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EFFECTS OF APPLICATION OF CULTURAL PRACTICE APPROACH AND LECTURE METHOD ON BASIC SCIENCE STUDENTS' ATTITUDE IN DELTA STATE

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ABSTRACT

The aim of the study was to compare the Effects of Cultural Practice Approach and Lecture Method on Students' Attitude in Basic Science among Junior Secondary School Students in Delta State. Specifically, the variables studied are: cultural practice approach and lecture method (independent variables), attitude (dependent variables) and sex as intervening variables. Based on the stated problem, three research questions were raised and three corresponding hypotheses were formulated and tested at alpha level of 0.05. The design adopted for the study was the non-randomized pre-test post-test, planned variation quasi - experimental design. The sample for the study consisted of 210 basic science students from six secondary schools sampled from Delta state. The instruments used for data collection were Basic Science Attitude Scale (BSAS). The instrument was properly validated and reliability determined before it was used determined before usage. Using the data collected, the research questions were answered with the descriptive statistics of the mean and standard deviation, while the hypotheses were tested using independent sample t-test and ANCOVA. All hypotheses were tested at 0.05 alpha level of significance. The findings of the study include: (i) \ significant difference in the attitude score of students taught with lecture method and cultural practice approach (ii) significant difference in the performance of male and female students taught with cultural practice approach but no significant difference in the attitude score of male and female students taught with lecture method (iii) significant effect of interaction between sex and method on students' attitude. Based on the findings of the study it was concluded that cultural practice approach is the most effective approach for the teaching of Basic Science and it was recommended that faculty of education should review their curriculum to include this methodology so that trainee teachers will acquire the skills before graduation.

KEYWORDS: Culture, Practice, Cultural practice, lecture method, sex and attitude

INTRODUCTION

Attitude can be defined as a person's disposition to respond to an object, subject and person in a consistent favourable or unfavourable manner. Peni (2011) described it as a state of readiness and the tendency to act in a certain way by an individual. On the other hand, Ngogo (2014) sees it as the

building up of information about people/person, object, experience or situation which forms an individual's predisposition or opinion about that thing. Elias, Smith, and Barney, (2012) defines it as favorable or unfavorable evaluative judgment made about people or objects, which may be concrete or abstract. From the various definition of attitude, it can be concluded that attitude is formed from either observation or experience or both. There are so many factors that can influence student's attitude towards learning. In the classroom situation, the learning environment has the ability to influence students' attitude towards any subject. According to Sowunmi, Olagunju, & Apata, (2022) attitude formed by students towards a subject emanate from the teaching and learning process and this attitude can be positive or negative. Researchers like Obumanu and Adaramola (2011) has identified teaching method as one of the influencers. Going further, they stressed that teachers lack of usage of right activities during instruction leads to negative attitude towards the study of science, irrespective of sex. To buttress this, Hacıeminoglu, (2016) is of the view that teaching of science by teachers through rote memorization from the textbooks and the use of teacher centered methods leads to negative attitude from the students. No wonder Ogunleue, (2019) recommended that Basic Science should be taught with students-centered strategies that will enable the students to actively participate in the learning process and reduce learning difficulties among students.

Basic science formerly known as Integrated Science is a body of knowledge that is taught at both primary and junior secondary schools' levels of education in Nigeria. From the lower basic to the middle basic levels, it is made compulsory for all students. Basic Science is regarded as the bedrock upon which every other science subjects are built (Sowunmi, Olagunju, & Apata, 2022). Basic Science is also described as the foundational subject which prepares the learners for the studying of the other science subjects in the upper secondary school and higher institution level in the Nigerian educational system. The aims and objectives for teaching basic science include the following: to enable the learners develop interest in Science and Technology; acquire basic knowledge and skills in science and technology; apply scientific and technological knowledge and skills to meet contemporary societal needs; take advantage of the numerous career opportunities provided by science and technology; avoid drug abuse and related vices; be safety and security conscious and become prepared for further studies of science and technology (Basic Science and Technology Curriculum (BSTC), 2012).

Looking at the aims and objectives of teaching Basic science, one expects that the subject should be taught using the appropriate teaching strategy. However, observation and research have shown that Basic Science is being taught with teacher-centered strategy. Teacher- centred method of teaching is probably the oldest and most common teaching method used by teachers. It is considered to be an effective way of presenting materials in a manner in which students' learning is mediated by the teacher. When teacher centered method is used, students listen and take down notes. They are given little or no room to ask questions. The usage of this method leads to students' poor performance which is a product of negative attitude towards the subject (Nsengimana et al, 2017; Ojekwu and Ogunleye, 2020). To avoid this, Basic science concepts should be presented to students with student-centered

approach to prevent rote memorization by students. Students centered approach that elicits their prior knowledge and get them actively involved in the teaching and learning process should be used.

One of such teaching approaches that as this ability of relating students' experiences with what are to be taught is the cultural practices approach. Cultural practice is also known as ethno-science. It is also defined as practices of a given people that have direct bearing to science or can be scientifically defined (Peni, 2011). From the definition of the term cultural practices, one can say that the science related practice indulged in by students can act as their prior knowledge which is an important determinant of learning as advocated by Ausubel. Some of the cultural practices in Nigeria that have scientific explanations includes: addition of potash into sour soup (Neutralization reaction), addition of nail to the pots when cooking animal skin (catalysis), addition of ash into pit latrine (Neutralization reaction), Fishermen floating on calabash (Density), Slicing of meat to enhance faster drying for making kilishi (Increase in surface area) Soap making (Saponification). In order to teach Science using cultural practices some researchers have used the following cultural practices to teach some scientific concepts: fermentation of corn / maize grains (used for teaching production of alcohol), eating of sour taste fruits (used in teaching of acid), pushing and pulling of objects to move (used to teach force). The cultural practices that will be used in this study include: boiling of water (to teach kinetic energy/ convection), heating of metal spoon with palm oil on it (to teach heat flow), and heating of frying pan (to teach conduction).

The basic reasons for the use of cultural practices and ideas in the classroom includes: the sensitivity that people have a strong hold for their culture and religion, most of our schools' lack the required laboratory facilities needed to effectively teach Basic Science, and students come to the classrooms with different cultural beliefs that can be misconceptions which are detrimental to the learning of science. With these reasons, it becomes necessary to use cultural practices that students are familiar with to teach scientific concepts. When this is done, teachers will be able to elicit student's previous knowledge before teaching and present science to students in a more practical way within their world and engaging them actively in the teaching and learning of science irrespective of their sex and this may improve their achievement and attitude towards the study of basic science. It is against this background; that this study seeks to investigate the comparative effects of the use of cultural practices approach and lecture methods on student's attitude towards basic science in the junior secondary school in Delta State. And also determine if there is variation in attitudinal scores of the students as regards sex since the characteristics of both methods differ.

STATEMENT OF PROBLEM

The poor performance of students in basic science shows that the aims and objectives of teaching basic science have not been achieved over the years. The following were identified as the causes of student's poor performances from literature :(i) science learning is still teacher dependent (ii) classroom learning does not elicit students' prior knowledge, and this can hinder understanding (iii) Classroom learning is devoid of variety of activities even if the concept to be taught can be practicalized. From these

identified reasons one can say that the poor performance of students in sciences and particularly basic science is caused by the teaching process which is not in line with the constructivist theory of learning. Based on social constructivist theory of learning, meaningful learning occurs when learners interact among themselves, the environment and their prior knowledge. What is already known serves as an anchor to the new knowledge and their interactions makes learning occur easily and meaningful. In order to achieve this, it has been advocated that indigenous knowledge and practices of the society should be used to teach science curriculum concept because this type of teaching strategy may enhance the understanding of Basic Science. When cultural practices are used to teach, the students are made to see the relationship between their daily activities and scientific concept. This act will give the students the opportunity to carry out hands-on activities since most of our secondary schools do not have functional laboratories. When students are actively involved and their previous knowledge elicited, it is believed that students will understand better and have positive attitude towards the study of basic science. Based on this, the statement of the problem is “will the use of lecture method and cultural practices instructional approach have varying effects on Basic Science students’ attitude? Will there be variation in attitude based on sex?

Research Questions

The following research questions were raised to guide the study:

1. What is the difference between the mean attitude scores of Basic Science students taught using cultural practices approach and those taught using lecture method?
2. What is the difference between the mean attitude scores of male and female Basic Science students taught using cultural practices approach and those taught using lecture method?
3. What is the effect of interaction between method and sex on attitude?

Hypotheses

H₀₁: There is no significant difference between the mean attitude score taught using lecture method

H₀₂: There is no significant difference between the mean attitude scores of male and female Basic Science students taught using cultural practices approach and those taught using lecture method

H₀₃: There is no significant effect of interaction of method and sex on attitude

RESEARCH DESIGN

The design used for this study is the non-randomized pre-test post-test non-equivalent planned variation group, quasi -experimental design. The design consists of cultural practice approach and lecture method. In this design, there was no randomization of subjects but rather, intact classes were used. The variables for this study included: Instructional strategies, (cultural practice approach and lecture method of teaching) (independent variables), attitude (dependent variables), sex (intervening variable). The pre-test is a pre- attitude score of students before treatment. The post test was the post attitude test scores of the students at the end of treatment. The pretest was given to determine the initial equivalence of the groups.

Population and Sample for the Study

The population for the study consisted of all mixed Junior Secondary class 11 basic science students in Delta State. There are three hundred and eighty-six secondary schools (386) (144 in Delta Central, 144 in Delta North and 98 in Delta South) and fifty thousand, five hundred and twenty-five (50,525) students in Delta State (Delta State Ministry of Education, 2024)

To select the samples of school, the list of all the public secondary schools in Delta state were collected from the Post Primary Education Board. All the single- sex schools and schools in riverine areas were eliminated from the list. With that done, the remaining names of schools were written on pieces of paper for each of the Senatorial Districts. Schools in each senatorial district were put in separate blind bags. Using withdrawal with replacement model of balloting, two mixed schools were selected from each senatorial district. Six basic science teachers teaching in the selected schools were used for the study

Research Instrument

The instrument for data were used for data collection is The Basic Science Students Attitude Scale (BSSAS). On the other hand, an intervention package was used for training of teachers on the use of cultural practice approach.

(a). Basic Science Students Attitude Scale (BSSAS)

The Basic Science Students Attitude Scale (BSSAS) is made up of two sections. Section A contains questions asked on students' bio-data while section B contains 20 items on attitude on a four likert scale.

(b). Cultural Practice Approach Intervention Package

This is made up of three sections, section A of the teachers training manual deals on the concept of cultural practice approach, the specific step to be followed in using cultural practices. Section B shows the steps to be followed in using cultural practice approach and section C is a lesson plan showing the topics to be taught, objectives to be achieved, students and teachers' activities.

A flowchart on the general steps involved in the instructional process are highlighted below

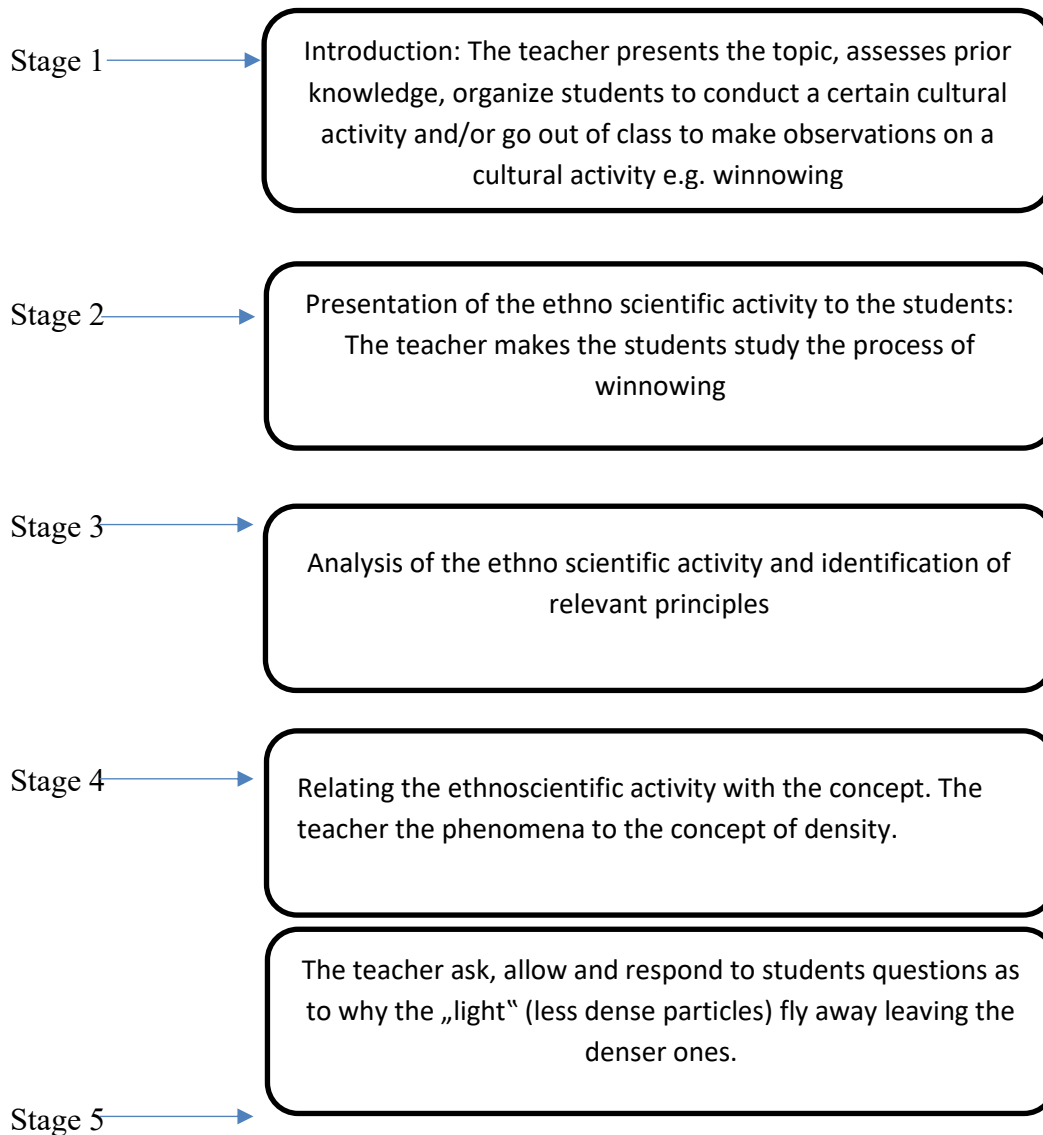


Figure1: Flow Chart of Ethnoscience-enriched-instruction adapted from Achor, Imoko and Uloko (2009).

Validity of the Instrument

The validity of the Basic Science Students Attitude Scale (BSSAS). was determined by a panel of three experts: one specialist in Science Education, one Measurement and Evaluation expert and one Basic Science teacher in a government-owned secondary school. They explicitly scrutinized the contents of the BSSAS, the research questions and hypotheses to determine if the instrument would be able to generate the appropriate data to answer the stated research questions and test the hypotheses raised. The experts worked independently. All the members of the panel confirmed that items in the instrument

are appropriate and approved of its usage for the study after minor editing of grammar used. With this all the items were retained.

Reliability of the Instrument

In determining the reliability of the **Basic Science Students Attitude Scale (BSSAS)** Cronbach's Alpha statistics was used. These statistics enable one to estimate the internal consistency for scoring of items on a test that is not limited to one point (for correct) and 0 point (for incorrect response) (Johnson and Christensen, 2000). The BSSAS is framed on a 4-point Likert scale. This shows that Cronbach's Alpha approach and procedure is the appropriate measure to be used in determining its reliability. To do this, the instrument (BSSAQ) was administered on 30 basic science students in two secondary schools in Delta central Senatorial District who was not part of the study. Their scored responses were subjected to Cronbach Alpha. Cronbach Alpha yielded an r value of 0.81. This shows that the instrument is valid since the result obtained agreed with the reliability standard of at least $r=0.70$ (Wiseman, 1999; Johnson & Christensen, 2000).

Treatment Procedure

The treatment consisted of two groups: cultural practice approach group and Lecture teaching group. The duration for study was for eight weeks and the duration for treatment also was for six weeks. Six basic science teachers were sampled from the three senatorial Districts and were used as teachers (3 each per group). Three of the basic science teachers (cultural practices approach group) that was used, were trained on the skills peculiar with the instructional strategies to adopt in the classroom and separately too. The researcher assistants were trained using the different teaching manuals on both methods and the teachers employed the steps in the various method in teaching of the selected concepts.

Step IV: Post - testing

At the end of six weeks of instruction, the groups (i.e cultural practice approach and lecture method) were given a post- achievement test to respond to. The responses of the students of both groups to the items in the Basic Science Students Attitude Scale (BSSAS).

METHOD OF DATA ANALYSIS

Scoring of the Responses

In BSSAS, SA was scored 4, A 3, D 2, SD 1. To analyze the data collected, three statistical procedures were used as follow: All research questions were answered using descriptive statistics of the mean and standard deviation. H_{01} was tested using independent sample t-test to determine if there was a significant difference between the cultural practice approach and the lecture method group students' attitude, H_{02} was tested using independent sample t-test to determine if there is a difference in the mean attitude scores of male and female students taught with cultural approach and lecture method on students' attitude. Then Hypotheses 3 was tested using ANCOVA (Analysis of covariance) to determine if there is an effect of interaction of method and sex on attitude.

RESULTS

Research Question One: What is the difference between the mean attitude scores of Basic Science students taught using cultural practices approach and those taught using lecture method?

In order to answer research question one, descriptive statistics of mean and standard deviation was used to analyze the data collected at post test, and the result is shown in Table 1

Table 1: Descriptive statistics of mean and standard deviation showing the difference in attitude score of basic science students taught with cultural practice approach and lecture method at post test

Methods	N	Mean	Mean Diff	SD
Cultural Practice	99	55.79	11.54	11.52
Lecture Method	111	44.25		15.62

Table 1 shows that the cultural practice approach group, had an attitude mean score of 55.79 with a standard deviation of 11.54, while the lecture method group students had a n attitude mean score of 44.25 with a standard deviation of 15.62, From the scores, it can be seen that cultural group practice students had the higher attitude mean score with an attitude mean difference of 11.54. To determine if this difference is significant, independent sample t-test was used to test the hypothesis one.

Hypotheses one: There is no significant difference in the attitude mean scores of basic science students taught using cultural practice approach and those taught with lecture method.

In order to determine if the observed difference is significant, independent sample t-test was used to test hypotheses 5, and the result is shown in Table 2.

Table 2: Independent sample t –test showing the difference in the attitude score of basic science students taught with cultural practice and lecture method.

Methods	N	Mean	Mean Diff	SD	df	t-cal	Sig(2-tail)
Cultural Practice	99	55.79	11.54	11.54	208	6.03	0.00
Lecture Method	111	44.25		15.62			

Table 2 shows that the observed difference is significant since the calculated significant value of 0.00 is less than the critical significant value of 0.05. With this, H₁₅ which states that there is no significant

difference in the attitude means score of basic science students taught using cultural practice approach and those taught with lecture method is rejected.

Research Question 2: What is the difference between the mean attitude scores of male and female Basic Science students taught using cultural practices approach and those taught using lecture method? To answer research question six, descriptive statistics of mean and standard deviation were used to compare the data collected and the result is shown in table 3

Table 3: Descriptive statistics of mean and standard deviation comparing the attitude mean score between male and female student taught basic science using cultural practice and lecture method

Methods	Sex	N	Mean	Mean Diff	SD
Cultural Practice	Male	44	28.89	2.00	5.41
	Female	55	26.89		8.19
Lecture Method	Male	57	23.18	2.10	3.75
	Female	54	21.08		2.54

Table 3 shows that the male students in the cultural practice group had a mean score of 28.89 and a standard deviation of 5.41, while their female counterparts had a mean score of 26.89 and a standard deviation of 8.19. The Table also shows that for the lecture group, the male standard deviation had a mean score of 23.18 and a standard deviation of 3.75 while the female had a mean score of 21.08 and a standard deviation of 2.54. So from the set of scores there exist a mean difference of 2.00 for cultural practice approach group and 2.10 for those in lecture method group. To determine if this difference is significant, independent sample t-test was used to test hypotheses two.

Hypotheses two: There is no significant difference in mean attitude score between male and female basic science students taught using cultural practice approach and lecture method.

In order to determine if the observe difference is significant, independent sample t-test was used to analyze the data collected at post test.

Table 4:
Independent sample t –test statistics comparing the difference in the mean attitude score of male and female students taught with cultural practice approach and lecture Method

Methods	Sex	N	Mean	Mean Diff	SD	df	t-cal	Sig(2-tail)
Cultural Practice	Male	44	28.89	2.00	8.41	99	0.78	0.44
	Female	55	26.89		11.19			
Lecture Method	Male	57	23.18	2.10	13.75	109	1.46	0.15
	Female	54	21.08		14.54			

Table 4 shows that the difference is no significant since the calculated significant value of 0.44 and 0.15 is greater than 0.005, with this H_0 which states that there is no significant difference in the mean attitude score of male and female students taught with cultural practice and lecture method is not rejected.

Research Question 3: What is the effect of interaction between method and sex on attitude?

To answer research question seven, descriptive statistics of mean and standard deviation were used to analyze the data collected, and the result is shown in Table 5

Table 5:
Descriptive statistics of mean and standard deviation comparing interaction effect mean between method and sex on achievement.

Methods	Sex	N	Mean	Mean Diff	SD	df	tcal	Sig
Cultural Practice		99	55.79	11.54	11.52			
Lecture Method		111	44.25		15.62			
Cultural Practice	Male	44	28.39	0.91	4.57	97	2.586	0.110
	Female	55	27.49		4.92			
Lecture Method	Male	57	22.15		4.67			

		1.95	109	1.456	0.148
Female	54	20.19	4.02		

Table 5 shows that the cultural practice approach group, had an attitude mean score of 55.79 with a standard deviation of 11.54, while the lecture method group students had a n attitude mean score of 44.25 with a standard deviation of 15.62, From the scores, it can be seen that cultural group practice students had the higher attitude mean score with an attitude mean difference of 11.54. Table 5 also shows that the male in cultural practice approach group had a mean score of 28.39, with a standard deviation of 4.57, while their female counterpart had a mean score of 27.49, with a standard deviation of 4.92, from the mean scores there exist a mean difference of 0.907 in favour of the females. On the other hand, the male students taught with lecture method had a mean score of 22.15, with a standard deviation of 4.67, while their female counterparts had a mean score of 20.19, with a standard deviation of 4.02. From the mean scores, it can be seen that the male student had the highest mean score with a mean difference of 1.95. This shows that there is an interaction effect. To determine if the interaction effect is significant, Analysis of Covariance (ANCOVA) was used to test hypothesis three.

Hypotheses Three: There is no significant effect of interaction between method and sex on attitude.

To test this hypothesis, analysis of covariance (ANCOVA) statistics was used to analyze data collected and the result is shown in table 5

Table 6: Analysis of covariance statistics showing the effect of interaction on achievement

source	Type III sum of square	df	Mean square	F	Sig	
Corrected model	3697.88	4	924.469	6.12	.00	
Intercept	2971.64	1	2971.635	19.68	.00	
Pre-test-score	623.90	1	623.900	4.14		.043
Method	1732.53	1	1732.527	11.47	.00	
Sex	28.65	1	28.647	0.19	.66	
Method*Sex	1174.82	1	1174.820	7.78		0.07
Error	30963.40	205	151.041			
Total	465419.00	210				
Corrected Total	34661.28	209				

Table 6 shows that the observed interaction effect is not significant since the calculated significant value of 0.07 is greater than the critical significant value of 0.05. With this H_{03} which states that there is no significant effect of interaction between method and sex on attitude is not rejected.

DISCUSSION

On comparing the attitude scores of students taught with cultural practice approach and those taught with lecture method, the first finding of the study showed that there is a significant difference in attitude scores of students taught basic science taught with cultural practice approach and those taught using lecture method. Those taught with cultural practice approach had higher post attitude scores when compared with their lecture group counterparts. This noticeable difference was however found to be significant. Table 2 shows that the difference in the students' mean attitude scores between the cultural practice approach group and lecture method group students was significant. This therefore means that all the cultural practice approach group students were positively influenced on attitude by the use of the various activities that they were engaged in. This thus influenced their post-test attitude scores. This finding agrees with that of Rasheed (2017) who found significant effect of Ethno-science instruction on students' attitude.

Also, the study found out that the male students taught with cultural practice approach and lecture method had better post attitude scores when compared with their female counterparts. This noticeable difference was however found not to be significant. Table 4 shows that the difference in the mean scores between the males and females' students was not significant. This therefore means that all the students were positively influenced by the use of both the cultural practice approach, lecture method which influenced their post attitude test scores equally. This shows that the method are not sex biased. This finding agrees with that of Rasheed (2017) who found non -significant effect of Ethno-science instruction on male and female students' attitude.

On interaction, the finding of the study showed no significant effect of interaction of method and sex on attitude as shown in Table 6. This implies that the combined effects of method and sex did not influence students' attitude towards basic science. This means that the effect cultural practice approach and lecture method had on basic science students' attitude is not dependent on sex. The findings affirmed that method is not sex - biased. This finding is in agreement with the findings of Obodo, & Ifunanya (2023) who found no significant interaction effects of teaching method and sex on student's interest scores in basic science and that of Fatoke and Olaoluwa (2014) who found no significant interaction effect of problem solving and sex on students' attitude.

CONCLUSION

Based on the finding of the study, the following conclusions emerged

- Cultural practice approached improved Basic Science students Attitude more than Lecture method.

- Cultural practice approached and Lecture method improved male and female Basic Science students Attitude without sex bias

RECOMMENDATION

In line with the findings of the study, it was recommended that faculty of education should review their curriculum to include this methodology so that trainee teachers will acquire the skills before graduation.

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