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Effects of Cooperative Learning Strategy (CLS) and Inquiry Teaching Strategy (Its) On Basic Science Students' Attitude in Delta State

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Abstract: *The study looked into the effects of CLS and ITS on basic science students' attitude in Delta State. The design was a 3x2 pretest, posttest control group quasi-experimental factorial design. The study's population comprised 174,570 JSII basic science students in public secondary schools in Delta State. The study's sample comprised 382 JSII basic science students. Basic Science Attitude Scale (BSAS) was employed for the collection of data. BSAS was face validated by three experts. BSAS reliability was 0.83. BSAS was administered as pre- and post-test. The scores obtained were ANCOVA. The results showed: a significant difference in mean attitude scores of students taught basic science but in favour of the inquiry teaching group among the three teaching methods; and a non-significant interaction effect between teaching method and sex on attitude. It was concluded among others that inquiry teaching is the most effective teaching method for learning basic science while cooperative learning can act as alternative. It was thus recommended that inquiry teaching should be adopted as the major instructional method for teaching basic science at the Junior Secondary level.*

Keywords: Cooperative Learning Strategy (CLS), Inquiry Teaching Strategy (ITS), Attitude

Introduction

Education is the process of passing on knowledge, values, and skills from one generation to the next. The value of education to any country is incalculable. Every country attempts to give high-quality education to its citizens and residents so that they can effectively contribute to the country's economic development. Learning contents and experiences are divided into numerous subjects that are taught at various stages of education in order to successfully nurture these citizens. Basic science as a subject is taught as an introductory course at the primary and junior secondary school levels in Nigeria to introduce the younger generation to the world of science and technology.

To facilitate the attainment of the objectives of the basic technology curriculum at the junior secondary school level requires the adoption of appropriate teaching methods during instruction. From the researcher's experience, the lecture method has been the most commonly used teaching method in Nigerian schools (Emerhiona, Ajaja, Pius, Nwanze & Izuegbuna, 2018). The lecture method of teaching involves the teacher in complete verbal instruction telling the students what he/she feels they should know without giving the students the opportunity to be actively involved during instruction. Students' passive involvement during instruction encourages students' memorization and regurgitation of learnt basic technology concepts. Therefore, the students lack the practical skills that could have promoted complete comprehension and understanding of the learnt basic technology concept. This may be one of the causes of students' poor academic achievement in basic technology in the Basic Education Certificate Examination (BECE). This is most evident in the examination reports (2016-2018) on students' academic achievement by the Delta State Ministry of Basic and Secondary Education on BECE (Orivwude, 2022). Therefore, in order to enhance students' academic achievement in Basic Science, active teaching methods such as cooperative learning strategy (CLS) and inquiry teaching strategy (ITS) that have the potency of improving students' achievement through active participation during instruction may be suitable alternative to the lecture method.

CLS is the polar opposite of traditional classroom activities, in which the conquest of all is the conquest of all. In comparison to other teaching strategies, CLS is thought to be more effective at enhancing students' cognitive, social, and motivational abilities (Gull & Shehzad, 2015). Positive interdependence and accountability, which come from the realisation that each group member is crucial to the success of the whole, are two key characteristics that have set CLS apart from traditional learning (Slavin, 2011). The goal of CLS is to enhance the learner's critical thinking, reasoning, and problem-solving abilities. It is well known for actively involving students in the learning process. According to research-based evidence, CLS enhances students' learning outcomes, and educators have acknowledged CLS as a useful teaching-learning strategy for a variety of courses (Ajaja & Eravwoke, 2010; Ajaja & Mezeiobi, 2018).

On the other side, ITS is a teaching strategy that encourages students to conduct independent research, sometimes with little assistance from the teacher, in an effort to find and create solutions to problems that have already been identified. ITS is also a word used in science instruction that denotes a method of inquiry, seeking information or understanding phenomena. ITS is one teaching strategy that can be applied in teaching BS (Burrowes, 2013). In ITS, Many of the activities and thought processes that scientists employ to develop new knowledge are engaging for students. According to Abdi (2014), in order to create an inquiry classroom atmosphere, students must create a community of practice similar to how scientists do their work. Students engage in authentic ITS activities that replicate scientists' methods for knowing and proving what they know. Students are in charge of watching and challenging events, formulating theories to explain what they observe, designing and carrying out experiments to confirm or deny

their hypotheses, analysing data, drawing conclusions from experimental data, creating models, or any combination of these. Inquiry teaching is backed up with research-based knowledge of the learning process. Researchers have urged teachers to adopt ITS to guarantee that students actively participate during instruction by demonstrating ideas through a variety of hands-on activities thereby promoting their attitude towards Basic Sicence (Abdi, 2014; Sylvanus & Eke, 2017).

Thus, the goal of the research was to find out which of CLS, ITS and LM will help students acquire positive attitude toward basic science. The definition of attitude is the propensity to react favourably or unfavourably to a particular object. The way a person thinks or behaves, or both, can often make or break how well they perform while carrying out their jobs and responsibilities (Fehintola, 2014). The instructional strategy adopted by basic science teachers may influence positively or negatively the attitude of students. It is against this background this study explored the effects of CLS, ITS and LM on the attitude of Basic Science students.

Statement of the Problem

It is no longer news that most teachers in Nigerian schools adopt LM. The major disadvantage of LM is that students are passive during instruction. This suggests that the use of LM does not give students the opportunity to acquire basic practical skills which in turn affect students' attitude. This lapse in LM demands for the trial of CLS and ITS as alternative teaching strategies. CLS and ITS may have better positive effects on students' attitudinal change. Therefore, will CLS and ITS improve students' attitude towards basic science more than LM? This is the problem this study sought to explore.

Purpose of the Study

The study focused on how CLS and ITS affect students' attitude to BS. In particular, the study aimed to:

- ascertain the effects of CLS, ITS and LM on students' attitude to BS; and
- ascertain the interaction effect of instructional methods and sex on students' attitude towards BS.

Hypotheses

The study was guided by two hypotheses:

- There is no significant difference in the mean attitude scores among students taught BS using CLS, ITS and LM.
- There is no significant interaction effect of instructional methods (CLS, ITS and LM) and sex on students' attitude to BS.

Methods

The study adopted 3x2 pretest, posttest control group quasi-experimental factorial design. The design consisted of three treatment groups (CLS, ITS and LM) across two level of sex (male and female). In the design, the independent variable is the instructional methods (CLS, ITS and LM), the moderating variable is sex, and the dependent is attitude. The study's population is 174,570 public secondary schools' students in Delta State. A sample of 382 students took part in the study. Basic Science Attitude Scale (BSAS) was used for the collection of data. It was face validated by three experts that consisted of an experience BS teacher, an Integrated Science Educator and an expert in Test and Measurement. BSAS's reliability was established using Cronbach alpha which yielded 0.83 reliability coefficient. BSAS was administered as pretest and posttest. Obtained data were analysed with Analysis of Covariance (ANCOVA).

Results

- There is no significant difference in the mean attitude scores among students taught BS using CLS, ITS and LM.

Table 1: ANCOVA Summary on CLS, ITS and LM Group Students' Attitude

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1099.597[a]	3	366.532	5.323	.001
Intercept	111989.019	1	111989.019	1626.229	.000
Pretest	76.551	1	76.551	1.112	.292
Method	982.300	2	491.150	7.132	.001
Error	26030.678	378	68.864		
Total	1411345.000	382			
Corrected Total	27130.275	381			

The mean attitude scores among students who were taught BS via CLS, ITS, and LM differ significantly, as shown in table 1, $F(2, 378) = 7.132$, $P(0.001) < 0.05$. Therefore, HO1 is disregarded. As a result, students who learned BS utilising CLS, ITS and LM showed a significantly different mean attitude score. The Scheffe's post-hoc test, which is presented in table 2, was used to determine the direction of the difference between the three groups.

Table 2: Scheffe's Post-Hoc Test on CLS, ITS and LM Group Students' Attitude

(I) Teaching methods	(J) Teaching methods	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
ITS	CLS	2.625	1.080	.053	-.03	5.28
	LM	4.013*	1.047	.001	1.44	6.59
CLS	ITS	-2.625	1.080	.053	-5.28	.03
	LM	1.388	1.011	.391	-1.10	3.87

LM	ITS	-4.013*	1.047	.001	-6.59	-1.44
	CLS	-1.388	1.011	.391	-3.87	1.10

As shown in table 2, students taught BS using ITS outscored their counterparts taught using CLS and LM, with respect to attitudinal scores. Nevertheless, students taught BS with CLS perform as much their counterparts taught with LM, with reference to attitudinal scores.

- There is no significant interaction effect of instructional methods (CLS, ITS and LM) and sex on students' Attitude to BS.

Table 3: ANCOVA Summary on Interaction Between Strategies and Sex on Attitude

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1467.529[a]	6	244.588	3.574	.002
Intercept	111394.127	1	111394.127	1627.760	.000
Method	1085.372	2	542.686	7.930	.000
Sex	14.052	1	14.052	.205	.651
Strategy * Sex	345.085	2	172.542	2.521	.082
Error	25662.745	375	68.434		
Total	1411345.000	382			
Corrected Total	27130.275	381			

F(2,375) = 2.521, P(0.082>0.05) in table 3 shows insignificant interaction between instructional tactics and sex on students' attitudes. Consequently, the null hypothesis is not disproved. As a result, there is no discernible connection between instructional techniques (CLS, ITS, and LM) and sex in terms of how students view BS.

Discussion

The study revealed a substantial difference in the mean attitude scores among students who were taught fundamental science utilising CLS, ITS, and LM. The post hoc analysis to ascertain the course of significance showed that students taught BS using ITS outscored their counterparts taught using CLS and LM. Nevertheless, students taught BS with CLS performed as much as those taught using LM with reference to their attitude to BS. The order of effectiveness with reference to mean attitude scores established using the three instructional methods are: ITS > CLS = LM. By implication, the most effective instructional method that should be used to boost students' attitude to BS is ITS.

The finding of superiority of ITS over the other instructional method supports the conclusions of Agboola (2017) who found that students in ITS groups outperformed other students in LM group with reference to positive attitudinal change. The significant higher achievement scores of students in ITS group over the LM may be attributed to the fact that attitude of learners are generally developed and formed through social interaction which ITS emphasizes. The involvement of students in actual experiment in ITS in order to discover fact on their own capture students' interest which in turn affects their disposition towards BS.

The study found that there is no significant interaction effect of instructional methods (CLS, ITS and LM) and sex on students' attitude to BS. This means that the combined effects of instructional method and sex were not responsible for the basic science students' attitude scores obtained. Each of the variables (sex and instructional methods) acted independently to influence the students' attitude scores. The variables of instructional method and sex were separate main effect independent variables. This may explain the reason for the finding obtained.

Conclusion

The study concludes that CLS, ITS and LM boost students' attitude to BS. However, ITS bears greater effect on students' attitude than CLS and LM. Furthermore, the study found non-significant interaction effect between instructional strategies and sex on BS students' attitude. Thus, it was concluded that each of the instructional strategy acted separately to influence BS students' attitude scores.

Recommendations

The study recommends that:

- ITS should be adopted as the major instructional method for boosting students' achievement in BS at the Junior Secondary level of Education, while CLS and LM should be used as alternatives when it is impracticable to apply ITS.
- BS teachers should always allow students' self-discovery of knowledge to facilitate proper conceptualization of concepts as well as development of positive attitude towards the subjects.

References

Abdi, A. (2014). The effect of inquiry-based learning method on students' academic achievement in science course. *Universal Journal of Educational Research, 2(1),* 37-41.

Agboola, O. S. (2017). Effects of inquiry-based and field-trip instructional strategies on pupils learning outcomes in basic science in Ado-Ekiti, Ekiti State, Nigeria. *Journal of Education and Practice, 8(29),* 143-151.

Ajaja, O. P., & Eravwoke, O. U. (2010). Effects of cooperative learning strategy on junior secondary school students' achievement in integrated science. *Electronic Journal of Science Education, 14(1),* 1-18.

Ajaja, R., & Mezieobi, S. A. (2018). Effect of cooperative learning strategy on students' performance in social studies. *International Journal of Education and Evaluation, 4(9),* 96-103.

Burrowes, P. A. (2013). A student-centred approach to teaching general biology that really works: Lord's constructivist model put to a test. *The American Biology Teacher, 65(7),* 491-502.

Emerhiona, F., Ajaja, O. P., Pius, P. O., Nwanze, A. C., & Izuegbuna, A. G. (2018). Effects of problem and discovery-based instructional strategies on students' academic achievement in chemistry. *International Journal of Innovative Research and Advanced Studies (IJIRAS), 5(6),* 209-214.

Fehintola, J. O. (2014). Teachers' characteristics as correlates of students' academic performance among secondary school students in Saki-west Local Government Area of Oyo State. *Journal of Educational and Social Research, 4(6),* 459-468.

Gull, F., & Shehzad, S. (2015). Effects of cooperative learning on students' academic achievement. *Journal of Education and Learning, 9(3),* 246-255.

Orivwude, A. (2022). *Delta State awards of excellence for students of Delta State in Basic Education Certificate Examination.* Retrieved 22nd December, 2022 from http//:www.basicedu.deltastate.gov.ng.

Slavin, R. E. (2011). Instruction based on cooperative learning. In R. E. Mayer & P. A. Alexander (Eds.), *Handbook of research on learning and instruction* (pp. 344-360). New York: Taylor & Francis.

Sylvanus, T., & Eke, S. (2017). Effect of inquiry teaching strategy on academic achievement of senior secondary school chemistry students in Okrika Local Government Area. *International Journal of Education and Evaluation, 3(12),* 9-14.