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## **Perception, Motivation and Satisfaction of Secondary School Physics Students Based on Learning Pattern on Lesson Study in Federal Capital Territory Abuja, Nigeria**

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### **Abstract**

This study investigated the perception, motivation and satisfaction of secondary school physics students based on learning pattern on Lesson Study in FCT Abuja. Descriptive survey was research design adopted. The researcher used random sampling to select three (3) area council out of six (6) area council in the Federal Capital Territory Abuja. From the 1848 target population of students in science and technical colleges in FCT, the researcher used a Simple random sampling technique to sampled the total of 317 students from the total of three (3) co-educational science and technical colleges for this study. Two different questionnaires of five- point Likert scale with the reliability coefficient of 0.98 for Determinate of students learning pattern questionnaire (DSL PQ) and 0.84 for perception, motivation and satisfaction of physics students on lesson study questionnaire (PSPSLSQ) were administered to the sampled population. And to guide the study, two research questions and two research Hypotheses were raised.

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The data collected were analyzed using frequency counts for determination of students learning pattern, mean and standard deviation for research questions and ANOVA for research hypotheses. Some of the findings from the study revealed that both visual, social and logical learning pattern of Physics students have positive perception on lesson study method, there was no significant difference in the response on perception, Motivation and satisfaction level of students based on visual, social and logical learning pattern. It was recommended among others that Lesson Study should be adopted by FCT school principals and teachers to improve students learning perception, motivation and satisfaction. Both the Federal and State governments should implement lesson study in all the secondary school in Nigeria.

**Keywords:** Lesson Study; Learning pattern; Perception; Motivation; Satisfaction.

## **1. Introduction**

Physics is a foundational science whose discoveries have never ceased to be the propelling engine of technological advancement as stated by the authors in [1]. The structure of the evolution of universe has provided insight into fundamental forces of nature which is controlled by the understanding of physics. In the light of this we need physics (science) education. It is expedient that useful method of teaching and learning foundation is laid for positive perception, and satisfaction in the study of physics. Teaching methodology is crucial in the construction of knowledge and the method adopted by teachers can promote the construction of knowledge or hinder it. What may discourage initiatives and curiosity of learners, therefore the need for constructivist- based teaching and learning strategy and application of Lesson study is one of the methods. Lesson Study is defined as professional development that offers continuity, collaboration, and refinement to enhance teachers' knowledge and skills in order to facilitate students' learning according to the authors in [2]. Lesson study in a Japanese teaching and learning environment, teachers work in small teams to plan, teach, observe, analyze and refine individual class lessons, called research lessons. Nearly all Japanese teachers participate in a lesson study team during a school year. In addition, the teacher observes lesson study regularly in the school and at schools that host lesson study open houses. Lessons study are published and widely disseminated throughout the Japanese. In essence, is abroad-based, teacher-led system for improvement of teaching and learning. Lesson study involves a small team of instructors working together to design, teach, study and refine a single class lesson. Lesson Study is a process of improving teaching and learning, not only for students but also for teachers, which originally appeared in Japan as stated by authors in [3]. Lesson study method aims to create structured occasions for teachers to examine teaching and learning as stated by the authors in [4] indicated that lesson study is a systematic attempt to achieve an educational objective that involves repeated opportunities to plan, observe, evaluate and discuss student learning in close detail. Lesson study was initially used in Japan and benefits from this approach have contributed to the strong record of achievement level in students. In addition, the author in [5] stated that having goal of becoming more effective, teachers used lesson study as their professional development in order to be engaged and able to examine their practices systematically. Lesson Study involves not only lesson planning and teaching a lesson but also observing and critiquing the lesson being observed by a number of teachers working collaboratively. The teachers involved will select an overarching goal and related research question that they want to investigate and this will provide as their focus and direction to their work. The teachers will jointly work on a detailed lesson

plan and one of the teachers will teach the lesson while others will observe the lesson. After the lesson, all the teachers will discuss about their observation and this often led to a better revision of plans where another teacher will then implement into a second lesson while the rest observe the lesson. Then, discussion will take place and this cycle can repeat up to 3 or 4 lessons and eventually the teachers will make a report on this professional development process in particular in answering their chosen research question. In the Federal capital Territory (FCT) Abuja, lesson study is not practice, instance, all the senior secondary school in FCT use convectional method of teaching and learning, because of the evidence of the result of lesson study in other country the research investigated the perception of physics students and satisfaction on using lesson study and students learning outcome in physics The aspect of physics focused is heat and temperature as a research lesson. This is because The WEAC chief examiner report have constantly raised issues of student's poor performance in questions under Heat and Temperature physics especially specific heat capacity and specific latent heat over a decade now. It has often branded heat questions as unpopular and students who answer the question perform poorly both in essay and practical. As shown by chief Examiners report of the extermination examination bodies in [6] Learning pattern is conceptualized as a coherent whole of learning activities that learners usually employ, student's beliefs about learning and learning motivation, a whole that is characteristic of students in a certain period of time. It is a coordinating concept, in which the interrelationships between cognitive, affective, and regulative learning activities, beliefs about learning, and leaning motivation are united. It is a development that prompted psychologists, according to the author in [7]. The author in [7] maintained that a person's learning style may be equated with learner's characteristic way of thinking or approaching a problem. The author in [7] added that, while an individual's learning style remained more or less stable over the years, the individual strategy may vary from one situation to another. Visual(Spatial) Learning Style is a style in which a learner utilizes graphs, charts, maps and diagrams. It also involves Sight; emphasis on seeing, watching, viewing, drawing. Visual learners think in pictures and learn best in visual images. They depend on the instructors or facilitators non-verbal cues such as body language to help with understanding. Sometimes, visual learners favor sitting in the front of the classroom. They also take descriptive note of other materials being presented. Social (Interpersonal) Learning style are the students who love to make learning interesting by engaging in group activities or by interacting with other people. Interpersonal learner for students are the individuals that seem to be involved in every extracurricular activity. This group of learners like to engaged with others. Work in teams, and ask their peers for feedback in order to learn. Logical(Mathematical) Learning Style learner thinks deductively; deals with numbers and recognizes abstract patterns. Most logical thinkers end up being engineers, mathematicians or pursuing the sciences. This is because they have a very unique way of learning. Logical learning are individuals who want to understand the reason behind content or skills. Perception of students on learning is a personal interpretation of information from their own perspective. The influence of school on students learning outcome is derived from a student's individual perception rather than the objective reality of the activities and intervention. The focus of this work is on investigating the way students think about the new learning method introduced to them. Perceived learning is the extent to which a certain level of knowledge obtained on the new learning recognized by students as stated by the author in [8]. Perceived learning is a change in the learner's perceptions of skill and knowledge levels before and after the learning experience. Motivation toward learning is one of the determinations of learning outcome in physics and it is not static, it changes when the interest is met with the right teaching strategy capable of addressing individuals learning

differences especially through the zone of proximal development and learning cycle construction of knowledge. This in turn lead to better learning outcome in physics as stated by the author in [9]. Also, the author in [10] revealed that motivation and what motivate dictate individual's perception of the world and social interaction. The implication of this is that any teaching strategy that will help student to interact with their teacher and teacher interact with teachers in sharing explored knowledge during learning will eventually lead to a robust mastering of new knowledge and consolidation of previous knowledge, helping them to build their own meaningful knowledge and apply the knowledge correctly toward a better achievement in physics. Motivation consequentially trigger interest which can develop over time through learning and accumulation of useful and constructive information where this could be changed through persuasion using a teaching strategy. Students Satisfaction refers to the favorability of a student's subjective evaluations of the various outcomes and experiences associated with education. As satisfaction is based on experience, student satisfaction is constantly being influenced by the students' overall experiences. In order to make the institutions more efficient and effective, the students' expectations and motivation, academic preferences and perceptions about quality of the institution's environment or atmosphere and their learning outcome should be kept higher by the managements of the institutions, according to the author in [11]. The students of school level particularly at secondary level, need more high-quality services and facilities for study at high level education because high quality of services at this level satisfied their esteem and develops them with all the essentials and capabilities to be an effective education personality. In this research, the study investigates the perception, motivation and satisfaction of secondary school physics students based on learning pattern on lesson study method in FCT Abuja

### ***1.1. Statement of the Problem***

The poor learning outcome, negative perception, less motivation and unsatisfactory of student in physics on heat and temperature over the years can be attributed to the nature of the subject and the methodology used in the teaching and learning process. Studies were conducted using lesson study in physics but focus on teachers and not students and it was done outside Nigeria. A study was also conducted on lesson study in basic science and technology in Nigeria but not in FCT and also focus on teachers. Studies was also employed on lesson study to teach year 9 students the topic pressure in physics outside Nigeria and not on heat and temperature. Majority of this study was done outside Nigeria and not focus the concept of heat and temperature in physics and also did not investigate student's perception, motivation and satisfaction based on learning pattern on lesson study strategies. The few lesson study that was conducted Nigeria did not investigate student's perception on lesson study. Therefore, there seem to be limited studies using lesson study in Nigeria, especially in Federal Capital Territory Abuja, despite the potential of this approach to enhance learning. Hence the need for this study.

### ***1.2. Research Questions***

- What is the perception based on virtual, social and logical learning pattern of physics students taught heat and temperature on lesson study method in FCT Abuja?
- What is the motivation based on virtual, social and logical learning pattern of physics students taught heat and temperature on lesson study method in FCT Abuja?
- What is the satisfaction based on virtual, social and logical learning pattern of physics students taught

heat and temperature on lesson study method in FCT Abuja?

### **1.3. Null Hypotheses**

HO<sub>1</sub>: There is no significant difference in the perception based on virtual, social and logical learning pattern of physics students taught heat and temperature using lesson method in FCT Abuja.

HO<sub>2</sub>: There is no significant difference in the motivation based on virtual, social and logical learning pattern of physics students taught heat and temperature using lesson method in FCT Abuja.

HO<sub>3</sub>: There is no significant difference in the satisfaction based on virtual, social and logical learning pattern of physics students taught heat and temperature using lesson method in FCT Abuja.

## **2. Material and Methods**

The study employed descriptive survey design which are to elicit response from students on their Perceptions, motivation and Satisfaction of Secondary School Physics Students based on learning pattern using Lesson Study method in Federal Capital Territory Abuja. The targeted population for this study is the whole year two(II) students of the senior secondary school, in the five science and technical colleges in FCT Abuja offering physics in 2019/ 2020 academics session. The total target population is 1848 in which 740 students are female and 1108 students are male (FCT Department for Science and Technology, Abuja.) 2019. The researcher used random sampling to select three (3) area council out of six (6) area council in the Federal Capital Territory Abuja. From the 1848 target population of students in science and technical colleges in FCT, the researcher sampled a total 317 students from the total of three (3) co-educational science and technical colleges for this study. This is in line with the authors in [12] table for determining sample size. The study adopted the multi-stage sampling technique in selecting the respondents. Stratified sampling technique was used to categorize the schools based on the type of student enrolled. Purposive sampling technique was used by the researcher for selection and assignment of three (3) Government Science and Technical Colleges from the selected Area Council in FCT Abuja. School A, Government Girls Science secondary school (GGSSS)Kuje from Kuje Area Council, School B, Government Science and Technical College (GSTC)Kwali from Kwali Area Council, and School C Government Science Secondary School (GSSS) Maitama from Manicipal Area Council, which was used for the study. Simple random sampling technique (using hat and draw method), where pieces of paper written "Yes" or "No" were folded for the students to pick from. Students who pick "Yes" option were selected, while those who pick "No" option were dropped. This was conducted in order to give the students equal chance of representation.

**Table 1:** Distribution sample for the study

Schools	Male	Female	Total
School A: Government Girls Science Secondary School  (GGSSS)Kuje Abuja.	-	110	110
School B: Government Science and Technical College  (GSTC) KwaliAbuja	107	-	107
School C: Government Science Secondary School  (GSSS) Maitama Abuja.	52	48	100
Total	159	158	317

Two instruments used for the data collection were questionnaires designed for eliciting information from students. The first questionnaire is for the determining of the students learning pattern. The questionnaire included a list of three learning pattern purposive selected from seven students learning style in education needed for the teaching and learning. DSLP consisted of five (5) items from each of the three learning styles make up the total of fifteen (15) items of 5- point liker scale of strongly agree (SA), agree (A), unsure (U), disagree(D) and strongly disagree (SD), rated 5,4,3,2 and 1 respectively and the decision mean 3.0 was used by the researcher to identify students most preferred learning pattern of heat and temperature on lesson study. The second questionnaire is on the perception, motivation and satisfaction of physics students based on the learning pattern on Lesson Study method which comprises of two sections. Section A sought for background information about the respondents. Section B comprises of two (2) parts. Part 1 sought for the perception of students based on learning pattern on Lesson Study method. The questionnaire consists of twenty (20) items of 5- point liker scale of strongly disagree (SD), disagree (D), unsure (U), agree (A) and strongly agree (SA), rated 1,2,3,4 and 5 respectively. Part 2, sought for the student motivation on Lesson Study method of teaching and learning of heat and temperature. It consists a total of thirty(30) items of a 5-point liker scale HM (Highly Motivated), MM (Moderately motivated), AM(Averagely motivated), LM(Less motivated), NM(Not motivated),rated 5,4,3,2 and 1 respectively, and the decision mean of 3.0 was used to determine the students motivation and Part 3 sought for the student’s satisfaction on Lesson Study. It consists of twenty (20) items of a 5-point liker scale of Very Satisfied (VS), Satisfied (S), Moderately Satisfied (MS), Fairly Satisfied (FS), Not Satisfied (NS) rated 5,4,3,2 and 1 respectively and the decision means of 3.0 was used. The questionnaire ware face – validated by two experts from the department of science education, Federal university technology, Minna, and the observations they made were noted and effected accordingly. pilot study was conducted in a school that is within the population of study but outside the already sampled schools for the study. Simple random sampling technique (using hat and draw method), where pieces of paper written "Yes" or “No" were folded for the students to pick from. Students who pick "Yes" option were selected, while those who pick "No" option were dropped. This was conducted in order to give the students equal chance of representation. Fifty (50) students which pick yes option

comprising of twenty-four (24) male students and twenty-six(26) female students which participated in the pilot study. Data were collected, analyzed and the reliability coefficient of the instruments was calculated using Cronbach Alpha Coefficient. And the reliability coefficient of 0.98 and 0.82 were obtained for the two instruments respectively. The data collected from administering the instruments were analyzed using frequency count for determination of students learning pattern, descriptive statistics (mean and standard deviation) for research questions and ANOVA research hypotheses. The researcher used 0.05 significant level to take decision for all the hypotheses formulated.

### 3. Results

The data collected from the student’s responses were analyzed using means and standard deviation for the research questions and ANOVA for the research hypotheses formulated for the study.

**Research Question 1:** What is the perception based on visual, social and logical learning pattern of physics students taught heat and temperature using lesson study method in FCT Abuja?

**Table 2:** Mean and Standard Deviation on perception Response based on Visual, Social and Logical Learning pattern of Physics Students’ using Lesson Study

Learning pattern	N	$\bar{x}$	Std. Deviation
Visual	169	80.44	8.22
Social	94	80.74	5.71
Logical	54	81.28	6.14
<b>Total</b>	<b>317</b>		

Table 2 shows the mean and standard deviation response on perception based on the visual, social and logical learning pattern of physics students using lesson study. The result indicated that the mean and standard deviation of the three groups differ with a mean score of 80.44 with standard deviation of 8.22 for visual students, mean score of 80.74 with standard deviation of 5.71 for social leaning pattern students and mean score of 81.28 with standard deviation of 6.14 for logical learning pattern students. The logical learning pattern had the highest mean score then the social and visual pattern.

**Research Question 2:** What is the motivation level based on visual, social and logical learning pattern of physics students taught heat and temperature on lesson study method in FCT Abuja?

**Table 3:** Mean and Standard Deviation on Motivation Response based on Visual, Social and Logical Learning pattern of Physics Students’ on Lesson Study

Learning pattern	N	$\bar{x}$	Std. Deviation
Visual	169	124.82	46.31
Social	94	118.67	9.16
Logical	54	122.41	6.50
<b>Total</b>	<b>317</b>		

Table 3 shows the mean and standard deviation response on motivation based on the visual, social and logical learning pattern of physics students on lesson study. The result indicated that the mean and standard deviation of the three groups differ with a mean score of 124.82 with standard deviation of 46.31 for visual students, mean score of 118.67 with standard deviation of 9.16 for social students and mean score of 122.41 with standard deviation of 6.50 for logical students. The visual learning pattern had the highest mean score then the social and lastly logical pattern.

**Research Question 3:** What is the satisfaction based on visual, social and logical learning pattern of physics students taught heat and temperature using lesson study method in FCT Abuja?

**Table 4:** Mean and Standard Deviation on Satisfaction Response based on Visual, Social and Logical Learning pattern of Physics Students' using Lesson Study

Learning pattern	N	$\bar{x}$	Std. Deviation
Visual	169	70.33	9.35
Social	94	70.14	8.05
Logical	54	69.87	9.50
<b>Total</b>	<b>317</b>		

Table 4 shows the mean and standard deviation response on satisfaction based on the visual, social and logical learning pattern of physics students using lesson study. The result indicated that the mean and standard deviation of the three groups differ with a mean score of 70.33 with standard deviation of 9.35 for visual students, mean score of 70.14 with standard deviation of 8.05 for social students and mean score of 69.87 with standard deviation of 9.50 for logical students. The visual learning pattern had the highest mean score then the social and logical pattern.

**Hypothesis 1:** There is no significant difference in the perception based on visual, social and logical learning pattern of physics students taught heat and temperature using lesson study method in FCT Abuja

To test this hypothesis, analysis of variance (ANOVA) was applied on the students' response score regarding the perception based on visual, social and logical learning pattern using lesson study.

**Table 5:** ANOVA Result of Students' Perception based on the three Learning Pattern using Lesson study

Source of Variation	Sums of Squares	Df	Means Square	F	P-value
Between Groups	29.111	2	14.556	0.279	0.757
Within Groups	16370.422	314	52.135		
Total	16399.533	316			

Not Significant at 0.05 level



Table 5 shows the ANOVA results of perception based on visual, social and logical learning pattern of physics students using lesson study. The result indicates  $(2, 314) = 0.279, p = 0.757 > 0.05$ . This shows that there was no significant difference in the mean response scores on perception of students based on visual, social and logical learning pattern using lesson study. On this basis, hypothesis one is therefore accepted. This shows that there was no difference in the perception of physics students on lesson based on the visual, social and logical learning pattern.

**Hypothesis 2:** There is no significant difference in the motivation level based on visual, social and logical learning pattern of physics students taught heat and temperature on lesson study method in FCT Abuja. To test this hypothesis, analysis of variance (ANOVA) was applied on the students' response score regarding the level of motivation on lesson study based on visual, social and logical learning pattern.

**Table 6:** ANOVA Result of Students' Level of Motivation based on the three Learning Pattern on Lesson Study

Source of Variation	Sums of Squares	Df	Means Square	F	P-value
Between Groups	2288.376	2	1144.188	0.970	0.380
Within Groups	370364.488	314	1179.505		
Total	372652.864	316			

Significant at 0.05 level

Table 6 shows the ANOVA results on motivation level based visual, social and logical learning pattern of physics students on lesson study. The result indicates  $F(2, 314) = 0.970, p = 0.380 > 0.05$ . The result shows that there was no significant difference in the mean response scores on the motivation level of students based on visual, social and logical learning pattern on lesson study. On this basis, hypothesis two is therefore accepted. This shows that there was no difference in the motivation level of physics students based on visual, social and logical learning pattern on lesson study.

**Hypothesis 3:** There is no significant difference in the satisfaction based on visual, social and logical learning pattern of physics students taught heat and temperature using lesson study method in FCT Abuja.

To test this hypothesis, analysis of variance (ANOVA) was applied on the students' response score regarding the satisfaction level based on visual, social and logical learning pattern using lesson study.

**Table 7:** ANOVA Result of Students' Satisfaction Level based on the three Learning Pattern using Lesson Study

Source of Variation	Sums of Squares	Df	Means Square	F	P-value
Between Groups	9.135	2	4.568	0.056	0.945
Within Groups	25498.739	314	81.206		
Total	25507.874	316			

Not Significant at 0.05 level

Table 7 shows the ANOVA results on satisfaction level based on visual, social and logical learning pattern of physics students using lesson study. The result indicates  $F(2, 314) = 0.056, p = 0.945 > 0.05$ . The result shows that there was no significant difference in the mean response on satisfaction level of students based on visual, social and logical learning pattern. On this basis, hypothesis three is therefore accepted. This shows that there was no difference in the satisfaction level of physics students based on visual, social and logical learning pattern on lesson study.

### **3.1. Discussion of Findings**

Finding that emanated from this study on perception of physics students based on the visual, social and logical learning pattern taught heat and temperature on lesson study method in FCT Abuja. The result indicated that the mean and standard deviation of the three groups differ with a mean score of 80.44 with standard deviation of 8.22 for visual students, mean score of 80.74 with standard deviation of 5.71 for social students and mean score of 81.28 with standard deviation of 6.14 for logical students. The logical learning pattern had the highest mean score then the social and visual pattern. This finding is in line with the earlier findings of the authors in [13] who found out that visual, auditory and kinesthetic learning styles alike enhances academic performance of students. The correlation research design was adopted for the study of authors (13). The population of the study of author (13) was 2,554 respondents, while the Taro Yamane formula was used to obtain a sample size of 345 respondents. The stratified sampling technique was adopted for the study. Arithmetic mean was used to answer the stated research questions. Author 13 study concluded that visual, auditory and kinesthetic learning styles alike enhances academic performance of students which it is in line with this author that students has positive perception on lesson study based on the three learning pattern. Hypothesis one finds out if there is significant difference in the mean scores' perception based on visual, social and logical learning pattern of physics students taught heat and temperature using lesson study method in FCT Abuja. The result shows that there was no significant difference in the response on perception of students based on visual, social and logical learning pattern. This finding is in line with the earlier findings of the authors in [13], who found out that visual, auditory and kinesthetic learning styles alike enhances academic performance of students. The inferential statistic of Pearson Product Moment Correlation was used by authors (13) as the tool in testing the formulated hypotheses at 0.05 alpha level. The result of the statistical analyses showed that a significant relationship exist between visual learning styles and academic performance of students. Auditory learning style and kinesthetic learning style were also found to have significant relationship with academic performance of students which is line with this study. Finding that emanated from this study on motivation of physics students based on the visual, social and logical learning pattern taught heat and temperature on lesson study method in FCT Abuja, The result indicated that the mean and standard deviation of the three groups differ with a mean score of 124.82 with standard deviation of 46.31 for visual students, mean score of 118.67 with standard deviation of 9.16 for social students and mean score of 122.41 with standard deviation of 6.50 for logical students. The visual learning pattern had the highest mean score then the social and lastly logical pattern. This finding is in line with the earlier findings of the authors in [14] who found out that the use of the improved lesson design increases the motivation level of the learners. Authors (14) aims to explore how the use of lesson study approach enhance

Year 9 students' conceptions of pressure specifically on the topic of manometer reading in determining gas pressure. According to authors (14) a diagnostic test was first administered to three Year 10 classes to help teachers identify student difficulties in learning the topic. The total number of students involved in the study was 71 students with 37 boys and 34 girls of year ranging between 12 and 14 years old. 64 students was sample for the study. The results of the study showed that with the use of the improved lesson design positive progress were achieved on the understanding of pressure to assist the reading of manometers to determine gas pressure. Which in line with this study that visual, social and logical learners are motivated by using lesson study method to teach heat and temperature. Hypothesis two finds out if there is significant difference in the mean scores' motivation based on visual, social and logical learning pattern of physics students taught heat and temperature on lesson study method in FCT Abuja. The result shows that there was no significant difference in the mean response scores on the motivation level of students based on the three-learning pattern. This finding is in line with the earlier findings of Hassan (2013) [11] who found out that there is no significant difference in motivational orientations towards learning combined science between boys and girls and between the high ability and low ability students. Author (11) result show that there is no significant difference between low ability and high ability learners and also this research show that there is no significant difference between the motivation of visual, social and logical learner. Finding that emanated from this study on the satisfaction of physics students based on the visual, social and logical learning pattern taught heat and temperature on lesson study method in FCT Abuja. The result indicated that the mean and standard deviation of the three groups differ with a mean score of 70.33 with standard deviation of 9.35 for visual students, mean score of 70.14 with standard deviation of 8.05 for social students and mean score of 69.87 with standard deviation of 9.50 for logical students. The visual learning pattern had the highest mean score then the social and logical pattern which show that physics students are satisfied with lesson study strategies. This finding is not in line with the earlier findings of the authors in [15] who found out that students were not satisfied with the level of use of 14.0 technologies in lesson delivery. A descriptive survey research design was employed for the study. Authors (15) targeted population is one hundred and twenty five (125) students which formed the sample size for the study. The instruments for the data collection is students satisfaction on utilization of fourth generation technologies in courses lesson delivery questionnaire. Authors (15) concluded that students were not satisfied with the level of use of 14.0 technologies in lesson delivery while this study concluded students are satisfied with the use of lesson study strategies in teaching and learning and in line with Sigh and Rani (2015) who revealed that the most preferred learning style of secondary school students was Visual followed by Auditory, Tactile and kinesthetic. Hypothesis three finds out if there is significant difference in the satisfaction based on visual, social and logical learning pattern of physics students taught heat and temperature on lesson study method in FCT Abuja. The result shows that there was no difference in the satisfaction level of physics students based on visual, social and logical learning pattern on lesson. This finding is line with the authors in [16] who revealed that the most preferred learning style of secondary school students was Visual followed by Auditory, Tactile and kinesthetic. Authors (16) data was on nominal scale, Chi- Square test was employed to analyze the data. The findings of the study revealed that the most preferred learning style of secondary school students was Visual (45.7%) followed by Auditory (21%), Tactile (18.3%) and kinesthetic (15%). and also revealed that there was no significant impact of certain demographic variables like gender, place of living, religion and educational level of father on the learning style preferences of secondary school students. Which is in line with this study

which show that there is no significant difference between Visual, Social and Logical Learning pattern of physics students satisfaction using lesson study.

#### **4. Conclusion**

The result from this study revealed that physics students in FCT Abuja have positive perception based on visual, social and logical learning pattern using lesson study, physics students in FCT Abuja are motivated based on visual, social and logical learning pattern using lesson study, physics students in FCT Abuja are satisfied based on visual, social and logical learning pattern using lesson study, there was no significant difference in the response on perception, motivation and satisfaction of physics students based on visual, social and logical learning pattern. The researcher therefore concluded that lesson study should be adopted in all the secondary schools in FCT Abuja.

##### **4.1. Recommendations**

From the findings of this research, the following recommendations are made:

- Lesson Study should be adopted by FCT school principals and teachers to improve students learning perception and satisfaction.
- Lesson Study is also recommended for large class so that the lesson study team can observe properly how students learn.
- Multiple intelligence learning pattern which include visual, social and logical learning pattern is recommended for classroom physics teachers since students has different learning pattern.
- Other difficult topics in physics such as simple harmonic motion, energy quantization and electromagnetism should be subjected to this kind of investigation.
- Both the Federal and State governments should implement lesson study in all the secondary school in Nigeria.

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