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Identification of Difficult Topics encountered by Senior Secondary School Physics Students in Conservation Principles and Physics in Technology

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Abstract
The study sought to find out the topics in conservation principles and physics in technology in the physics Curriculum that students in Senior Secondary School have difficulties in learning, if gender has a moderating influence on the students having difficulties in learning such topics in physics, the underlying factors responsible for such difficulties and to suggest ways of improving the effectiveness of the teachinglearning process of physics topicsin Enugu state, Nigeria. The study was guided by three research questions and two null hypotheses. Descriptive survey research design was adopted for the study. The population of the study comprised of 17,439 senior secondary schools 1-3 physics students in Enugu state, Nigeria. The sample size of the study comprised of 377 SSS1-3 physics students drawn from the population (that is; 224 male and 153 female). Two instruments titled, Conservation Principles and Physics in Technology Difficulty Identification Questionnaire (CPPTDIQ) and Questionnaire on Factors for the Difficulties Encountered (QFDE) were developed by the researcher and used for data collection. CPPTDIQ was constructed from the new senior secondary school physics curriculum. The two instrumentsused were subjected to face validity by experts from research measurement and evaluation unit, and physics education unit. Cronbach Alpha formula (α) was used to obtain reliability index for CPPTDIQ and QFDE which gave a reliability estimate of 0.72 and 0.83. Research questions 1 & 2 were answered using frequency and percentage. While research question 3 was answered using mean and standard deviation. Chi-square was used to test hypotheses 1 & 2 while independent sampled t-test was used to test hypothesis 3. The findings revealed that topics in conservation principles and physics in technology that are considered the most difficult by students in senior secondary school physics do not depend significantly on gender. Based on the findings of the study, recommendations were made.
Keywords*: Physics Curriculum; Conservation Principles; Physics in Technology*

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I. Introduction

One of the most fundamental sciences that directly advances the creation of new technologies is physics. This means that physics play a central role in the evolution of our modern-day technology. Physics is concerned with the acquisition of knowledge on the relationship between energy and matter (Nduji, 2019). According to Shahid (2020), physics is an exciting intellectual adventure that inspires young people and expands their frontiers of knowledge about energy, matter and their interactions.The knowledge gained through physics helps young people and the societyrecognize various natural phenomena that are embedded in our reality such as;fog, thunder, tornadoes, wave propagation among others. Physics is designed in a way that will build up the youths or students who have interest in physics so as to appreciate and understand physics principles, concepts and processes (Federal Republic of Nigeria [FRN], 2008). According to FRN, the general objectives of physics are, “to give fundamental literacy in physics for efficient living in the general public, acquire basic concepts and principles of physics as a preparation for further studies, obtain essential scientific skills and attitude as a preparation for technology application of physics, and to stimulate and enhance creativity” (2008: p. ii).Despite the objectives of physics and the way its structured, students view abouttopics in physics is not encouraging. This is because most students see physicsas subject with abstract concepts(Ugwuanyi, 2012). In view of Shiwani(2022),many students are challenged with difficulties in understanding physics concepts due to demands in problem-solving skills from the students. Physics is a subject that requires high numerical literacy (Taangahar& Okwori, 2022). Besides, most students dodge away from mathematical calculations, learning of physics theories and experiments, thus seeing physics as a rocket science.

To this end, the researchers would like to ascertain difficult topics encountered by senior secondary school physics students.

Difficult topics encountered by physics students in senior secondary school have resulted to most students diverting to other course of studiesduring their higher education learning. This is evident on the decline in number of students who opted for physics as a course of study in the higher institutions (Aina, 2018). However, students may experience difficulties as a result of different factors which could be lacking during the process of teaching and learning. Murei (2022) observed that the major reason students find physics difficult and irrelevant is because teaching methods used are not usually interesting to students, resulting to more students dropping out. According to Dusabimana and Leon (2022), lack or insufficiency of teaching-learning materials and infrastructures, shortage of time, lack of teachers' skills and knowledge to prepare inquiry-based lessons contributes to the reason behind students seeing physics as a difficult subject.The researcher further explained that 63.3% of learning difficulties in physics are directly contributed by interest, study habit and mastery of information. Though in this study, the researchersascertained if physics students encounter difficulties in conservation principles and physics in technology from having; too many formulae and theories to memorize, textbooks not easy to follow, syllabus too wide, too many calculations and many more.

On the contrary, the senior secondary school (SSS) physics curriculum captures both conservation principles and physics in technology as a theme at all levels, that is from SSS1-3 (Nigerian Educational Research and Development Council, NERDC, 2014). For instance, at SS1, conservation principle has the following as its topics; work, energy and power, heat energy and electric charges while physics in technology has units of measurement, electrical continuity testing and solar collector.Also, this is similar to SS2 and SS3. Nevertheless, the Chief West Africa Examination Council (WAEC, 2019 & 2021) revealed that most students skipped questions which relates to conservation principles and physics in technology. This could be as a result of challenges or difficulties many of these students encounter on the course of learning the topic.

Various research studies have been carried out on students learning difficulties in physics. They include;difficulty encountered by students on heat energy (Nduji, Onuya, Okeke & Nweke, 2022); students' conceptions of heat energy (Nduji, 2019); electric resistance (Tao, Sanjun, Jingying&Yongjun, 2018); misconception real and virtual experimentation on electric circuit (Zacharia, 2017); misconceptions of heat and temperature among physics students (Orji, 2013); poor conceptual understanding of force (Ugwuanyi, 2012). This shows that studies have not beencarried out on investigating difficulties encountered by students in conservation principles and physics in technology. Hence, the researcher's interest in identifying the difficult topics encountered by senior secondary school physics students in conservation principles and physics in technology.

The following questions were posed to guide the study:

1. Which of the topics in conservation principles are considered the most difficult by students in senior secondary school physics?
2. Which of the topics in physics in technology are considered the most difficult by students in senior secondary school physics?
3. What are the underlying factors responsible for the difficulties encountered by senior secondary school physics in conservation principles and physics in technology?

The following null hypotheses guided the study.

1. Topics in conservation principles that are considered the most difficult by male and female students in senior secondary school physics do not depend significantly on gender ($p < 0.05$).
2. Topics in physics in technology that are considered the most difficult by male and female students in senior secondary school physics do not depend significantly on gender ($p < 0.05$).

II. Methods

Descriptive survey research design was adopted for the study. This is because the researcher's interest is in collecting and describing some relevant data with respect to identification of difficulties encountered by senior secondary school physics students in conservation principles and physic in technology. The population of the study comprised of 17,439 senior secondary schools 1-3 physics students in 292 secondary schools in Enugu state. This state was chosen as a result of decline in the performance of students in physics as reported by Onah (2022). The sample size of the study comprised of 377senior secondary school physics students that is; 224 male and 153 female. The sample size was drawn from the population using confidence level of 95 per cent as opined by Cohen, Manion and Morrison (2011).The sample size was composed using multi stage sampling procedure. Two instruments titled, Conservation Principles and Physics in Technology Difficulty Identification Questionnaire (CPPTDIQ) and Questionnaire on Factors for the Difficulties Encountered (QFDE) were developed by the researcher.CPPTDIQ was constructed from the new senior secondary school physics curriculum. CPPTDIQ has two sections: A, and B. Section A has bio-data information on gender; section B consists Cluster A& B. Cluster A tries to draw out information on difficulties in Conservation Principles. Cluster B extract information on difficulties in Physics in Technology. QFDE elicits information on factors responsible for difficulties encountered physics students. All the clusters comprised 10 questionnaire items, and structured in four Likert scales of Very Difficulty (VD), Difficult (D), Easy (E), and Very Easy. The instrument was subjected to face validity by experts from research measurement and evaluation unit, physics education unit and physics and astronomy unit. Cronbach Alpha formula (α) was used to obtain reliability index for CPPTDIQ and QFDE. The internal consistency estimated was determined for CPPTDIQ and they yielded the following: Cluster A (0.77) and Cluster B (0.71) respectively. The overall reliability estimates of the instruments gave 0.72. The internal consistency of QFDE yielded 0.83. The reliability index obtained indicated that the instrument is reliable. The instrument for data collection was administered with the help of research assistants in each of the sampled school. On the spot administration and collection of data was used during field work. This ensured high percentage of the instrument returned.Research questions 1 & 2 were answered using frequency and percentage. While research question 3 was answered using mean and standard deviation. The benchmark for mean ratings is 2.50. This means that any item with mean ratings of 2.50 and above is difficult while any item with mean ratings below 2.50 is easy. Chi-square was used to test hypotheses 1 & 2 while independent sampled t-test was used to test hypothesis3. All the hypotheses were tested at 0.05 level of significance. The decision rule for accepting null hypotheses was based on p-value. Any null hypothesis that its p-value is greater than 0.05 level of significance were accepted while any null hypothesis that its p-value is less than 0.05 level of significance were rejected.

III. Result

Research Question One: Which of the topics in conservation principles are considered the most difficult by students in senior secondary school physics?

Table 1: Mean and standard deviation of the topics in conservation principles considered as the most difficult by students in senior secondary school physics

N=377

S/N	Item Statement	MD f (%)	D f (%)	E f (%)	ME f(%)
1	Work, energy and power	13(3.4)	77(20.4)	227(60.2)	60(15.9)
2	Heat energy	32(8.5)	123(32.6)	201(53.3)	21(5.6)
3	Electric charges	258(68.4)	87(23.1)	32(8.5)	0(0)
4	Mechanical energy	272(72.1)	53(14.1)	51(13.5)	1(0.3)
5	Temperature and its measurement	106(28.1)	27(7.2)	238(63.1)	6(1.6)
6	Heat energy measurement	251(66.6)	87(23.1)	39(10.3)	0(0)
7	Gas laws	269(71.3)	58(15.4)	26(6.9)	24(6.4)
8	Energy and society	9(2.4)	13(3.4)	87(23.1)	268(71.1)
9	Laws of momentum	8(2.1)	61(16.2)	294(78.0)	14(3.7)
10	Conservation of momentum	11(2.9)	67(17.8)	255(67.6)	44(11.7)

NB: MD = Most Difficult; D = Difficult; E = Easy; ME = Most Easy; f = frequency

Analysis in **Table 1** shows that **item1** have 13, 77, 227 and 60 students who sees item11 as MD, D, E and ME respectively. Also, in **item2**, 32, 123, 201 and 21 students see item2 as MD, D, E and ME respectively. In **item3**, 258, 87, 32 and 0 students see item3 as MD, D, E and ME respectively. In **item4**, 272, 53, 51 and 1 students see item4 as MD, D, E and ME respectively while for **item5,** 106, 27, 238, and 6 students see item5 as MD, D, E and ME respectively. In addition, in **item6**, 251, 87, 39 and 0 students see item6 as MD, D, E and ME respectively. In **item7**, 269, 58, 26 and 24 students see item7 as MD, D, E and ME respectively.

In **item8**, 9, 13, 87 and 268 students see item8 as MD, D, E and ME respectively while for **item9,**8, 61, 294, and 14 students see item9 as MD, D, E and ME respectively. In **item10**, 11, 67, 255 and 44 students see item10 as MD, D, E and ME respectively. Analysis in **table 1** also shows that topics in conservation principlesconsidered by students as most difficult are in items 3, 4, 6 & 7. Thus, it implies that electric charges, mechanical energy, heat energy measurement, and gas laws are those topicsin conservation principlesconsidered by students as most difficult (MD).

Hypothesis One: Topics in conservation principles that are considered the most difficult by students in senior secondary school physics do not depend significantly on gender.

Table 2: Chi-square analysis of topics in conservation principles that are considered the most difficult by male and female students in senior secondary school physics

S/N	Item Statement	Male (224) MD f (%)	D f (%)	E f (%)	ME f (%)	Female (153) MD f (%)	D f (%)	E f (%)	ME f(%)	X^2	df	p-	Dec.
1	Work, energy and power	0(0)	57 (15.1)	132 (35.0)	35 (9.2)	13 (3.4)	20 (5.3)	95 (25.1)	25 (6.6)	26.029^a	3	.000	**S**
2	Heat energy	6(1.5)	55 (14.5)	142 (37.6)	21 (5.5)	26 (6.8)	68 (18.0)	59 (15.6)	0(0)	57.827^a	3	.000	**S**
3	Electric charges	0(0)	176 (46.6)	32 (8.4)	16 (4.2)	0(0)	82 (21.7)	55 (14.5)	16 (4.2)	27.948^a	3	.000	**S**
4	Mechanical energy	39 (10.3)	152 (40.3)	32 (8.4)	1(0.2)	12 (3.1)	120 (31.0)	21 (5.5)	0(0)	8.264^a	3	.041	**S**
5	Temperature and its measurement	5(1.3)	70 (18.5)	143 (37.9)	6(1.5)	22 (5.8)	36(9.5)	95 (25.1)	0(0)	24.798^a	3	.000	**S**
6	Heat energy measurement	134 (35.5)	68 (18.0)	19 (5.0)	0(0)	117 (31.0)	19(5.0)	17 (4.5)	0(0)	16.608^a	3	.000	**S**
7	Gas laws	143 (37.9)	42 (11.1)	15 (3.9)	24 (6.3)	108 (28.6)	16(4.2)	21 (5.5)	8(2.1)	12.612^a	3	.006	**S**
8	Energy and society	7(1.8)	10 (2.6)	47 (12.4)	160 (42.4)	2(0.5)	3(0.7)	40 (10.6)	108 (28.6)	3.969^a	3	.265	**NS**
9	Laws of momentum	5(1.3)	24 (6.3)	185 (49.0)	10 (2.6)	3(0.7)	37(9.8)	109 (28.9)	4(1.0)	12.562^a	3	.006	**S**
10	Conservation of momentum	5(1.3)	51 (13.5)	149 (39.5)	19 (5.0)	6(1.5)	16(4.2)	106 (28.1)	25 (6.6)	13.553^a	3	.004	**S**

NB: MD = Most Difficult; D = Difficult; E = Easy; ME = Most Easy; f = frequency; X^2= Chi-square; df = degree of freedom; p-= P-value; Dec.= Decision

Analysis in **Table 2** revealed that item 8 with probability value of .265 is not significant since it is greater than the level of significance (p=0.05). Therefore, the decision is not significant (NS). Also, items 1 to7, 9 & 10 whose probability values ranges from (p= 0.00 to 0.041) which is less than the level of significance (p=0.05) were significant (S). Additionally, the above findings call for overall trace analysis so as to draw conclusion on topics in conservation principles that are considered the most difficult by male and female students.

Table 3: Overall Trace Analysis of topics in conservation principles that are considered the most difficult by male and female students in senior secondary school physics

		Response MD	D	E	ME	Total	χ^2	df	p-value	Decision
Gender	**Male**	29	90	71	33	223	2.285^a	3	.515	NS
	Female	18	62	42	31	153				
	Total	**47**	**152**	**113**	**64**	**377**				

NB: MD = Most Difficult; D = Difficult; E = Easy; ME = Most Easy; NS= Not Significant; χ^2= Chi-Square; p-value= Probability value; df= Degree of Freedom

The result presented in **Table3** summarizes the topics in conservation principles that are considered the most difficult by male and female students; it can be seen that probability value (0.515) is greater than the level of significance (0.05). This gave the decision that the hypothesis is NS (Not Significant). To this effect, the null hypothesis was upheld by the researcher. Thus, topics in conservation principles that are considered the most difficult by students in senior secondary school physics do not depend significantly on gender.

Research Question Two: Which of the topics in physics in technology are considered the most difficult by students in senior secondary school physics?

Table 4: Mean and standard deviation analysis of the topics in physics in technology considered as the most difficult by students in senior secondary school physics

N=377

S/N	Item Statement	MD f (%)	D f (%)	E f (%)	ME f(%)
11	Electrical continuity testing	0(0)	24(6.4)	256(67.9)	97(25.7)
12	Solar collector	255(67.6)	16(4.2)	81(21.5)	25(6.6)
13	Musical instruments	256(67.9)	77(20.4)	10(2.6)	33(8.7)
14	Battery	0(0)	250(66.3)	99(26.3)	28(7.4)
15	Electroplating	270(71.6)	70(18.6)	10(2.7)	27(7.2)
16	Application of electromagnetic field	0(0)	222(58.9)	111(29.4)	44(11.7)
17	Transmission system	30(7.9)	97(25.7)	217(57.6)	33(8.8)
18	Uses of machines	40(10.6)	36(9.5)	59(15.6)	242(64.2)

19	Dams and energy production	263(69.8)	22(5.8)	70(18.6)	22(5.8)
20	Rockets and satellites	240(63.7)	90(23.9)	22(5.8)	25(6.6)

NB: MD = Most Difficult; D = Difficult; E = Easy; ME = Most Easy; f = frequency; X^2= Chi-square; df = degree of freedom; p-= P-value; Dec.= Decision

Analysis in **Table 4** shows that **item11** have 0, 24, 256 and 97 students who sees item11 as MD, D, E and ME respectively. Also, in **item12**, 255, 16, 81 and 25 students see item12 as MD, D, E and ME respectively. In **item13**, 256, 77, 10 and 33 students see item13 asMD, D, E and ME respectively. In **item14**, 0, 250, 99 and 28 students see item14 asMD, D, E and ME respectively while for **item15,** 270, 70, 10, and 27 students see item15 as MD, D, E and ME respectively. In addition, in **item16**, 0, 22, 111 and 44 students see item16 as MD, D, E and ME respectively. In **item17**, 30, 97, 217 and 33 students see item17 as MD, D, E and ME respectively. In **item18**, 40, 36, 59 and 242 students see item18 as MD, D, E and ME respectively while for **item19,** 263, 22, 70, and 22 students see item19 as MD, D, E and ME respectively. In **item20**, 240, 90, 22 and 25 students see item20 as MD, D, E and ME respectively.

Analysis in **table 4** shows that topics in physics in technologyconsidered by students as most difficult are in items 12, 13, 15, 19&20. Thus, it implies that solar collector, musical instruments, electroplating, dams and energy production, rockets and satellites are those topics in physics in technologyconsidered by students as most difficult (MD).

Hypothesis Two: Topics in physics in technology that are considered the most difficult by students in senior secondary school physics do not depend significantly on gender.

Table 5: Chi-square analysis of topics in physics in technology that are considered the most difficult by male and female students in senior secondary school physics

S/N	Item Statement	Male (224) MD f (%)	D f (%)	E f (%)	ME f (%)	Female (153) MD f (%)	D f (%)	E f (%)	ME f(%)	X^2	df	p-	Dec.
11	Electrical continuity testing	0(0)	8(2.1)	151 (40.0)	65()	0(0)	16(4.2)	105 (27.8)	32 (8.4)	9.111	3	.011	**S**
12	Solar collector	13 (3.4)	151 (40.0)	41 (10.8)	19 (5.0)	3(0.7)	104 (27.5)	40 (10.6)	6(1.5)	8.619	3	.035	**S**
13	Musical instruments	157 (41.6)	51 (13.5)	0(0)	16 (4.2)	99 (26.2)	26(6.8)	0(0)	28 (7.4)	11.569	3	0.03	**S**
14	Battery	0(0)	145 (38.4)	57 (15.1)	22 (5.8)	0(0)	105 (27.8)	42 (11.1)	6(1.5)	4.608	3	.100	**NS**
15	Electroplating	169 (44.8)	45 (11.9)	10 (2.6)	0()	101 (26.7)	25(6.6)	0(0)	27 (7.1)	48.178	3	.000	**S**
16	Application of electromagnetic field	0(0)	127 (33.6)	76 (20.1)	21 (5.5)	0(0)	95 (25.1)	35 (9.2)	23 (6.1)	6.714	3	.035	**S**
17	Transmission system	0(0)	59 (15.6)	143 (37.9)	22 (5.8)	0(0)	38 (10.0)	104 (27.5)	11 (2.9)	1.036	3	.596	**NS**
18	Uses of machines	18 (4.7)	16 (4.2)	46 (12.2)	144 (38.1)	22 (5.8)	20(5.3)	13 (3.4)	98 (25.9)	15.214	3	.002	**S**
19	Dams and energy production	19 (5.0)	158 (41.9)	43 (11.4)	4(1.0)	3(0.7)	105 (27.8)	27 (7.1)	18 (4.7)	22.303	3	.000	**S**
20	Rockets and satellites	136 (36.0)	67 (17.7)	11 (2.9)	10 (2.6)	104 (27.5)	23(6.1)	11 (2.9)	15 (39.7)	13.899	3	.003	**S**

NB: MD = Most Difficult; D= Difficult; E= Easy; ME= Most Easy; f= frequency; X^2= Chi-square; df= degree of freedom; p-= P-value; Dec.= Decision

Analysis in **Table 5**revealed that items 14 & 17were not significant since the probability values ranges from (p= 0.100 to 0.596) which is greater than the level of significance (p=0.05). Therefore, the decision is not significant (NS). Also, items 11, 12, 13, 14, 15, 18, 19 & 20 whose probability values ranges from (p= 0.00 to 0.035) which is less than the level of significance (p=0.05) were significant (S). Also, the above findings call for overall trace analysis so as to draw conclusion on topics in physics in technology that are considered the most difficult by male and female students.

Table 6: Overall Trace Analysis of topics in physics in technology that are considered the most difficult by male and female students in senior secondary school physics

		Response MD	D	E	ME	Total	χ^2	df	p-value	Decision
Gender	**Male**	56	83	58	27	224	1.966^a	3	.579	NS
	Female	33	56	38	26	153				
	Total	**89**	**139**	**96**	**53**	**377**				

NB: MD = Most Difficult; D = Difficult; E = Easy; ME = Most Easy; NS= Not Significant; χ^2= Chi-Square; p-value= Probability value; df= Degree of Freedom

The result presented in **Table 6** summarizes the topics in physics in technology that are considered the most difficult by male and female students; it can be seen that probability value (0.579) is greater than the level of significance (0.05). This gave the decision that the hypothesis is NS (Not Significant). To this effect, the null hypothesis was upheld by the researcher. Thus, topics in physics in technology that are considered the most difficult by students in senior secondary school physics do not depend significantly on gender.

Research Question Three: What are the underlying factors for the difficulties encountered by senior secondary school physics in conservation principles and physics in technology?

Table 7: Mean and standard deviation analysis of the underlying factors responsible for the difficulties encountered by senior secondary school physics in conservation principles and physics in technology

N=377

S/N	Item Statement	Mean	Std. Dev.	Decision
1	Problems not easy to solve	3.61	.863	A
2	Too many calculations	2.59	.701	A
3	Teacher not helpful	2.54	.699	A
4	It is more of theories	2.92	.494	A
5	Too many formulae to memorize	3.14	.590	A
6	Content not easily understood	2.27	.597	D
7	Textbooks not easy to follow	2.17	.557	D
8	Too much practical work	2.40	.744	D
9	Syllabus too wide	2.02	.523	D
10	Physics is not an interesting subject	2.98	.520	A
	Cluster Mean	**2.66**	**.629**	**A**

NB: A = Agree; D = Disagree; Std.Dev = Standard Deviation

Table 7 shows the mean and standard deviation of the ratings of the students on factors responsible for the difficulties encountered by studentsin conservation principles and physics in technology as topics in physics. It shows that the mean ratings of the students on items 1 to 5 and 10 are within the range of 2.54 to 3.61 which indicates agree since their mean ratings is above 2.50. Also, items 6 to 9 with the mean ratings range of 2.02 to 2.27 indicates disagree since the mean ratings is below 2.50. Therefore, since students agree with items 1-5 and 10, this implies that the underlying factors responsible for the difficulties encountered by students in conservation principles and physics in technology topics are; too many calculations, teacher not helpful, problems not easy to solve, it is more of theories, too many formulae to memorize and physics is not an interesting subject.

IV. Discussions

The research finding have shown that topics in conservation principlesconsidered by students as most difficult are electric charges, mechanical energy, heat energy measurement, and gas laws. This implies that students consider four topics out of ten topics under the theme conservation principles in senior secondary school physics curriculum is considered most difficult by students.Further analysis reveals that topics in conservation principles that are considered the most difficult by students in senior secondary school physics do not depend significantly on gender. This is in agreement with the findings ofEtobro and Fabinu (2016) who unveiled thatstudents' usually have difficulties in ecological management, conservation of natural resources, and pests is inconsonance with the finding of the study.The report of Saleh (2022) in a study showed that gender is not a significant factor in determining specific difficulties encountered in map reading and interpretation in geography, location of places on maps, mathematical calculations in geography, drawing of diagrams of physical features, in differentiating climatic types. Saleh's findings in consonance with that of the study. However, the finding of the study is not in agreement with that of Jimoh (2016) who indicated that students' gender have no influence on their perception of difficult topics in chemistry curriculum. The disparity in the research findings could be as a result of differences in the geographical area used.

Also, finding of the study have shown that solar collector, musical instruments, electroplating, dams and energy production, rockets and satellites are those topics in physics in technologyconsidered by students as most difficult. Additional analysis revealed that topics in conservation principles and physics in technology that are considered the most difficult by students in senior secondary school physics do not depend significantly on gender.This is inline with the finding of Herridge (2016) and Erinosho (2013) who found that students have difficulty in understanding specific topics in the curriculum that are usually characterized as lacking concrete examples and requiring a lot of mathematical manipulations or visualization.Charles-Ogan and George (2015) findings revealed that, students identified some mathematics topics (longitude and latitude, bearing mensuration) as difficult topics. This is in affirmation with the finding of this study.

The research finding have also shown that there are six underlying factors responsible for the difficulties encountered by students in both conservation principles and physics in technology topics. They include; too many calculations, teacher not helpful, problems not easy to solve, it is more of theories, too many formulae to memorize and physics is not an interesting subject. Some of these factors could be as a result of physics teachers not having the required technological, pedagogical and content knowledge about the topic. This is inline with the finding of Wanasinghe (2020) whose report revealed that factors responsible for the difficulties encountered by students in writing proper research are insufficiency of relevant literature and other related information on the proposed research study, unavailability of primary sources of data and research literature and many more. Bada and Loyiso (2020) showed thatthe challenges of access to resources for teaching and the absence of test items of the theme during national and local assessment militate against effective implementation of the newly added topics to the curriculum in schools. The finding of Bada and Loyiso disagrees with that of this study. The findings of Algrenita and Listyani (2020);Acharya (2017)do not agree with the findingsof this study. This is because Algrenita and Listyani's workdiscovered that factors which causes students' difficulties in writing academically are self-motivation, self-confidence, lack of knowledge and feeling of under pressure. On the other hand, Acharya (2017) revealed that teachers lack of linkage between new mathematics concept and previously learned mathematics structure, mathematics anxiety, negative feelings of mathematics, economic condition and their educational background, school management system, lack of infrastructure of school and lack of regular assessment system of school are the main causes of difficulties in learning mathematics. The disparity on the findings of both studies could be as a result of differences in their geographical and content area.

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V. Conclusion

Based on the findings of the study and discussion that follows, the following conclusion were made, thus; electric charges, mechanical energy, heat energy measurement, and gas laws are those topics in conservation principlesconsidered by students as most difficult. Also, solar collector, musical instruments, electroplating, dams and energy production, rockets and satellites are those topics in physics in technologyconsidered by students as most difficult. Furthermore, topics in conservation principles and physics in technology that are considered the most difficult by students in senior secondary school physics do not depend significantly on gender. The underlying factors responsible for these difficulties encountered by students in conservation principles and physics in technology topics are; too many calculations, teacher not helpful, problems not easy to solve, it is more of theories, too many formulae to memorize and physics is not an interesting subject.

VI. Recommendations

Based on the findings of the study and the conclusion that follows, it is therefore recommended that;

1. Government in synergy with school administrators should help organize trainings, seminars and workshops for physics teachers on the best instructional approach to use towards teaching and learning of the identified difficult concepts encountered by physics students.
2. School administrators should ensure that only those who studied physics education are employed in their schools to teach. This would help ensure that trained personnel are the instructors of physics.
3. Enugu state government should endeavor to make available all the necessary instructional aids required in teaching and learning of geography.

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