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Effect of Instructional Conversation on Students' Achievement, Retention and Attitude towards Physics

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Abstract: *This study examined the effects of instructional conversation on students' achievement, retention, and attitude toward Senior School Physics. The theoretical framework on which the study was anchored is Vygotsky's Social Development Theory. The study employed quasi-experimental research design. This design used intact classes for both experimental and control groups. Three (3) research questions and three (3) null hypotheses were tested at 0.05 level of significance. A sample size of one hundred and eight-six (186) SS II Physics Students from six (6) public secondary schools in Delta State were used. The students were taught physics utilizing instructional conversation in the experimental groups made up of nine-one (91) students, and the lecture method was utilized in teaching ninety-five (95) in the control groups. The instruments used were Physics Achievement Test (PAT) and Physics Students Attitude Questionnaire (PSAQ). The instruments were validated by three experts and the reliability co-efficient of PAT was calculated to be 0.79, while the one of PSAQ was found to be 0.73. The data collected were analyzed using Mean, Standard Deviation, and Independent t-test. The findings were that instructional conversation positively affects physics students' achievement, retention, and attitude compared to the lecture method. Conclusively, the study stated that Instructional Conversation appears as an appropriate strategy to facilitate practical learning, organize knowledge content in a meaningful way, and ensure knowledge acquired is long-lasting among physics learners.*

Keywords: *Instructional Conversation, strategy, achievement, retention and attitude.*

Introduction

Background to the Study

Basically, Physics is a science subject that deals with the properties of matter and its interaction with energy. It is typically an experimental subject. Values and thoughts bring forth from physics are very helpful in understanding of natural events. The concentration of physics instructions is to usher students to the knowing of physics values and to have the cognition to utilize this knowledge. It is a field specifically obsessed with two basic aims, the presentation of a scientifically sophisticated society and the improvement of latent scientific and technological workforce (Ogunniyi, 2001).

Consequently, the National Policy on Education (FRN, 2004, 2007, 2013) expressed explicitly in the secondary school physics curriculum its objectives as:

(i) provide basic literacy of physics for functional living in the society,

(ii) acquire basic conceptions and values of physics as a provision for promoting studies,

(iii) get indispensable technological ability and cognition as a provision for the technical utilization of physics, and

(iv) excite and heighten creativeness.

Physics as a fundamental science deals with the matter and energy in nature. Many students perceive physics to be difficult despite different interventions, such as the introduction of new Educational Systems. Literature (Barmby and Defty, 2006; Lavonen, Meisano, Byman, Uiito and Juiit, 2005; Angell, Guttersrud, Henriksen and Isnes, 2004; Williams, Stanisstreet, Spall, Boyes and Dickson, 2003) opined that students specifically discriminate against physics as conceptually challenging, intangible, and boring that only extraordinary exceptional students' acknowledge and endure its instruction and learning. Nevertheless, educators steadfastly accept that students acquire high-grade and accomplish in physics if they discover the instruction understandable (Gebbels, Evans and Murphy, 2010). Additionally, these authors asserted that students' conceptualization of physics determines their knowing and acquisition of the course of study.

Despite the importance of this subject, it is widely recognized that the teaching and learning of Physics has been taught with challenges such as low enrollment both in secondary schools and in tertiary institutions in Nigeria. Noteworthy of the justification for reduced enrollment of learners studying Physics in institution of learning are due to poor Scientific discipline background and Mathematics heritage of learners at the junior school level of education, ailing equipped Physics laboratories, incompetent condition of instructors, poor wage, deficient figure of well-qualified Physics instructors and unsuitable instruction approaches used by the science instructors (Jegede and Adedayo, 2013; NERDC, 2009). These factors have equally added to the decline in attitude, achievement and retention of physics by students who enrolled for the subject at Senior School Certificate Examinations (SSCE). This is evident in the West African Examination Council (WAEC) results between 2010 and 2018 as presented in Table 1.

Table 1

Trends in Students' Achievement in Physics in the May/June West African Senior School Certificate Examination (WASSCE) (2010-2018)

Year	Subject	Total No. of Candidates	No. of Credit Pass	% Pass	No. of Fail	% Fail
2010	Physics	487, 963	159, 264	32.64	324, 699	67.36
2011	Physics	587,772	157, 543	26.80	430, 229	73.20
2012	Physics	324, 998	126, 131	38.81	198, 866	61.19
2013	Physics	298, 971	86, 612	29.17	212, 359	70.83
2014	Physics	241, 161	72, 522	29.27	168, 639	70.73
2015	Physics	529, 425	165, 604	31.28	363, 820	68.72
2016	Physics	488,113	161, 522	33.09	362,591	66.90
2017	Physics	391,745	121, 988	31.14	269,757	68.86
2018	Physics	359, 818	101, 774	28.28	258, 044	71.72

Source: *West African Examination Council, Research, and Statistics Unit 2018*

This implies that only a few students would eventually be able to pursue Physics related careers in higher institutions. This will consequently have great implication on manpower development in Engineering and other related professional fields. The observed decline in achievement with respect to senior school physics students' is of serious concern among researchers, scholarly person and assessment organizations. Various investigations by researchers of Science Education in Nigerian and other nations have attributed the observed decline in achievement with respect senior school physics to the instructional strategy used, among other factors such as cognitive content, learning environment, curriculum evaluation and implementation (Bilesanmi-Awoderu, 2012; Abdulraheem, 2012; Ibidapo-Obe, 2007; Ajayi, 2007; Mankilik, 2006 and Ajayi, 2000). In Nigeria, among the above factors, the issue of inappropriate method of presentation and conversation strategies applied by teachers in physics delivery has been stigmatized. Bilesanmi-Awoderu (2012) asserted that poor instructional approach adopted by teachers is majorly responsible for poor achievement scores of the students in physics. To him most teachers are in the habit of using lecture method and sometimes rote learning where the student solely depend on memorization of concepts rather than complete understanding of the subject content and concepts.

According to Vanderhye (2007) Instructional Conversation is a situation whereby the instructor listens carefully, makes guesses about intended meaning, and regulates responses to assist learners' efforts. In instructional conversation, the teacher associate conventional school science cognition in respect of learner's individually and collaboratively. Instructional Conversation renders possibilities for the improvement of the connection of pedagogy and course content. The scaffolding and cooperative effects instructional conversation creates inter-subjectivity and an awareness of uniformity among learners. Instructional Conversation accomplishes personalization of direction, including collaborative and whole class setting instructions. It is possible for the use of instructional conversation in the instruction of physics to solve the problem of rote learning and poor academic performance in physics experienced over the years due to inappropriate method of instruction used in the teaching of physics.

The classrooms in Nigeria are predominantly dominated by lecture approach in teaching which does not encourage students to set goals for their learning and attempts to monitor, regulate and control their cognition, motivation and behaviour guided by their goals. Ajaja (2009) referred to the lecture method as a "talk-chalk" method. He further stated that the lecture method may be used for any class size, but it is usually used for large classes. Lecture approach to instruction is an instructor directed approach where students receive instruction from the teacher with little or no participation (Roediger and Marsh, 2005). In lecture method of teaching, the students have little or no control of their learning. The adoption of the lecture method by teacher is predicated on the fact that it encourages completion of subject matter content within a limited time. Lecture method is a teacher-centred approach to instruction and acquisition where the instructor is seen as an authority, dispensing knowledge to students who contribute little or nothing to the instruction. Lecture method has been criticized by Adegoke (2011) who posited that only hardworking students can benefit from it. This may have accounted for students' poor academic achievement, retention and attitude towards physics.

Students' achievement according to Hattie (2009) means a resultant effect of instruction and acquisition where certain aims with respect the subject matter is realized, specific aims in respect of focusing on activeness with respect to educational situation, specifically in educational institutions. Students' achievement is the outcome of learning which expresses the degree of instructional objectives that have been met. Anene (2005) defined students' accomplishment as achievement in an educational institution's subject matter acquisition which is usually expressed in grade or mark obtained in a standard test. The intervention package of Instructional Conversation Strategy has shown in definite studies to significantly improve students' achievement, retention and attitude towards different subject areas including physics (Kim, 2016; Fortus, Sutherland, Adams, Krajcik and Reiser, 2015; Pes, man and Ozdemir 2012; Guido and De la Cruz 2012 and Erdemir, 2009. Instructional Conversation Strategy utilization did not only improve achievement and retention but also improved students' attitude.

Chinanson, Kurumeh and Obida (2010) while elaborating on the works of Kunbo and Tutoo (2002) explained that students' retention is the preservative factor of the mind. They asserted that the mind acquires materials of knowledge and information through

sensation and perception. When a stimulating situation occurs, retained images are revived or reproduced to make stimulation possible. In this light, when teaching physics concepts, there is need for concepts to be given to the learners in ways that awaken their sub-conscious which can initiate speedy inclination of the ideas being learned or taught. Instruction Conversation is an effective instructional strategy that can serve this purpose of actually making both fast and slow learners understand and retain senior school physics concepts through their collaborative and active learning process.

Akinsola and Olowojaiye (2008) defined attitude as "psychological constructs theorized to be composed of emotional, cognitive and behavioural components". They further stated that impressive educational approaches will assert affirmative cognition in the learners concerning educational institution's course pf study. It is generally believed that students' attitude towards physics determines their success in physics. Attitude is the inclination to deliberate, consciousness and respond affirmatively or antagonistically concerning a target in our environment. They further stressed that attitude organizes thoughts, emotions and behaviours towards a psychological object. In the context of this study, attitude is the feeling of the students' towards physics. This feeling can be affected positively or negatively by the instructional strategy adopted by the physics teachers. The use of interactive, collaborative and student-centred instructional strategies including Instructional Conversation Strategy is capable of creating students positive attitude towards physics, thereby encouraging achievement, retention and attitude in physics.

This study was carried out to find solution to the problem of students' poor achievement, retention and attitude towards senior school physics in public examinations. Interactive, collaborative and student-centred instructional strategy invariably has improved students' achievement, retention and attitude in physics. Instructional conversation strategy no doubt can enhance students' achievement, retention and attitude towards physics. In this study therefore, the researcher used innovative and collaborative instructional strategy such as instructional conversation strategy that could promote physics students effective participation during physics instruction to ascertain how it impacts on physics students achievement, retention and attitude.

Statement of the Problem

A review of West African Examinations Council (WAEC) Chief Examiner reports from 2010-2018 has shown that students' achievement in senior school physics is on a continuous decline as shown in Table 1. Physics students' abysmal poor academic achievement in physics in West African Senior School Certificate Examination (WASSCE) has been attributed to poor teaching methods among others. The lecture method almost normally utilized in Nigerian Senior Schools has made students resort to memorization of physics contents due to their passive roles during the teaching-learning process. The learners instructed in a lecture method classroom are not given the opportunity to be active learner through interaction, collaboration and participation in the pedagogy and acquisition activity. This calls for the adoption of alternative teaching strategies that could involve students' active participation, interaction and collaboration, motivate and encourage problem solving skills in the students'. Instructional Conversation Strategy could be the alternative strategy, since it gives students the opportunity to participate, interact and collaborate among themselves in a knowledge acquisition activity, thereby improving their difficulty resolution abilities and enhancing their achievement. Hence the problem of this study is: Is there any effect of Instructional Conversation Strategy on students' Achievement, Retention and Attitude towards Senior School Physics?

Specific objectives of the study

Specifically, this research was designed to find out:

i. if there is any difference in the mean achievement scores among physics students that were exposed to Instructional Conversation Strategy and Lecture Method;
ii. if there is any difference in the mean retention scores of physics students that were exposed to Instructional Conversation Strategy and Lecture Method; and
iii. if there is any difference in the mean attitude scores of physics students that were exposed to Instructional Conversation Strategy and Lecture Method.

Research Questions

The following research questions were raised to guide the study.

1. What is the difference in the mean achievement scores of physics students that were exposed to Instructional Conversation Strategy and Lecture Method?
2. What is the difference in the mean retention scores of physics students that were exposed to Instructional Conversation Strategy and Lecture Method?
3. What is the difference in the mean attitude scores of physics students that were exposed to Instructional Conversation Strategy and Lecture Method?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance.

HO_1. There is no significant difference in the mean achievement scores of physics students exposed to Instructional Conversation Strategy and Lecture Method.

HO_2. There is no significant difference in the mean retention scores of physics students exposed to Instructional Conversation Strategy and Lecture Method.

HO_3. There is no significant difference in the mean attitude scores of physics students exposed to Instructional Conversation Strategy and Lecture Method.

Methodology

The Design of the Study

A pretest; posttest quasi-experimental design was used to examine effects of Instructional Conversation Strategy on the dependent variables (achievement, retention and attitude). The study involved experimental and control groups consisting of an intact class. A pretest was administered to the groups, before the treatment, to determine the groups' comparative effects between the experimental and control groups' achievement, retention and attitude in physics. The experimental group was taught on physics concepts using Instructional Conversation strategy. The control group was taught on similar physics concepts using lecture method. A posttest was administered to both groups after the treatment period of six (6) weeks was compared to establish the effects of the treatments on dependable variables. Also a retention test administered three (3) weeks after the posttest and retrieved retention scores.

Population and Sampling Technique

The population of this study consists of four hundred and thirty five (435) Public Senior Schools in Delta State. The study used ninety-one (91) SS II Physics Students from six (6) public secondary schools that were randomly selected. This study used six (6) SS II physics intact classes of senior school II students from the six (6) selected schools. The study equally used simple random sampling technique at all stages of selection. At the first stage, a simple random sampling was used to select one LGA from each senatorial district. Secondly, simple random sampling utilized to select two (2) senior schools from each LGA's selected. Thirdly, selected SS IIA class as the intact class among the selected schools, the selected classes were randomly assigned to experimental and control groups through" hat and draw" method. This method was randomly applied and eradicated any form of bias in the selection.

Instrumentation

The study used two (2) research instruments including Physics Achievement Test (PAT) and Physics Students Attitude Questionnaire (PSAQ). The Instruments were validated through face validity, content validity and construct validity. Reliability Indices of 0.79 for PAT and 0.73 for PSAQ were obtained through Kuder-Richardson 21 formula and Cronbach-Alpha formula respectively.

Treatment Procedure

I. Training of Research Assistants for Experimental Group

Three Physics teachers used as Research Assistants were trained on the techniques of using Instructional Conversation strategy. This lasted for five days. Day one involved the researcher to request for the approval from the selected schools heads (Principals) to allow their physics instructors with pupils to participate in the study. On the second day, the researcher exposed to the three physics instructors to the theories, origin and features of Instructional Conversation strategy. On the third day, the teachers were trained using the training manuals prepared by the researcher on Instructional Conversation strategy. The fourth day was spent on practice and generation of ideas regarding application of Instructional Conversation strategy in instructing Physics concepts. The trained Physics teachers (Research Assistants) were evaluated and were seen to have accurate understanding on how to apply Instructional Conversation strategy in instructing physics contents.

The three Lecture Method Research Assistants were equally trained on how use the lesson plan prepared based on lecture method to ensure uniformity in the approach. The researcher, also, provided the three lecture method instructors their detailed lesson plans on the instructional units to be used during teaching to avoid discrepancy in the lecture method group.

II. The Step by Step Treatment Procedure

The treatment group consists of:

i. Experimental Group (Instructional Conversation Strategy)
ii. Control Group (Lecture Method)

The treatment lasted for six weeks. A week before the start of treatment the researcher distributed the instructional units to the six research assistants. The instructional units contained Physics contents which includes: (i) Linear Momentum I (ii) Linear Momentum II (iii) Mechanical Energy I (iv) Mechanical Energy II (v) Heat Energy I Temperature and its Measurements and (vi) Heat Energy II Temperature and its Measurements as contained in Delta State Senior School Physics SS II plan of action. Intervention materials which were circulated earlier were based on these two reasons: (i) to familiarize research assistants with contents of the lessons and (ii) to ensure unbiased instructional presentation by following the recommended format for the selected classes.

Two days before the commencement of treatment, both the experimental and control groups were pretested with the 40 items of the Physics Achievement Test (PAT) and 30 statements of the Physics Students Attitude Questionnaires (PSAQ). This was done for the groups before treatment, so that any noticed change should be as a result of the applied treatment.

On treatment with respect the control group, six weeks instructional units were presented to the students using lecture method. The three physics teachers equally presented the content materials to learners in their original forms.

Instructional Conversation: The physics instructor (research assistant) presents the physics lesson based on the eleven steps involved which are: thematic focus, activation of background schemata, successive comments, promotion of more complex expression, promotion of basis for statements or positions, few known answers and questions, responsiveness to students contributions, connected conversation, a challenging atmosphere, making cumulative contributions explicit and retention including transfer.

Thematic Focus: This involves the teacher presenting the physics lesson to the learners, while focusing on central concept, problem and interpretation using relevant inquiries with learners' responses by elaborating required central theme of the lesson.

Activation of Background Schemata: Here instructors renders learners required applicable heritage cognition concerning lesson founded with respect to the objectives.

Successive Comments: The students' comments on one another outcome instead of skipping among different issues or questions while instructors' renders relevant support.

Promotion of More Complex Expression: Here an instructor encourages students' utilization regarding text, pictures and logical thinking in influencing their statement or perspective.

Few Known Answers and Questions: Nearly all conversations centre on questions and issues for which there may be additional correct answers.

Responsiveness to Students' Contributions: With the first arrangement including keeping concentration for cohesion in conversation, instructors are equally sensitive to learners' arguments including possibilities rendered by them.

Connected Conversation: This is defined with aggregate, mutual and connected terms; ensuing vocalization created to broaden preceding statements through teachers' scaffolding to ensure concentration regarding the theme.

A Challenging Atmosphere: The teacher creates a challenging atmosphere which is balanced by a positive effective climate by asking questions relevant to the presented lesson.

Making Cumulative Contribution Explicit: The teacher provides corrective feedback as required after the students' responses and presentations by summarizing collective understanding during conversation, especially, concerning alteration occasion including conclusion.

Retention and Transfer: Students appreciate the concept and application regarding pedagogy. Learners should be capable of displaying transfer of leant concepts to related home and environmental situations.

The next lesson period after concluding treatments, students' in experimental and control groups were tested with 40 items of the Physics Achievement Test (PAT) and 30 statements of the Physics Students Achievement Questionnaire (PSAQ) after reshuffling the items. Similarly a delayed post test was administered on the physics students four (4) weeks after treatments for retention.

Data Analysis

The data collected from the administered Physics Achievement Test (PAT) and Physics Students Attitude Questionnaire (PSAQ) were analyzed using mean, standard deviation and independent sample t-test. The significance level to which a hypothesis is rejected or not-rejected is at 0.05.

Results

HO_1.

There is no significant difference in the mean achievement scores of physics students exposed to Instructional Conversation and Lecture Method. The result is presented in Table 2.

Table 2

Independent t-test on the Mean Achievement Scores of Physics Students Exposed to Instructional Conversion Strategy and Lecture Method.

Groups	N	Mean	Std. Deviation	Mean Diff.	Df.	t	Sig.(2-tailed)	Remark
ICS	91	77.13	5.78					
				38.73	184	27.43	0.00	Significant
LM	95	38.40	12.43					

$p < 0.05$

Table 2 showed that the instructional conversation (ICS) mean score was 77.13 with standard deviation of 5.78 and the lecture method (LM) had a mean score of 38.40 with standard deviation of 12.43. The table also showed that the calculated t-value

of 27.43 is significant at p-value of 0.00. Testing at an alpha level of 0.05, the p-value is less than the alpha level, so the null hypothesis which states that there is no significant difference in the mean achievement scores of physics students exposed to instructional conversation and lecture method was rejected. This implied that there is a significant difference in mean achievement scores of secondary school physics students exposed to Instructional Conversation and Lecture Method in favour of Instructional Conversation Strategy (ICS).

Hypothesis 2
There is no significant difference in mean retention scores of physics students exposed to instructional conversation (ICS) and lecture method (LM).

Table 3
Independent t-test on the Mean Retention Scores of Physics Students Exposed to Instructional Conversion Strategy and Lecture Method.

Groups	N	Mean	Std. D	Mean Diff.	Df.	t	Sig.(2-tailed)	Remark
ICS	91	59.77	6.73					
				32.26	184	29.18	0.00	Significant
LM	95	27.51	8.24					

$p < 0.05$

Table 3 shows that the t-value of 29.18 is significant at p value of 0.00. Testing at an alpha level of 0.05 the p-value is less than the alpha level. Hence the null hypothesis which states that there is no significant difference in mean retention scores of physics students exposed to Instructional Conversation and Lecture Method is hereby rejected. This implied that there is a significant difference in mean retention scores of senior school physics students exposed to Instructional Conversation and Lecture Method in favour of Instructional Conversation Strategy (ICS).

Hypothesis 3: There is no significant difference in mean attitude scores of physics students exposed to instructional conversation (ICS) and lecture method (LM).

Table 4
Independent t-test Comparison of the Mean Attitude Scores of Physics Students Exposed to Instructional Conversion Strategy and Lecture Method.

Groups	N	Mean	Std. D	Mean Diff.	Df.	t	Sig.(2-tailed)	Remark
ICS	91	88.58	10.37					
				29.37	184	17.82	0.00	Significant
LM	95	59.21	12.01					

$p < 0.05$

Table 4 indicated that instructional conversation had a mean score of 88.58 with standard deviation of 10.37 and the lecture method had a mean score of 59.21 with standard deviation of 12.37. The table also revealed that the calculated t-value of 17.82 is significant at a p value of 0.00. Since the p-value of 0.00 is less than the alpha level of 0.05, the null hypothesis which states that there is no significant difference in mean attitude scores of physics students exposed to Instructional Conversation and Lecture Method was rejected. This implied that there is a significant difference in mean attitude scores of senior school physics students exposed to Instructional Conversation and Lecture Method in favour of Instructional Conversation Strategy (ICS).

Discussion

This outcome of this study with respect to hypothesis (HO_1) showed the presence of a significant difference among the mean achievement scores of physics students exposed to instructional conversation and lecture method. The ascertained differences in achievement by physics students is in favour of those physics students exposed instructional conversation strategy. Possible explanations for this discovery should be that instructional conversation strategy possesses the potential to arouse and sustain students' induction and involvement, while helping students' to develop problem solving ability in physics. Instructional conversation strategy provided the students the opportunity to participate, effectively, in the teaching-learning situation and it has encouraged them in building self-confidence in solving physics problems. The lecture method, being an instructor dominated activity, never encourages students' effective engagement in respect of teaching-learning process. The findings of this study with respect to the effectiveness of instructional conversation strategy on students achievement in senior school physics agrees with the work of Kaya (2015) who conducted a quasi-experiment study on utilizing scaffolding strategy (Instructional Conversation) on students' achievement in learning physics. His study concluded that students exposed to instructional conversation strategy showed higher achievement in learning content in science than those that exposed to lecture method. This study's finding equally supports

the study of Duchy et al (2003) who agreed that students' exposed to Instructional Conversation performed significantly better on both basic and clinical sciences. The current finding also supports the investigations carried out by Schmidt and Van der Molen (2001) and Schmidt et al (2006), where they noted that Instructional Conversation strategy used in teaching basic science has shown advanced interactive effect, specialized skills achievement and advancing self-directed learning, advanced level reasoning among the students.

The findings of this study in respect of hypothesis (HO_2) showed a significant difference among the mean retention scores of physics students exposed to instructional conversation and lecture method. The observed difference in retention by physics students is in favour of those physics students exposed instructional conversation strategy. One possible explanation to the higher retention scores, is that Instructional conversation strategy has provided physics students' equal opportunity to participate effectively in respect of teaching-learning situation and it has encouraged them in building self-confidence in solving physics problems and ensured effective retention as evident in this study. This discovery is in agreement with Alexander (2009) which stated that the instruction of physics content and principles using instructional conversation has made positive impact among physics students in their mean retention scores in physics. According to (Alexander, 2017) instructional conversation strategy was found to be effective in the improvement of students' retention among wide range of science learners irrespective of the diversity that existed and is used across most academic disciplines.

The current result of this study with respect to hypothesis (HO_3) showed that there is a significant difference among the mean attitude scores of physics students exposed to instructional conversation strategy and lecture method. The determined difference in attitude by physics students is in favour of those physics students exposed instructional conversation strategy. One probable explanation for this discovery should be that instructional conversation strategy possessed the potential to arouse and sustain pupils' induction and involvement, which has impacted the students' to develop problem solving ability in physics. Instructional conversation strategy has provided students' the opportunity to participate effectively in respect of the teaching-learning situation and it has encouraged them in building self-confidence in solving physics problems. The lecture method being an instructor dominated activity never encourages students' effective engagement regarding teaching-learning process as a teacher-centred approach. The present finding supports the opinions of Erdemir (2009) who stated that the innovative instructional strategies are more effective with respect to improving Learner's content knowledge of science and attitude than lecture teaching method. The current finding also agrees with the studies of Moore and Stanley (2010), who revealed that Instructional Conversation strategy was superior to lecture teaching method on learners understanding and attitude of Newton's third Law of motion in physics. According to Resnick (2015) instructional conversation strategy was reaffirmed to be effective in ensuring positive students' attitude in science learners irrespective of the diversity that existed among them. According to Alexander (2017) instructional conversation strategy was found to be effective in the improvement of students' attitude among wide range of science learners irrespective of the diversity that existed and is used across most academic disciplines.

9.0. Conclusions

The findings of this study has shown that Instructional Conversation strategy as described in this study can be used to resolve key problems in teaching science subjects. Owing to the fact that it has viable empirical support and its ability to facilitate students effective leaning and organized knowledge content in a meaningful way, as well as its ability to make knowledge acquired to be long lasting among the learners makes it an appropriate alternative among other teaching methods for teaching science. This study has shown that contents taught using Instructional Conversation results in better understanding and retaining science concepts by the students than lecture method where students are passive. The form of teacher-student and student-student interactions during instructional conversation has positive effects for the teaching and learning of science disciplines. The foremost purpose of teacher-student and student-student interactions during instructional conversation is to ensure active students participation through individual and social process resulting in promoting critical thinking and problem solving in physics.

Additional research into Instructional Conversation could help science educators to understand the following better: (i) the impact of instructional conversation and location on students' performance in physics. (ii) Instructional Conversation strategies on students' achievements as correlates of attitude in physics. (iii) what is the influence teachers attitudes toward the implementation Instructional Conversation strategy.

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