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Enhancing Students' Attitude Towards Nigerian Senior Secondary School Physics Through The Use Of Cooperative, Competitive And Individualistic Learning Strategies

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Abstract: The study was conducted to find out the attitude of students towards the use of cooperative, competitive and individualistic learning strategies in Nigerian senior secondary school physics. The design selected for this study was quasi-experimental. A total of 140 students took part in the study and they were selected by a random sampling technique. A structured questionnaire titled Students' Attitude Towards Physics Questionnaire (SATPQ) on 4-point scale was used to collect the data. The Students' Attitude Towards Physics Questionnaire (SATPQ) was validated and trial-tested to establish reliability using Cronbach Alpha. The instrument had a coefficient of internal consistency of 0.86. Analysis of Variance (ANOVA) was used in analyzing the data. The result of the findings showed that cooperative learning strategy was the most effective in facilitating students' attitude towards physics. This was then followed by competitive strategies with the individualistic learning strategies being seen to be the least facilitative. The results also showed an insignificant gender difference in the attitude of students toward physics when taught with cooperative, competitive and individualistic learning strategies. Consequently, it is recommended that cooperative learning strategy should be used in schools to facilitate students' attitude towards physics.

Introduction

Attitudes are acquired through learning and can be changed through persuasion using variety of techniques. Attitudes, Once established, help to shape the experiences the individual has with object, subject or person. Although attitude changes gradually, people constantly form new attitudes and modify old ones when they are exposed to new information and new experiences (Adesina & Akinbobola, 2005)

Gagne (1979) defines attitudes as an internal state that influences the personal actions of an individual, he recognized attitude as a major factor in subject choice. He considers attitudes as a mental and neutral state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's responses to all objects and situations with which it is related. Teachers have the opportunity of structuring lessons cooperatively, competitively or individualistically and the decisions teachers make in structuring lessons can influence students' interactions with others,

knowledge, and attitudes (Carson, 1990). In teaching-learning processes, an opportunity is created whereby the teacher can talk to the students directly or in small groups. Teachers may raise questions to help direct students or explain concepts. In addition, a natural tendency to socialize with the students on a professional level is created by approaches to problem solving and about activities and attitudes, which influence performance in class. When students are successful they view the subject matter with a very positive attitude because their self-esteem is enhanced. This creates a positive cycle of good performance building higher self esteem which in turn leads to more interest in the subject and higher performance.

Schunk and Hanson (1985) suggest that the attitude of pupils is likely to play a significant part in any satisfactory explanation of variable level of performance shown by students in their school science subject. Ogunleye (1993) in his finding reports that many students developed negative attitudes to science learning, probably due to the fact that teachers are unable to satisfy their aspiration or goals. Alao (1990) showed that there is positive correlation between attitudes and performance in the science subjects. According to Johnson and Johnson (1989), cooperative learning experiences promote more positive attitudes toward the instructional experience than competitive or individualistic methodologies Johnson and Ahlgren (1976) examined the relationships between student's attitudes toward cooperation, competition, and their attitudes toward education. The results of the study indicated that student cooperativeness, and not competitiveness, was positive related to motivation. to learn. Tjosvold, Marine and Johnson (1977) found that cooperative strategies promoted positive attitudes toward both didactic and inquiry methods of teaching science and students taught by cooperative strategies believed they had learned more from the lesson than did students taught by competitive strategies.

Cooperative learning is a successful teaching strategy in which small teams, each with students of different levels of ability, use a variety of learning activities to improve their understanding of a subject. Each member of a team is responsible not only for learning what is taught but also for helping team mates to learn, thus creating an atmosphere of achievement (Ronsini, 2000).Cooperative learning is a mode of learning in which students work in small groups to achieve a purpose. Here there is an emphasis on the importance of group work, students in a group help each other in learning the content, but achievement is judged individually.

According to Odili (1990), the class in cooperative learning is divided into groups, and each group has specific work to do. Also, group rewards and individual accountability within the group are essential.

According to Slavin (1987), the two major theoretical perspectives related to cooperative learning are motivational and cognitive. The motivational theories of cooperative learning emphasize the students incentive to do academic work, while the cognitive theories emphasize the effects of working together. Motivational theories related to cooperative learning focus on reward and goals structures. One of the elements of cooperative learning is positive interdependence, where students perceive that their success or failure lies within their working together as a group (Johnson, Johnson & Holubec, 1986). From a motivational perspective, cooperative goal structure creates a situation in which the only way group members can attain their personals goals is when the group is successful (Slavin, 1990). Therefore, in order to attain their personal goals, students are likely to encourage members within the group to do whatever will help the group to succeed and to help one another with a group task.

Johnson, Johnson and Holubec's (1986) theory identified the three types of cooperative learning groups as formal, informal and base. According to them the formal

group ranges from one class period to several weeks. This group ensures that students are actively involved in the intellectual work of organizing materials, explaining it, summarizing it, and integrating it into existing conceptual structures. Informal cooperative learning group task from a few minutes to a whole class period .and the teachers uses them during direct teaching to focus student's attention on the materials to be learnt. A base cooperative learning group task extends for at least a year. It provides students with long-term committed relationship. The formal cooperative learning group as used in this study.

According to Johnson and Johnson (1999), competitive learning is one in which students' work against each other to achieve a good grade. It exits when one students; goal is achieved and all other students fail to reach the goal. The further state that competitive learning can be interpersonal (between individuals) or inter-group (between groups). If competitiveness seems to be so unfavourable to success why is to so predominate in classroom? Competitive learning is most appropriate when students need to view learned materials (Johnson, Johnson & Holubec, 1986).

The mode of delivery for physics lessons at senior secondary school in Nigeria is by expository. The expository method is teacher-centered, student-peripheral teaching approach in which the teacher delivers a pre-planned lesson to the students with or without the use of instructional materials. However, the modern expository method involves more that talking and reading about science for it allows some interaction between the teacher and the students in terms of asking and being asked questions on the topic of discussion (Akinbobola, 2006). Also, the current educational system in Nigeria is based upon competition among the schools. Therefore in Nigeria and with the present educational system, competition is valued over cooperative learning strategies (Akinbobola, 2004).

Hence, cooperative learning being a new strategy for physics teaching in Nigeria has not been frequently used by teachers (Akinbobola, 2004).

Statement of the Problem

In Nigeria, students poor performance in physics have been attributed to poor teaching methods, unqualified and inexperienced teachers, poor student attitude toward physics, poor learning environment and gender effect (Ivowi, 1997). Hence, the questions for this research were; will there be any change in the attitude of students toward physics when they are taught with cooperative, competitive and individualistic learning strategies and to what extent will these learning strategies affect attitude and gender of physics students? The study therefore aimed at investigating the attitudes of students towards the use of cooperative, competitive and individualistic learning strategies in Nigerian senior secondary school physics.

Purpose of the Study

This study aims at achieving the following objectives.

(1) To determine if there is a difference in the attitude of physics students who have been taught with cooperative, competitive and individualistic learning strategies.

(2) To find out if there would be a difference in the attitude of male and female physics students taught with cooperative, competitive and individualistic learning strategies.

Hypotheses

(1) There is no significant difference among the attitude of physics students taught with cooperative, competitive and individualistic learning strategies.
(2) There is no significant difference between the attitude of male and female physics students taught with cooperative, competitive and individualistic learning strategies.

Research Method

The study adopted a quasi-experimental design. All senior secondary school two (SSII) physics students in all the 13 co-educational secondary schools in Ife South Local Government area of Osun State, Nigeria formed the population of this study. The size of the population was 680 senior secondary two (SSII) physics students. A total of 140 students took part in the study. This consisted of 66 males and 74 females. A random sampling technique, through the use of balloting was carried out to select three co-educational secondary school. One intact class from each participating school was randomly reflected and the three intact classes were randomly assigned to treatment groups.Students Attitude Towards Physics Questionnaire (SATPQ) was the instrument used for data collection. This instrument used to measure the attitudes of physics students towards the learning strategies was developed by the researcher. Content validity of the items was assessed at the time they were developed by an educational psychologist and two physics experts. The SATPQ comprised 25 items on four (4) rating scale responses. The responses, Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree(SD) are respectively assigned value point of 4,3,2,1 for positive statements and in reverse order for negative statements.

The instrument was trial-tested to establish the reliability of the instrument in the school not used for the main study. Cronbach Alpha was used to obtain the reliability coefficient of the instrument. The instrument had a internal consistency of 0.86.

Research Procedure

Teacher quality variable was controlled in this study by using the research assistants (physics teachers in each school) to teach the concept of heat energy to their respective students. They were given special training on how to teach the concept using various learning strategies. The research assistants were also provided with detailed instructions and well articulated lesson packages on the concept of heat energy. All of the three groups were taught the concept using the same content outline, but with different learning strategies. Students in the cooperative learning group were taught in small heterogeneous groups of different ability levels. Each group was made up of 3 students. Students in the competitive learning group were also divided into groups. Questions in the form of quizzes were asked of each group in order to determine the winning group. The best group was given a prize at the end of each lesson. Students in the individualistic learning group completed their activities individually. The concept was taught to the groups for four weeks. The SATPQ was administered at the end of the treatment. Analysis of Variance (ANOVA) was used in testing the two hypotheses formulated at $P<.05$ alpha level.

Results
Hypothesis One

There is no significant difference among the attitude of physics students taught with cooperative, competitive and individualistic learning strategies.
The analysis is presented in Table 1.

Source of variation	Df	Sum of squares	Mean squares	F.cal.	F. Critical	Decision of P<.05
Main effects	2	3939.90	1969.95	20.57	3.91	*
Explained	2	3939.90	1969.95	20.57		
Residual	137	13119.85	95.77			
Total	139	17059.74	122.73			

* = significant

Table 1: Analysis of Variance (ANOVA) of the attitude of students taught with cooperative competitive and individualistic learning strategies

The analysis in Table 1 shows that the calculated F-value of the main effects of 20.57 is greater than the critical F-value of 3.91 at P<.05 Alpha level. Hence the null hypothesis which stated that there is no significant difference among the attitude of physics students taught with cooperative, competitive and individualistic learning strategies is rejected. Since there is difference among the attitude of students taught with difference learning strategies, Multiple Classification Analysis (MCA) is considered in order to determine the specific gain of the learning strategies on students' attitude towards physics.

Grand mean=69.76		N	Unadjusted		Adjusted for independence	
Variable + Category			Dev'n	Eta	Dev'n	Beta
Learning Strategies				0.78		.78
Cooperative		48	5.28		5.28	
Competitive		45	1.89		1.89	
Individualistic		47	-7.20		-7.20	
Multiple R.	= .78					
Multiple R. Squared	= .61					

Table 2: Multiple Classification Analysis (MCA) of the attitude scores of physics students taught with cooperative, competitive and individualistic learning strategies.

Derivation from the analysis in Table 2 indicates that students show more positive attitude towards cooperative learning strategy than competitive and individualistic learning strategy. Also students show more positive attitude towards competitive than individualistic learning strategy. The multiple regression analysis (R)is .78 with multiple regression squared of .61 This implies that 61% of the total variance in the attitude of students toward physics can be attributed to the influence of cooperative, competitive and individualistic learning strategies.

(i) Strategy	(i)Strategy	Mean difference (i-j)	Std. Error	Sig.	95% confidence interval	
					Lower bound	Upper Bound
Coop	Comp	3.3972*	2.0521	.258	-1.6824	8.4769
	Ind	12.4885*	2.0294	.000	7.4649	17.5121
Coop	Comp	-3.3972*	2.0521	.258	-8.4769	1.6824
	Ind	9.0913*	2.0626	.000	3.9855	14.1970
Coop	Comp	-12.4885*	2.0294	.000	-17.5121	-7.4649
	Ind	-9.0913*	2.0626	.000	-14.1970	-3.9855

*= the mean difference is significant at the .05 level of significance:
Where: Coop = Cooperative learning strategy
Comp = Competitive learning strategy
Ind = Individualistic learning strategy

Table 3: Result of Scheffe's post hoc test for multiple comparison of learning strategies on students' attitude towards physics.

As shown in the Table 3, cooperative learning strategy was the most effective in facilitating students' learning attitude towards physics. This was then followed by competitive with individualistic learning strategy being seen to be least effective in facilitating students; attitude towards physics.

Hypothesis Two

There is no significant difference between the attitude of male and female physics students taught with cooperative, competitive and individualistic learning strategies. The analysis is presented in Table 4.

Source of variation	Df	Sum of squares	Mean squares	F-cal.	F-Crit.	Decision of P<.05
Corrected model						
Intercept	5	3953.81[a]	790.76	8.09	3.91	*
Strategy	1	676169.49	676169.49	6913.41		*
Gender	2	3919.18	1959.59	20.04		*
Strategy x gender	1	1.22	1.22	0.012		NS
Error	2	12.46	6.23	0.064		NS
Total	134	13105.94	97.81			
Corrected total	140	698308.00				
	139	17059.74				

* = significance at p<.05
NS = Not significance at p<.05
a = R. squared = 0.63 (Adjusted R. squared =.61)

Table 4: Analysis of Variance (ANOVA) of the attitude of male and female students taught with cooperative, competitive and individualistic learning strategies

The analysis in Table 4 shows that the calculated F-value of the gender main effect of 0.012 is less than the critical F-value of 3.91 at p<.05 alpha level. Therefore, the null hypothesis stating a non-significant difference between the attitude of male and female

physics students taught with cooperative, competitive and individualistic learning strategies is retained.

Discussion

The result of hypothesis one indicated that a significant difference exists among the attitude of physics students taught with cooperative competitive and individualistic learning strategies. Students showed more positive attitudes toward cooperative than competitive learning strategy and also students showed more positive attitude toward competitive than individualistic learning strategy. This study was in line with the findings of Johnson and Johnson (1989) that cooperative learning strategy promotes more positive attitudes toward the instructional experience than competitive or individualistic strategies. This is not surprising because in cooperative learning, students are trained on how to interact positively, resolve disputes through compromise or mediation and encourage the best performance of each member for the benefit of the group. When students are successful, they view the subject with a very positive attitude because their self-esteem is enhanced.

The result of hypothesis two indicated no significant difference in the attitude of male and female students taught with cooperative, competitive and individualistic learning strategies. This result was in line with Udousoro (1999) findings that gender and ability of students failed to have any significant effect in the cooperative group.

. The improved attitude is due to the novelty of the approach. Evidence support for the use of cooperative learning in physics according to Akinbobola (2004) has shown that it develops higher-level thinking skills, increases students; retention and fosters team building. Hence the improved students' attitude in physics will enhance students' performance in the subject.

Conclusion

The results of this study showed that cooperative learning strategy is more effective in enhancing students' attitude towards physics than competitive and individualistic learning strategies. Using cooperative learning strategy will enable the students to understand, enjoy and create more positive attitude towards Physics, so that teaching it will become more rewarding to teachers. Also, cooperative learning strategy does not discriminate against sexes

Recommendations

Based on the findings of the study and conclusion reached, the following recommendations were made:

(1) Physics teachers should adopt cooperative learning strategy as an effective learning strategy in order to enhance students' attitude towards the subject.
(2) Physics teachers should arrange their laboratories and classrooms in such a way as to give room for effective interaction among students.
(3) Cooperative learning strategy should be used in teaching various concepts in physics starting from the secondary schools and continuing in tertiary institutions.

(4) Seminars, workshops and conferences should be organized for physics teachers to appraise them with the use of cooperative learning strategy.

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