%)	6(60%)	1 (10%)
Theme 3	3(30%)	5 (50%)	2 (20%)
Theme 4	3(30%)	5(50%)	2(20%)
Theme 5	3(30%)	5(50%)	2(20%)
Theme 6	5(50%)	4(40%)	1(10%)
Total	20 (33.33%)	29 (48.33%)	11(18.33%)

Table 6 identifies with research question 4 and the table shows item distribution among the 6themes of the SSS physics curriculum vis-à-vis lCT, entrepreneurship education andharmonisation of definitions, standards and practices. From the table, it can be seen that33.33% of the whole items are on ICT, 48.33% are on entrepreneurship while 18.33% areon harmonisation of definitions, standards and practices.

Research Question 7: What challenges are likely to militate against the successful infusion of the identified areas in any proposed review?

Many factors have been known to militate against the successful infusion of lofty ideals in our scientific and technological practices, physics inclusive. Ogu (2003) opines that the use of computer in the teaching and learning of secondary school physics has been constrained by a lot of factors including lack of awareness and access to computers, inadequate number of computers in schools and inadequate infrastructural facilities. In supporting this view, Agommuoh (2015) also maintains that there is need for all the physics teachers to be computer literate so that they can deliver properly to students, and also identify other problems such as high enrolment in schools, lack of motivation among teachers, irregular and inadequate supply of electricity. This is consistent with Ogu (2008) observation while identifying problems of physics education delivery in secondary school recommends that seminars, symposia and workshops should be organised by Ministry of Education for serving physics teachers to enable them update their knowledge on the use of modern instruments for teaching. He also suggests that teachers should emphasize hands-on activities and de-emphasize the acquisition of basic physical theories.

Hypotheses

H_{o1}: There is no significant difference in the mean ratings of respondents perceptions on infusion of Information and Communication Technology and Entrepreneurship education learning experiences in subsequent review of SSS Physics Curriculum. The hypothesis was tested at a 0.05 level of significance and presented in table 8

Table 8 t-test of mean ratings of respondents' perceptions on infusion of Information and Communication Technology and Entrepreneurship education learning experiences in subsequent review of SSS Physics Curriculum.

	Number(N)	Mean (x)	S.D	df	t_{cri}	t_{cal}	Inference
ICT	20	3.5	0.24	46	2.00	6.57	Reject H_{01}
E.E	29	3.3	0.36				

From table 8, the value of t_{cal} =6.57 is greater than t_{cri}=2.00. That is, the null hypothesis is rejected. This means that there is significant difference in the mean ratings of the respondents on infusion of Information and Communication Technology andEntrepreneurship education learning experiences in subsequent review of SSS Physics Curriculum.

H_{02}:There is no significant difference in the mean ratings on ICT and HSDNP learning experiences in subsequent review of SSS Physics Curriculum

Table 9: t-test of mean ratings respondents' perceptions on ICT and HDSNP learning experiences in subsequent review of SSS Physics Curriculum.

	Number(N)	Mean(x)	S.D	df	t_{cri}	t_{cal}	Inference
ICT	20	3.5	0.24	29	2.05	7.92	Reject H_{02}
HDSNP	11	2.6					

From table 9, the value of t_{cal} =7.92 is greater than t_{cri}=2.05. That is, the null hypothesis is rejected. This means that there is significant difference in the mean ratings of the respondents on infusion of Information and Communication Technology and HSDNP learning experiences in subsequent review of SSS Physics Curriculum.

H_{03}: There is no significant difference in the mean ratings on E.E and HSDNP learning experiences in subsequent review of SSS Physics Curriculum

Table 10 : t-test of mean ratings of respondents' perceptions on E.E and HDSNP learning experiences in subsequent review of SSS Physics Curriculum.

Number(N)	Mean(x)	S.D	dftcritcal	Inference
E.E 293.3	0.36			
37	2.02	5.26	Reject H_{03}	
HDSNP 11	2.6			

From table 10, the value of t_{cal} =5.26 is greater than t_{cri}=2.02. That is, the null hypothesis is rejected. This means that there is significant difference in the mean ratings of the respondents on infusion of Entrepreneurship Education and HSDNP learning experiences in subsequent review of SSS Physics Curriculum

Discussion of Results

Thefindings of this study show that among other things, elements of ICT used in teaching and learning ought to be embedded in the SSS Physics Curriculum. This will provide continuity for students who have passed through the National Computer Education for Primary Schools developed by Nigerian Educational Research and Development Council (NERDC)for primary schools was structured around two vital ICT constructs namely (i) System components, functions and uses. (ii) Applications. Such exposure will be consolidated for use in the teaching and learning of physics.Since Ajagun(2003) is of the opinion that the National Computer Education Curriculum is capable of inculcating more desire ICT skills if properly implemented, use of ICT in SSS Physics Curriculumwill not only make for continuity in the use of skills acquired from the primary education levels,but will also consolidated the acquisition of high order skills in computer literacy. Citing poor delivery as a consequence of poor performance in physics Aguommoh(2015) opines that ‘physics teachers can effectively teach their physics lessons by using active learning strategies such as ICT tools in teaching and learning of physics’.This study has identified such tool as over head projectors to show fundamental quantities, use of computer simulation to differentiate vectors and scalars and use of computer animation to demonstrate energy conversion to mention but a few.

On impinging elements of Entrepreneurship Education in subsequent review of SSS physics Curriculum, the findings of this study hold serious implications for Science, Technology and Mathematics (STM) education.Inone of their recommendations Okoliand Onwuachu (2009) posit that the current STM curricular has strong focus on learning content, be restructured to include skill based curricular to meet the needs of the society and students. This study has identified such entrepreneurial skills as ability to construct transformer for electrical appliances,ability to construct an inverter that convert solar to electrical energy, ability to service micro-wave oven as part of the need to infuse entrepreneurship education learning experiences in any review of the curricular and to sustain such infusion. Such skills will provide source of livelihood since the theme ‘Physics in Technology’ in the current SSS 1-3 Physics Curriculum contains entrepreneurship education learning experiences. The findings of this study show that other themes can also contain entrepreneurship education learning experiences. This include ability to carry out maintenance services in faulty measuring instruments, example, faulty stop watch in theme 1,ability to detect fault in freeloader in theme 2,use of computer to video record teaching procedures in theme 3, ability to electroplate household materials in theme 4 and ability to improvise models of atoms in theme 5.

On harmonisation of Definitions,Standards,Notations and Practices, according to United Nations Economic Commission for Africa ,African Centre for Statistics (2011), harmonisationis a multi-dimensional concept; harmonisation of curriculum, harmonisation of different aspects of a subject namely theory methodology applications .The findings of this study are in relation to the harmonisation of definitions in Physics such as definition of velocity while some textbooks defined velocity as time rate of change of displacement (Awe and Okunnola, 2004) others define it as time rate of change of displacement (Okeke and Anyankowa,1989).Similarly, on the unit of pressure some textbooks used millimetre mercury(mm/Hg) or centimetre Mercury(cm/Hg) (Ababio,1985) as in chemistry while in Physics the units is Pascal(Pa) or Newton per metre square (N/m^2). The findings of this study show that there is need to harmonise such definitions and units of measurements in order to remove bottlenecks in lesson delivery. The hypotheses raised for the study were rejected at a 0.05 level of significance. This may be due to chance effect or the fact that there are dissimilar areas of knowledge with ICT,Science and Technology oriented. Definitions, Notations and Practices technically and professionally oriented.

Conclusion.

In conclusion, efforts should be made continually to find ways of enriching every science curriculum in order to meet with the present Science and Technology programme and as such there is need to give the identified areas of need in subsequent reviews of SSS Physics Curriculum the consideration they deserve.

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