

Learner Centered Teaching Strategies: Imperative to Improvement of Secondary School Students' Attitude towards Physics

P. C Agommuoh

Department of Science Education, Michael Okpara University of Agriculture, Umudike

Abstract: *This study learner centered teaching strategies as a way to improve secondary school students' attitudes towards physics employed a descriptive survey research design. The population of the study is all senior secondary school two (SSS2) students in Umuahia Education Zone of Umuahia North Local Government Area of Abia State. Purposive sampling technique was used to select one hundred (100) senior secondary school two (SSS2) students from four coeducational senior secondary schools in Umuahia North Local Government Area of Umuahia Education Zone of Abia State. The instrument for data collection was the researchers developed structured questionnaire of the Likert type on senior secondary school students' assessment of learner centered teaching strategies as a way to improve secondary school students' attitudes towards physics. Two (2) research questions and one (1) hypothesis tested at 0.05 level of significance guided the study. The instrument was validated and the reliability index of 0.89 was obtained. The research questions were answered using mean while the hypothesis was tested with chi-square statistics. Results showed that brain storming, role playing, and demonstration, classroom debate, learning through research, group working and concept mapping are learner centered teaching strategies that could improve secondary school students' attitudes towards physics. Recommendations were made based on the findings.*

Keywords: *Science, Physics, Teaching Strategy, Learner centered strategy and attitude*

I. Introduction

Science and engineering are key to renewed economic growth, and to meeting the challenges of the 21st century from sustainable energy to global security to lifelong health and wellbeing (Wendy Piatt, 2011). For Nigeria to meet with these challenges, it is very important that the education system in Nigeria produces people with the right skills. Physics is a subject that is essential in the training of most science and engineering disciplines.

Physics is the study of matter, energy and their interactions. It is an international enterprise, which plays a key role in the future progress of humankind. Physics education is important and essential because it is an exciting intellectual adventure that inspires young people and expands the frontiers of our knowledge about nature; generates fundamental knowledge needed for the future technological advances that will continue to drive the economic engines of the world; contributes to the technological infrastructure and provides trained personnel needed to take advantage of scientific advances and discoveries; is an important element in the education of chemists, engineers and computer scientists, as well as practitioners of the other physical and biomedical sciences; extends and enhances our understanding of other disciplines, such as the earth, agricultural, chemical, biological, and environmental sciences, plus astrophysics and cosmology - subjects of substantial importance to all peoples of the world; improves our quality of life by providing the basic understanding necessary for developing new instrumentation and techniques for medical applications, such as computer tomography, magnetic resonance imaging, positron emission tomography, ultrasonic imaging, and laser surgery. Studying Physics at school is excellent preparation for a range of challenging and rewarding degree courses and careers both inside and outside the Sciences (Wendy Piatt, 2011). According to Wendy Piatt (2011), physics does not only have value for its sake but the intellectual challenge of studying the subject translates into qualities highly sought after by employers. It is therefore very imperative that the subject be properly taught especially at the secondary school level to enable students develop skills that will open up a range of career options for them.

According to Orhan Karamustafaoglu (2009), learner centered teaching strategies are teaching strategies through which students become active participant in the learning process. In the process of learner centered teaching, students move from being passive recipients of knowledge to being participants in activities that encompass analysis, synthesis and evaluation besides developing skills, values and attitudes. Learner centered learning is a process whereby students engage in activities, such as reading, writing, discussion, or problem solving that promote analysis, synthesis, and evaluation of class content. Cooperative learning, problem-based learning, and the use of case methods and simulations are some approaches that promote active

learning. Actively engaging students motivates deeper thinking about course content, brings additional energy to a classroom, and helps an instructor pin point problem areas. Learner centered methods also:

- i. Give the learner feedback on their incomplete understandings and encourage them fix this, for example by helping each other.
- ii. Give the teacher feedback on which learners understand, and who needs help
- iii. Develop thinking skills such as analysis problem solving, and evaluation
- iv. Help learners to use their learning in realistic and useful ways, and see its importance and relevance

Attitudes according to Hendrickson (1997), are the best predictor for estimation of students' success and can be acquired through learning and changed through persuasion using variety of techniques. Adesina and Akinbobola (2005) opined that although attitude changes gradually, people constantly form new attitudes and modify old ones when they are exposed to new information and new experiences thereby helping to shape the experiences the individual has with people, objects or subjects. There has always been an interest in the development of positive students' attitudes towards physics. It is really impossible to learn and understand physics when factors related to students' attitudes towards physics are not indemnified as a matter of urgency and feasible strategies and interaction programme organized to help address the problem and hopefully encourage the students to adopt meaningful and positive attitudes towards physics. This is why Omosowo (1999) stressed the need for teachers to have an understanding of their students' knowledge and feelings about the subject they teach. The study therefore aimed at identifying learner centered teaching strategies that will help to improve the attitudes and performance of students towards the study of physics in secondary schools. The purpose of this study is to indentify learner centered teaching strategies that will improve the attitudes and performance of secondary school students towards the study of physics.

II. Research Questions

The following research questions guided the study.

1. What are the mean scores of physics students' identified learner centred teaching strategies that will improve the attitudes and performance of secondary school students towards the study of physics?
2. What are the mean scores of male and female physics students' identified learner centred teaching strategies that will improve the attitudes and performance of secondary school students towards the study of physics?

III. Hypothesis

The hypothesis below tested at $P < 0.05$ significant level guided the study

H_{01} : There is no significant difference in the scores of the male and female physics students' identified learner centered teaching strategies that will improve the attitudes and performance of secondary school students towards the study of physics.

IV. Method

The study employed a descriptive survey to investigate physics students' identified learner centered teaching strategies that will improve the attitudes and performance of secondary school students towards the study of physics. The population of the study is all senior secondary school two (SSS2) students in Umuahia Education Zone of Umuahia North Local Government Area of Abia State. Purposive sampling technique was used to select one hundred (100) senior secondary school two (SSS2) students from four coeducational senior secondary schools in Umuahia North Local Government Area of Umuahia Education Zone of Abia State. The instrument for data collection was the researchers developed structured questionnaire of the Likert type on senior secondary school students' assessment of learner centered teaching strategies as a way to improve secondary school students' attitudes towards physics. The responses were Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) weighted 4, 3, 2, 1 respectively. The questionnaires were distributed by the researcher and collected back and so the percentage return was 100%. Two (2) research questions and one (1) hypothesis tested at 0.05 level of significance guided the study. The instrument was validated and the reliability index of 0.89 was obtained. The research questions were answered using mean while the hypothesis was tested with chi-square statistics.

V. Results

The findings got are represented in the tables below.

Research Question 1: What are the mean scores of physics students' identified learner centered teaching strategies that will improve the attitudes and performance of secondary school students towards the study of physics?

I. Table 1: Responses of Physics Students on the Identified Learner Centered Teaching Strategies.

S/N	ITEM	SA	A	D	SD	X	REMARK
1.	Brain storming	40	50	6	4	3.26	Agree
2.	Demonstration	55	40	3	2	3.48	Agree
3.	Experiment in the lab	48	50	2	-	3.46	Agree
4.	Organizing a classroom debate	65	35	-	-	3.65	Agree
5.	Learning through research	70	20	5	5	3.55	Agree
6.	Group working	80	20	-	-	3.80	Agree
7.	Using Concept Mapping	50	35	10	5	3.30	Agree
8.	Learning through exploration	60	35	3	2	3.53	Agree
9.	Using models and analogies	50	45	2	3	3.42	Agree
10.	Using students games	60	30	5	5	3.45	Agree
11.	Taking notes	45	48	2	5	3.33	Agree

Results on Table 1 show that the items have means values between 3.26 and 3.80 which is greater than 2.5 the mean value of the four point scale used. This means that all the students agreed that the eleven items listed above are learner centered teaching strategies that will improve the attitudes and performance of secondary school students towards the study of physics.

Research Questions 2: What are the mean scores of male and female physics students' identified learner centred teaching strategies that will improve the attitudes and performance of secondary school students towards the study of physics.

II. Table 2: Scores of male and female physics students on the learner centered teaching strategies that will improve the attitudes and performance of secondary school students towards the study of physics.

The following are learning disabilities of secondary school physics in the study of physics

S/N	ITEM	Mean Male(X)	Remarks	Mean Female(X)	Remarks
1.	Brain storming	3.51	Agree	2.98	Agree
2.	Demonstration	3.55	Agree	3.33	Agree
3.	Experiment in the lab	3.66	Agree	3.19	Agree
4.	Organizing a classroom debate	3.86	Agree	3.36	Agree
5.	Learning through research	3.50	Agree	3.61	Agree
6.	Group working	3.83	Agree	3.76	Agree
7.	Using Concept Mapping	3.40	Agree	3.17	Agree
8.	Learning through exploration	3.62	Agree	3.41	Agree
9.	Using models and analogies	3.52	Agree	3.29	Agree
10.	Using students games	3.71	Agree	3.10	Agree
11.	Taking notes	3.59	Agree	2.98	Agree

Result in Table 2 clearly showed that all the items presented to both male and female physics students had mean scores between 3.40 and 3.86 for male students and between 2.98 and 3.76 for female students. These scores are greater than 2.50 which is the mean value of the four point scale used for the study. The table also

showed that all the students both male and female agreed that all the eleven items listed above are learner centered teaching strategies that will improve the attitudes and performance of secondary school students towards the study of physics.

Hypothesis 1: There is no significant difference in the scores of the male and female physics students' identified learner centered teaching strategies that will improve the attitudes and performance of secondary school students towards the study of physics.

Table 3: Chi Square scores of male and female physics students on the learner centered teaching strategies that will improve the attitudes and performance of secondary school students towards the study of physics.

SEX		SA	A	D	SD	TOTAL
MALE	58	436 (361)	166 (237)	24 (22)	12 (18)	638
FEMALE	42	187 (262)	242 (171)	14 (16)	19 (13)	462
TOTAL	100	623	408	38	31	1100

$\chi^2_{cal} = 93.2$, $\chi^2_{crit/tab} = 7.815$, $df = 3$.

since $\chi^2_{cal} = 93.2$ and is greater than $\chi^2_{tab} = 7.82$, the hypothesis is rejected which means that a significant difference exists between the assessment of male and female physics students' on learner centered teaching strategies that will improve the attitudes and performance of secondary school students towards the study of physics.

VI. Discussion

Tables 1 and 2 showed that all the items have mean values greater than 2.5 which means that all the physics students both males and females agreed that brain storming, demonstration, experiment in the laboratory, organizing a classroom debate, learning through research, group working, using concept mapping, learning through exploration, using models and analogies, using students games and note taking are all learner centered teaching strategies that will improve the attitudes and performance of secondary school students towards the study of physics. This result is in agreement with Orhan Karamustafaoglu (2009) who opined that learner centered teaching strategy is the learning strategies that incorporate small groups, cooperative work, case studies, simulation, discussion, problem solving, journal writing and all types of teaching/learning in which the teacher uses to encourage students to interact and participate actively in the class activities. In other words, learner centered teaching strategies is the type of learning that involve the engagement of the students in the instructional process. Supporting this, Adesina and Akinbobola (2005) observed that in classrooms where learner centered learning techniques are used, the lessons become more interesting to the students and they take part in the lessons attentively. The results in tables 1 and 2 are also in agreement with Donaldson(2005) who observed that learner centered teaching learning was provided with learning methods such as brainstorming, role playing, demonstration, laboratory works and so on. Teachers believe that learner centered learning techniques are useful for permanent learning and should be used frequently in the physics classrooms. However, there are teachers who believe that student-centered learning cannot be realized in the physics classroom since according to them physics is a numerical subject (Karamustafaoglu O, Akdeniz, 2007). However, some studies indicate that using student-centered applications is necessary for the permanent learning as physics contains abstract concepts (Bennice, 2001).

Result in table 3 indicated that there is a significant difference in the opinions of male and female teachers on these learning disabilities in the study of physics. This means that gender played a role.

VII. Conclusion

The teacher has the responsibility of making the learner to learn. This can be done effectively by the teacher only if he/she makes the teaching environment stimulating, challenging and dynamic. The aim of teaching is not only to transmit information but also to transform passive students into active receptors of knowledge and constructor of their own knowledge. There is therefore great need to teach in a way that the learner will be actively involved for permanent learning to take place. To use learner centered approaches effectively, the curriculum should be revised and improved to make the students active in the classroom especially in the physics classroom.

VIII. Recommendation

Based on the findings the following recommendations are made:

1. The physics teacher has to use a more focussed and participatory teaching strategies in teaching physics students in order to increase their interest in the subject and thereby making them have permanent learning of physics concepts.
2. Conferences, workshops, and seminars should be organized for the practicing and serving physics teachers to update their knowledge/ skills on how to use learner centred teaching strategies to teach students in physics.
3. Physics students should be encouraged to be actively involved in the learning environment.
4. Physics teachers must provide conducive learning environment for physics students in order to help them participate actively in the physics classrooms.

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