



CAUSES AND EFFECTS OF PHYSICSPHOBIA AMONG SECONDARY SCHOOL STUDENTS IN RIVERS STATE, NIGERIA: IMPLICATION FOR STUDENTS' ENROLMENT IN PHYSICS

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Abstract

This study investigated the presence, causes and effects of Physicsphobia among Senior Secondary School physics students in Rivers State. The study had a descriptive survey design. Three research questions guided the study. Purposive random sampling technique was used to select 500 Senior Secondary 1 and 2 (SS1 and SS2) Physics students from forty-four (44) schools in three Local Government Areas of Rivers State, which are Obio-Akpor Local Government Area, Port Harcourt Local Government Area and Gokana Local Government Area. The research instrument was a validated researcher-developed questionnaire titled 'Students' Physicsphobia Questionnaire' with a reliability coefficient of 0.79 obtained using the Cronbach alpha formula. The findings of this study showed that Physicsphobia exists in students. The study further revealed some of the causes of Physicsphobia to be rumors and misleading information about Physics, teaching method, the uninteresting nature of physics lessons, as well as abstract, difficult and mathematical nature of Physics. The study also revealed some of the effects of Physicsphobia in students to be anxiety, rapid heartbeat, frustration, depression and a feeling of leaving Physics class. It was then recommended that conscious effort should be made to paint a better picture of physics, especially for students who are about to start the study of Physics.

Keywords: physics, Physicsphobia, causes, effects, secondary school, students

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1. Introduction

Physics is the study of matter and its interaction with energy. The knowledge and application of Physics concepts are essential and needed to face the dynamism and challenges of the contemporary world. Physics is the bedrock of the technological advancement of any nation. Little wonder the Federal Republic of Nigeria, through the National Policy on Education (2014) stated that learning Physics in secondary schools in Nigeria is aimed at ensuring that basic concepts and principles of Physics are learnt; learners are provided with scientific skills and attitude expected for the promotion of technological applications; also, creativity, self-reliance and sustainability are enhanced in learners. Physics is, therefore, essential for the provision of technology and infrastructure needed for the sustainable development of a nation.

A phobia is a persistent and disproportionate fear of some specific object or situation that presents little or no actual danger and yet leads to a great deal of avoidance of these feared situations (Carson, Butcher, Mineka & Hooley, 2011). Tillfors (2003) defined phobia as a learned emotional response which causes frequent anxiety that is intense and severe. Nwankwo (2013) noted that phobia is a disrupting, fear-mediated avoidance, out of proportion to the danger posed by a particular object or situation. Phobia is a disorder because it is irrational. It is an excessive and exaggerated fear, highly distressful, distortional, and inhibitory. It constitutes a source of hazard to sufferers and is aberrational. It differs from fear because it lasts longer than fear (more than six months). It is grave and persistent while fear is mild. It is expressed toward things that may not necessarily be dangerous. Unlike fear, it is unreal and exaggerated while fear is real. It also needs treatment while fear does not (Awujo, Ugwu & Amadi, 2011).

According to Carson et al. (2011), the three main categories of phobia are Specific phobia, Social phobia and Agoraphobia.

- 1) A person is diagnosed as having a Specific phobia if he or she shows strong and persistent fear that is excessive or unreasonable, triggered by the presence of a specific object or situation (Carson et al., 2011).
- 2) Social phobia is characterized by disabling fears of one or more specific social situations such as public speaking (Carson et al., 2011). A person with social phobia has a severe and irrational fear of being criticized, ridiculed, urged, scrutinized or condemned by other people in social settings, or while performing a public function (Awujo et al., 2011).
- 3) Agoraphobia is the intense and irrational fear of being in open public places with large crowds such as theatres, shopping malls, buses, bridges, elevators and standing in a queue (Carson et al., 2007; Awujo et al., 2011).

As categorized by DSM – IV-TR in Carson et al. (2011), the criteria for Specific phobia are:

- a) Marked or persistent fear that is excessive and unreasonable cued by the presence or anticipation of a specific object or situation.

- b) Exposure to phobia stimulus almost invariable provokes an immediate anxiety response or panic attack.
- c) The person recognizes that the fear is excessive or unreasonable.
- d) The phobic situation is avoided or endured with intense anxiety or distress.
- e) Symptoms interfere significantly with normal functioning or there is marked distress about the phobia.
- f) Duration of at least 6 months.

Irrational fear and anxiety (phobia) exhibited towards Physics specifically can then be termed Physicsphobia. Physicsphobia could be seen as a form of specific phobia in which the learning of Physics constitutes the phobia stimulus. Physicsphobia could be developed in a learner because of situations such as:

- a) rumors heard of the difficult and abstract nature of physics.
- b) hearing of poor performance of older siblings, family members or relations, friends, senior students in school or general examination in the nation.
- c) encountering mathematics expressions and operations which he already dreads in Physics.
- d) emotional torture by the Physics teacher with such statements as "Physics is only for geniuses", "you can never pass this subject", "Physics is not for dummies like you", "you are a dummy", "you girls better go to biological sciences, there is no place in Physics for you, Physics is for boys" and so on.
- e) persistent poor performance in Physics.
- f) difficulty to understand Physics concepts.
- g) teacher's lack of an amiable personality.
- h) the inability of the teacher to use instructional strategies that will enable him to pass across the knowledge to the learners and as such, the learners leave the physics lesson more confused than how they came.
- i) if the teacher does not have a 'human face'. In other words, the teacher is always harsh, uses abusive words, and/or physically abuses the students.

Phobia may lead to anxiety, muscle tension, restlessness and difficulty concentrating, chronic arousal which involves an excessive physiological and psychological state of being awake or reactive to stimuli, including elevated heart rate and blood pressure and a condition of sensory alertness, mobility and readiness to respond (DSM – IV-TR in Carson et al., 2011). Phobia may also lead to panic attacks which according to DSM – IV-TR in Carson et al. (2011), is a discrete period of intense fear in which four or more of the following symptoms develop abruptly and reach a peak within 10 minutes:

- a) Palpitation or pounding heart,
- b) Sweating,
- c) Trembling or shaking,
- d) Sensations of shortness of breath or being smothered,
- e) Feeling of choking,
- f) Chest pain or discomfort,

- g) Nausea or abdominal distress,
- h) Feeling dizzy, lightheaded or faint,
- i) Derealization (feelings of unreality) or depersonalization (being detached from oneself),
- j) Fear of losing control or going crazy,
- k) Fear of dying,
- l) Paresthesias (numbness or tingling sensations),
- m) Chills or hot flushes.

In line with the submission of DSM – IV-TR in Carson et al. (2011), a learner who has Physicsphobia may exhibit one or more of the following symptoms:

- a) Palpitations as physics lesson or teacher approaches,
- b) Profuse sweating at the sight of the Physics teacher,
- c) Trembling and shaking during physics lessons or when called upon to answer questions during Physics lessons,
- d) Low self-esteem in Physics class,
- e) Sensation of shortness of breath,
- f) Chest pain or discomfort in Physics class,
- g) Nausea, and abdominal distress in Physics class,
- h) Feeling of sickness in physics class,
- i) Feeling dizzy, or fainting,
- j) Tendency to leave physics class at any opportunity,
- k) Truancy or avoidance of Physics lessons,

Phobia, therefore, has many dimensions of consequences ranging from psychological, to social, to psychological and to educational.

- a) The physiological consequence includes the weakening of the immune system and high blood pressure due to rapid heartbeat at the instance of phobic stimulus.
- b) The social consequence includes social withdrawal, low self-esteem, generalized fear due to panic attacks and defective social conduct.
- c) Psychological consequences include stress, depression, addiction tendencies, defective cognition and faulty self-control.
- d) Educational consequences include problems in the choice of career or vocation, poor academic performance, truancy and school dropout (Awujo, et al., 2011).

Boruah and Saikia (2014) and Olaniyan and Salman (2015) found that mathematics phobia exists in students. Ihekwaba, Nwokocha and Onuike (2020) similarly found high and low phobia in students with a high proportion of the students having a high phobia for Physics. Boruah and Saikia (2014) found that mathematics phobia was caused by a lack of a sufficient number of teachers, a lack of textbooks in the college library, and a lack of practical classroom facilities. Olaniyan and Salman (2015) also found that some of the causes of mathematics phobia in students in the view of teachers, in order of ranking, were teaching method, the way mathematics is painted by people, the perception that mathematics is difficult and abstract, non-specialist teachers, poor teacher-student relationship. Few teachers however indicated causes of mathematics phobia in students

as poor mathematics background in students, hatred for calculation-related subjects, and wide mathematics syllabus. Similarly, in the view of the teachers, Nwoke and Ugwuegbulam (2016) found that some of the causes of mathematics phobia were teaching method, teacher's inability to break down concepts into simple understandable units, students' inability to solve mathematics problems, poor teacher-student relationship, use of abusive words on students, student's career choice, students' poor mathematics background, abstract nature of mathematics and long procedures in solving mathematics problems. In the view of the students, Olaniyan and Salman (2015) found that the causes of mathematics phobia in order of ranking were, numerous formulas, difficulty in solving mathematics problems, students often forgetting steps for solving mathematics problems, teachers' inability to solve mathematics problems in class and the belief that mathematics is difficult.

Phobia has negative effects on the teaching and learning of a subject. It can make the teaching and learning process a big struggle for the teacher and students. Olaniyan and Salman (2015) found from teachers' view, in order of ranking, that students express mathematics phobia in truancy in class, difficulty in understanding math problems, failure of students to answer or contribute in class, feverish feeling in math class, lack of interest in math class, student's refusal to do math assignment, lack of concentration in math class, student's mood switch in math class and student's lack of concern for a math lesson. Phobia also affects students' academic achievement. Ihekweba, Nwokocha and Onuike (2020) found a significant inverse relationship between the phobia score and academic achievement of Physics students. In other words, students with low phobia performed better in Physics than students with high phobia. Phobia for Physics, therefore, deserves serious attention from all educational stakeholders.

2. Statement of the problem

The enrolment of students for Physics in West African Secondary School Certificate Examination (WASSCE) has always been lower than the enrolment for other science subjects. This is because the number of students who offer Physics drop as the students' progress from Senior Secondary School 1 (SS1), to SS2, and to SS3 which is the class in which they sit for West African Secondary School Certificate Examination (WASSCE).

Table 1: WASSCE Enrolment Figures for the Years 2015-2019 in Nigeria

Year	Physics	Chemistry	Biology
2015	658,393	691,407	1,182,038
2016	666,992	667,412	1,087,921
2017	704,504	704,494	NA
2018	728,924	728,998	1,087,884
2019	762,340	762,595	1,086,449

Note: WASSCE- West African Secondary School Certificate Examination (Source- WAEC e-learning online)

Table 1 shows the enrolment figures of students for Paper 2 of science subjects in the West African Secondary School Certificate Examination (WASSCE) from the years 2015 to 2019. Could the persistent low enrolment be because students have a phobia for physics? Do students have a phobia for Physics? What are the causes and effects of phobia for physics? This study, therefore, intends to investigate the presence, causes and effects of Physicsphobia in students.

2.1 Aim and objectives of the study

The aim of this study was to investigate the presence, causes and effects of Physicsphobia among Senior Secondary School physics students in Rivers State. The specific objectives of the study were to:

- a) Investigate the presence of Physicsphobia in students.
- b) Ascertain the causes of Physicsphobia in students.
- c) Determine the effects of Physicsphobia on students.

2.2 Research questions

- a) How do students feel about Physics?
- b) What are the causes of Physicsphobia in students?
- c) How does Physicsphobia affect students?

3. Methodology

The study had a descriptive survey design. Purposive random sampling technique was used to select 500 Senior Secondary 1 and 2 (SS1 and SS2) Physics students from forty-four (44) schools in three Local Government Areas of Rivers State which are Obio-Akpor Local Government Area, Port Harcourt Local Government Area and Gokana Local Government Area. The research instrument was a validated researcher-developed questionnaire titled 'Students' Physicsphobia Questionnaire' with a reliability coefficient of 0.79 obtained using the Cronbach alpha formula. The instrument has three sections. Section A was used to gather information on the respondents' bio-data and Sections B and C contained statements addressing the presence, causes and effects of Physicsphobia in secondary school students. The responses were made based on the modified 4 - point Likert scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) scored 4, 3, 2 and 1 respectively. A total of 21 questionnaires were not properly filled, the remaining 479 valid questionnaires returned provided the data for the study. Mean was used to analyze the data. A criterion mean of 2.50 was used to make decisions to accept or reject the statements.

4. Results

Research question one: How do students feel about Physics?

Table 1: Mean value of students' perception of Physics

S/No	Item	\bar{X}	Decision
1.	I am scared of physics	2.63	Agree

Table 1 shows a mean value of 2.63 which is greater than 2.50 the criterion mean. This indicates that the majority of them agreed that they are scared of Physics. In other words, the students have a phobia for Physics.

Research question two: What are the causes of Physicsphobia in students?

Table 2: Mean values of students' responses
on the causes of their fear for Physics (Physicsphobia)

S/No	Items	\bar{X}	Decision
1	Rumors and misleading information about physics	2.56	Agree
2	Abstract nature of physics	2.68	Agree
3	Difficult nature of Physics	2.54	Agree
4	Physics contains too many topics	2.44	Disagree
5	Physics contains complicated scientific terms	2.57	Agree
6	Physics contains too many equations	2.54	Agree
7	Physics contains too many calculations	2.53	Agree
8	Teaching method	2.55	Agree
9	Uninteresting nature of physics lessons	2.74	Agree
10	Lack of practical lessons in physics	2.58	Agree
11	Unfriendly nature of Physics teachers	2.65	Agree
12	I always have low scores in Physics	2.49	Disagree

Table 2 shows mean values greater than 2.50 for all the items except items 4 and 12. This indicates that the majority of them agreed that their fear of Physics in them (Physicsphobia) was caused by rumours and misleading information about physics, the abstract nature of physics, the difficult nature of Physics, complicated scientific terms, too many equations and too many calculations contained in Physics, teaching method, uninteresting nature of physics lessons, lack of practical lessons in physics and unfriendly nature of Physics teachers. They were however of the view that the fact that Physics contains too many topics and obtaining low scores in Physics were not the causes Physicsphobia in them.

Research question three: How does Physicsphobia affect students?

Table 2: Mean values of students' responses on the effects of Physicsphobia on them

S/No	Items	\bar{X}	Decision
1	Fear of Physics lesson	2.57	Agree
2	Anxiety	2.69	Agree
3	Rapid heartbeat	2.60	Agree
4	Physics lesson becomes uninteresting	2.77	Agree
5	Physics lesson becomes boring	2.74	Agree
6	Uncomfortable feeling in class	2.86	Agree
7	A feeling of leaving the lesson	2.64	Agree
8	Frustration	2.62	Agree
9	Depression	2.67	Agree
10	Develop a feeling of dislike for the teacher	2.72	Agree
11	Develop a feeling of hatred for Physics	2.72	Agree

Table 3 shows mean values greater than 2.50 for all the items. This indicates that the majority of the students agreed that Physicsphobia makes them have a fear of Physics lessons and anxiety, and it triggers rapid heartbeat in them. It makes physics lessons uninteresting and boring to them, making them uncomfortable and having a feeling of leaving the lesson. It makes them feel frustrated and depressed, which results in a feeling of dislike for the teacher and Physics.

5. Discussion of findings

This study revealed that students are scared of Physics. This indicates that many of the students have a phobia for Physics. These findings agree with the findings of Boruah and Saikia (2014) and Olaniyan and Salman (2015) that mathematics phobia exists in students. The findings also agree with that of Ihekweba, Nwokocha and Onuike (2020) who found a high phobia in a high proportion of students.

This study has also revealed that Physicsphobia in the students was caused by rumors and misleading information about physics, abstract nature of physics, difficult nature of Physics, complicated scientific terms, too many equations and too many calculations contained in Physics, teaching method, uninteresting nature of physics lessons, lack of practical lessons in physics and unfriendly nature of Physics teachers. These findings agree with the findings of Olaniyan and Salman (2015) that some of the causes of mathematics phobia in students in the view of teachers, were teaching method, the way mathematics is painted by people, the perception that mathematics is difficult and abstract, numerous formulas, difficulty in solving mathematics problems, belief that mathematics is difficult, poor mathematics background in students and hatred for calculation-related subjects. These findings also agree with the findings of Nwoke and Ugwuebulam (2016) that, the causes of mathematics phobia were teaching method, teacher's inability to break down concepts into simple understandable units, inability to

solve mathematics problems, students' poor mathematics background, abstract nature of mathematics and long procedures in solving mathematics problems.

The respondents in this study were however of the view that the fact that Physics contains too many topics and obtaining low scores in Physics were not the causes Physicsphobia in them. These findings agree with the findings of Olaniyan and Salman (2015) in which only a few respondents indicated that a wide mathematics syllabus is a cause of mathematics phobia.

This study further revealed that Physicsphobia makes the students have a fear of Physics lessons and anxiety, as well as rapid heartbeat in them. It makes physics lessons uninteresting and boring to them, making them uncomfortable and having a feeling of leaving the lesson. It makes them feel frustrated and depressed which results in a feeling of dislike for the teacher and Physics. These findings may be because phobia causes chronic arousal which involves an excessive physiological and psychological state of being awake or reactive to stimuli, including elevated heart rate and blood pressure and panic attacks as noted by DSM – IV-TR in Carson et al. (2011). These findings agree with the submission of DSM – IV-TR in Carson et al. (2011) that phobia may lead to anxiety, muscle tension, restlessness and difficulty concentrating. These findings also agree with the findings of Olaniyan and Salman (2015) students express mathematics phobia in truancy in class, feverish feeling in math class, lack of interest in math class, lack of concentration in math class, failure of students to answer or contribute in class and student's mood switch in math class.

5.1 Implication of findings

This study has shown that students are scared of Physics. In other words, many students have a phobia for Physics. The findings of this study imply that, if these causes of Physicsphobia are consciously taken care of in the teaching of Physics, Physicsphobia and its effects on students will in turn be eradicated. This will consequently result in a higher enrolment of students in Physics. However, if students' phobia for physics is left unabated, the enrolment of students in Physics and Physics-related courses will continue on the downward trail to the detriment of the nation's technological advancement and sustainability.

6. Conclusion

Physicsphobia is a reality and it exists in students. This study has found that the causes of Physicsphobia are multidimensional. The causes of Physicsphobia discovered in this study include subject-related causes such as the abstract, difficult and mathematical nature of Physics; teacher-related causes such as teaching method, uninteresting nature of physics lessons, lack of practical lessons in physics and unfriendly nature of Physics teachers; and societal-related causes such as rumors and misleading information about Physics. Physicsphobia is a serious issue as confirmed by the respondents in this study

considering its effects which are grievous and cannot be swept under the carpet. The fact, therefore, remains that an urgent intervention is needed to tackle situations which have caused Physicsphobia in students in order to minimize or eradicate its effects.

6.1 Recommendations

Based on the findings of this study, it was recommended that:

- 1) Conscious efforts should be made to debunk the rumour and misleading information about Physics, especially for students who are about to start, or just starting the study of Physics.
- 2) Teaching methods and strategies that will demystify seemingly difficult concepts in Physics and make the study of physics interesting should be used by Physics teachers.
- 3) Sound mathematics background should be ensured for students.

Conflict of interest statement

The authors declare that there is no conflict of interest.

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