

## EFFECTS OF ACTIVE LEARNING STRATEGIES ON SECONDARY SCHOOL STUDENTS' PERFORMANCE IN MAP READING IN MANGU L.G.A., PLATEAU STATE, NIGERIA

<sup>1</sup>Hannah Nathaniel Shamle, <sup>2</sup>Prof. Dorah Nanman Damar, <sup>3</sup>Prof. Christian Yakubu Oche and <sup>4</sup>Professor Yakubu Gorah Kajang

<sup>1&2</sup>Department of Science and Technology Education, Faculty of Education, <sup>3</sup>Department of Geography, Faculty of Environmental Sciences, <sup>4</sup>Department of Physical and Health Education, Faculty of Education, <sup>1,2,3&4</sup>University of Jos, Jos, Plateau State, Nigeria.

Email: [hannahshamle@gmail.com](mailto:hannahshamle@gmail.com)

### ABSTRACT

*The study examined the effects of active learning strategies on secondary school students' performance in map reading in Mangu Local Government Area of Plateau State, Nigeria. Four objectives, two research questions and two hypotheses were used to guide the conduct of the study. The design employed was quasi-experimental research design particularly the pretest-posttest control group design particularly the pretest-posttest control group design without randomization. The study utilized 59 students as sample for the study, 46 from experimental group and 38 from control group. Map Reading Achievement Test was the instrument used for data collection with a reliability of 0.97. The mean, standard deviation and students' t-test were used to analyzed the data. The result revealed that the students from both groups performed poorly in the before the intervention. While after the intervention, there was improvement in the students' performance after the intervention in favour of the experimental group. The result from the hypotheses testing revealed that there is a significant difference between the mean scores of the experimental and control groups in favour of the experimental group especially, in the post-test. This implies that active learning strategies improves students' performance in map reading. The study recommended that active learning strategies be used by geography teachers to teach map reading in secondary school and that geography teachers be trained in the used of these strategies by organizing workshops and in-service training for teaching map reading. It was also recommended that map reading learning materials should be made available by the government to be used in all schools.*

### INTRODUCTION

Education is an indispensable tool for growth and development. It is globally recognized for its function towards providing an individual with opportunities to acquire the knowledge, skills and experiences need for the development of the individual who in turn, contributes immensely toward national development. The benefit of quality education is that it acquaints an individual with the ability to adapt to the changing needs of the society as the world at large changes and spearhead the development of human resources. In essence, for an individual to adapt to the changing needs of the society, that person needs quality education which is obtainable in various subjects and courses taught in schools. Geography as one of the disciplines enlightens students about the earth in its totality.

The subject studies the physical features of the earth and its atmosphere, and of human activity as it is affected by certain factors including the distribution of population and resources and political and economic activities (Edward, 2014). Geography seeks to develop students' appropriate competence and attitudes which will enable students become catalyst and contribute to the society. It gives the individual a better understanding of the terrain of the environment particularly, the features, problems and prospects.

In addition, Geography equips learners to make sound and rational judgment and take appropriate actions that will contribute to environmental development of the society and the physical world at large. This implies that when students are thoroughly equipped with the right values, skills and competence in geography, they will add value to the society where they belong. In line with

the assertion, Mansarry (2014) opined that Geography occupies an important position in secondary school curriculum due to its usefulness to society. Through its study, the learner gets to know of the world around which includes the nature and character of our environment, the interactions between people and their environment, the consequences of these interactions between man and his environment and such understanding will help learners to act as responsible persons. The Physical and Human or cultural features studied are depicted, expressed and illustrated most of the times in different forms of maps (Ulebor, 2014).

Map is therefore, a representation of physical and human or cultural features which are observable on the earth and have been adequately measured and are depicted as well as drawn to scale on a piece of paper. A substantial part of Geographical knowledge is recorded most accurately and most conveniently by means of maps in which it is believed that up to 90% of geographic information can be put on the map since there are several types of map that could be used for different purposes. Amosun (2014) identified four types which include sketch maps, atlas maps, distribution maps and cadastral maps and it is believed that all types of maps that are available can be classified under any of these. This implies that map making, reading and interpretation is vital and paramount and it is also an important branch of Geography that is not to be avoided by students and young learners.

Map reading and interpretation constitute a crucial aspect of the study of Geography especially in the secondary school level of education in Nigeria where it is an important aspect of the Geography curriculum and occupies a major place in the final examination (Amosun, 2014 & Okoro, 2021). Map reading and interpretation attracts more marks than any other branch in Geography examination that students' failure to attempt questions in it affects their general performance in Geography. As such, Geography teachers are expected to teach this aspect diligently seeing that everything within the environment is changing and every effort should be made towards bringing about understanding of issues at hand. Thus, improvement in the instructional process of Geography especially in Map reading and interpretation, will enhance effectiveness in teaching, increase understanding and assimilation of knowledge, improve students' achievement and attract students towards enrolment into Geography. This is essential because available literatures show that fewer students enroll in Geography as against the large number of students who opt for other social subjects despite the valuable opportunities Geography and map reading in particular offers in our daily life.

In essence, as the environment becomes more complex and advance in technology, the need for Geography education to improve in its pedagogical trend to meet up with the pace in such growth especially in map reading and interpretation where the content already suggested that. Thus, the use of active learning strategies in teaching map reading and interpretation is important because instruction will be more active in nature where students will actively participate in learning. Shamble and Retchen (2019) opined that active methods such as demonstration allow students' participation and significantly improves students' achievement in Geography. There are different ways to integrate active learning strategies in teaching map reading and one of such areas is by combining active learning strategies such that students will be actively engaged in the learning process.

The active learning strategies(ALS) used for the study is a combination of computer programs and other activities (such demonstration, reducing and reducing given portion of map, computation of scales, conversion of scales, and discussion) to enhance students' active participation in learning the content of map reading in the selected school. Kumar and Daniel (2016) asserted that there is a growing belief that using technologies such as ALS will transform instructional practices, making them more significant, interesting and relevant to the learner thereby, radically changing the quality of learning experiences. Similarly, Drent and Meelissen (2018) opined that such activities bring benefits for the students such that they are able to develop skills for searching and assessing information, collaboration, communication and publishing. In contrast to this, Shaibu (2016) observed that most science teachers use lecture methods in teaching just to enable them

cover the syllables within the stipulated time. This does not give room for students' active participation in the class leading to boredom. Mohammed, Bala and Ladu (2016) and Omoro and Nato (2014) also observed that Geography teachers use lecture method to teach Geography. It is believed that the package will reduce boredom in the classroom, improve attentiveness and increase understanding of the students such that assimilation will be easier and higher.

### **Statement of the Problem**

Despite the importance of Geography to national development, the performance of secondary school students in map reading have been unsatisfactory and that has resulted in low rate of performance in Geography. This is evident in the SSCE between 2010 and 2019 where most of the credit passes in Geography were within C6. This phenomenon has constituted source of concern to stakeholders in education such as teachers, parents, school authorities, officials in the Ministry of Education, the government and the society at large.

An ideal teaching and learning map reading has to be in a good learning environment such as using active learning strategies as method of teaching among others. Despite improvement in research and discovery of more effective ways of teaching and learning, but the situation seems different with the current state of instruction. A study conducted at the course of this work revealed that most Geography teachers will utilize lecture method to teach map reading and this is partly related to the ill preparation of students from their external examinations. In particular, students were unable to use contour lines to appropriately identify features on the topographical map, identify drainage patterns on the map, insert features inside reduced and enlarged maps among others. Allowing these to continue, there will be poorly equipped cartographers, weather forecasters, geologists, among others. Therefore, the current study will be determining the effects of teaching and learning technologies toward improving secondary school students' academic performance in map reading in Mangu Local Government Area of Plateau State. The objective of the study is to determine the difference between the academic performance of the experimental and control group of secondary school students in map reading before and after the experiment.

### **Research Questions**

The following research questions were posed to which answers were sought:

1. What is the performance mean scores of the experimental and control groups of senior secondary school students in map reading before exposure to treatment?
2. What is the performance mean scores of the experimental and control groups of senior secondary school students in map reading after exposure to treatment?

### **Hypotheses**

The following hypotheses will be formulated and tested at the 0.05 level of significance:

1. There is no significant difference between the performance mean scores of the experimental and control groups of senior secondary school students in map reading before the treatment.
2. There is no significant difference between the performance mean scores of the experimental and control groups of senior secondary school students in map reading after the treatment.

### **METHODS**

The design adopted for the research work was the quasi-experimental design particularly, the pretest-posttest non-equivalent control group design without randomization. The design allows the use of variables in intact classes to be used for the research even when the populations are not the same only that the participants from the experimental and control groups have to be comparable at base line. The choice of the design was to determine the effects of treatment on the experimental group and difference between the experimental group and control group after the experiment.

The sample for the study comprised of all the SS II students from the four selected senior secondary schools from Mangu Local Government Area that offer geography. The selection of SS II

was because the students have been exposed to Geography for at least one year and map reading is among the topic to be covered in SS II. The total sample of students is made up of 59 students. The simple random sampling technique was adopted to select the two public and two private schools used for the study. The list of schools was obtained from the Area Inspectorate Office, Mangu. The names of the schools were cut out, squeezed and dropped into two baskets (one for public secondary schools and the other for private secondary schools). The baskets were shaken to mix up the squeezed papers. The researcher randomly picked two schools from each basket, one after another, without replacement. The schools selected were the given code which the first school drawn was labeled as School A, the second as School B, the third as School C and the fourth as School D. The first school taken from each basket was used as the experimental group while the second one was the control group. The SS II students in the four selected schools formed the sample of students for the study.

The instrument used for data collection in the research work was Map Reading Achievement Test (MRAT). This instrument contains 40 multiple choice questions and ten essay questions drawn from the content of map reading and interpretation. Each of the 40 questions multiple questions have four options whereby only one of the four options is correct. Each correct answer is given one mark, giving a total of 40 marks for the 40 questions. The ten essay questions have 15 marks each and students are to answer only four questions making a total of 60 mark. The consent of 2 competent experts, two from Geography Department and two from Research, Measurement and Evaluation Units, University of Jos, were sought and was discovered that the developed instrument is valid. Likewise, the internal consistency of the MRAT was estimated using Cronbach Alpha Coefficient method. The instrument was trial-tested on 24 students and the data collected was analyzed using Statistical Package for Social Sciences – SPSS software. 0.97 was obtained as the reliability index indicating that the instrument was reliable. The instrument was administered before and after the experiment as pre-test and post-test respectively and the experiment lasts for six weeks.

The procedure for data collection includes training of research assistants, administration of pre-test (MRAT), administration of the treatment and administration of the post-test (MRAT). In each selected secondary school, one geography teacher was employed as the research assistant for the study. The two research assistants for the two experimental groups were given a three days training by the researcher about the conduct of the experiment. On the first day, the research assistants were given the scheme of work and the lesson plan to study in order to have prior knowledge of what they are expected to do. On day two, they were trained on how to administer the treatment to the experimental group. The treatment was a active learning strategies that is partly computer-based programme and partly containing other activities such as having a group discussion, taking measurements, making calculation that was developed for teaching map reading in secondary schools. The third day was question and answer session which was to enable the research assistants clarify issues that seem not clear to them after which the assistants tested on the use of the active learning strategies for instruction in map reading. Meanwhile, the research assistants for the control groups were asked to use lecture method.

The MRAT was administered to the sample of students on first day of the experiment by the research assistants and the test lasted for two years. The scripts were collected, marked, recorded and analyzed by the researcher. The experimental group was exposed to the treatment package by the research assistants while lecture method was used for the control groups. On the last day of the experiment, MRAT was administered on the two groups of students for two hours after which the scripts were collected, marked and analyzed by the researcher. The experiment lasted for six weeks.

The statistical tools used for data analysis were mean, standard deviation and students' t-test for independent samples and were computed with SPSS. The results obtained were used to answer the research questions and test the hypotheses raised.

## RESULTS

**Research Question one:** What is the performance mean scores of the experimental and control groups of senior secondary school students in map reading before exposure to treatment?

**Table 1**  
**Performance Mean Scores of Students in Map Reading in the Experimental and Control Groups before the Treatment**

Group	N	$\bar{X}$	SD	$\bar{X}$ -diff.
Experimental	31	30.84	8.74	5.66
Control	28	25.18	9.10	

Table 1 reveals the mean and standard deviation results of pre-test performance mean scores of students in map reading in the experimental and control groups. The result for experimental group yielded a mean score of 30.84 and standard deviation of 8.74, while the result for control group yielded a mean score of 25.18 and standard deviation of 9.10 before treatment. It means that both groups were almost at the same level and performed poorly in the pretest with a mean difference of 5.66.

**Research Question two:** What is the performance mean scores of the experimental and control groups of senior secondary school students in map reading after exposure to treatment?

**Table 2**  
**Performance Mean Scores of Students in Map Reading in the Experimental and Control Groups after the Treatment**

Group	N	$\bar{X}$	SD	$\bar{X}$ -diff.
Experimental	31	68.13	12.17	25
Control	28	43.39	6.82	

Table 2 reveals the mean and standard deviation results of posttest performance mean scores of students in map reading in the experimental and control groups. The result for experimental group yielded a mean score of 68.13 and standard deviation of 12.17 and control group yielded a mean score of 43.39 and standard deviation of 6.82 after treatment with a mean difference of 25. This means that there was improvement after exposure to treatment. The result further shows that those taught map reading with active learning approach performed better than those taught without.

**Hypothesis one:** There is no significant difference between the performance mean scores of the experimental and control groups of senior secondary school students in map reading before the treatment.

**Table 3**  
**Summary of t-test Showing Difference between Pre-Test Mean Scores of Experimental and Control Groups**

Group	N	$\bar{X}$	SD	DF	T	p-value	Decision
Experimental	31	30.84	8.74	57	2.44	0.018	Significant
Control	28	25.18	9.10				

Table 3 reveals the t-test result of the pretest mean scores of students in map reading in the experimental and control groups. The result indicated that the experimental group has mean score of 30.84 and standard deviation of 8.74 and the control group has a mean score of 25.18 and

standard deviation of 9.10. The result also yielded t-value of 2.44, degree of freedom of 57 and P-value of 0.018 where  $P < 0.05$ . Since the P-value of 0.018 is less than the 0.05 level of significance, the decision was that the null hypothesis was rejected. It was concluded that there is a significant difference between pre-test mean scores of the experimental and control groups in map reading. The result also shows that the pretest performance of students' in the two groups were poor although the experimental group performed better than the control group.

**Hypothesis two:** There is no significant difference between the performance mean scores of the experimental and control groups of senior secondary school students in map reading after the treatment.

**Table 4**  
**Summary of ANCOVA Result Showing Difference between Posttest Mean Scores of Experimental and Control Groups in Map Reading**

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	9154.321 <sup>a</sup>	2	4577.160	46.186	.000	.623
Intercept	13464.652	1	13464.652	135.867	.000	.708
Preattitude	152.449	1	152.449	1.538	.220	.027
Group	7482.539	1	7482.539	75.503	.000	.574
Error	5549.713	56	99.102			
Total	202313.000	59				
Corrected Total	14704.034	58				

a. R Squared = .623 (Adjusted R Squared = .609)

Analysis of Covariance (ANCOVA) was conducted to determine if a significant difference exists between the map reading mean scores of the secondary school students after the treatment in experimental and control groups. Table 4 shows that  $F(1,56) = 75.50$ ,  $p < 0.05$ , partial  $\eta^2 = .574$ , since the p value of 0.000 is less than 0.05 level of significance with an effect size of 57%, the null hypothesis was rejected, indicating that there was a significant effect of active learning strategy on students' performance. On the contrary, the pre-test (covariate) yielded  $F(1, 56) = 1.54$ ,  $P = 0.223$ , which was not significant, indicating no significant difference in the performance mean score between the experimental and control groups before treatment. The result further reveals an adjusted R squared value of .609 which means that 60.9 percent of the variation in the dependent variable which is students' performance is explained by variation in the treatment, while the remaining is due to other factors not included in this study. Hence, we can say that active learning strategy does increase students' performance in Map reading.

## DISCUSSION

The study determined the effects of active learning strategies on secondary school students' attitude and performance in map reading in Mangu Local Government, Plateau State. Furthermore, the findings on the performance mean scores of secondary school students before the intervention also revealed that most of the students from both groups performed poorly in the pre-test. This shows that the students from both groups did not do well in the pre-test. This could also be attributed to shallow knowledge of the content of map reading since they were yet to be exposed to it. This implies that the performance would not have been better than what was obtained since map reading is coming in as a new thing to the students unless the students had prior knowledge of the content before the intervention. This is supported by Obasi and Osoun (2010), Aliyu, Babajide, Bosede and Olunloye (2010) and Dawal (2016) whose studies revealed that the pre-test performance of the experimental and control groups of students were the same. In addition, the poor performance was also associated to the negative attitudes that the students developed over time towards map reading, probably from the wrong impression of their predecessors. This is in

agreement with Anup and Anujit (2017) who found positive correlation between students' attitude and achievement in geography. Students might also hold wrong notions about map reading and doing that may discouraged the students from making any good attempt. Therefore, most of the students performed poorly in the pre-test. This finding is in line with Philpott (2016) who discovered that negative attitude is associated with failure. The negative attitudes exhibited by the students toward map reading and the poor performance obtained in the pre-test indicated that students from the two groups were similar at entry point. This implies a level ground for comparison of students' attitude and performance after the intervention. Aliyu et al. (2010) and Dawal (2016) found it important to have parity in students' performance at entry point in order to have a clearer picture of the direction of students' attitude and students' level of performance after being exposed to the intervention.

The findings on the performance mean scores of the secondary school students after the intervention revealed that exposing students to active learning strategies improved their performance in map reading. The performance mean scores of the experimental group showed that students from the experimental group had higher mean scores in the post-test than their counterparts from the control group. The performance was the result of students' active involvement in the instructional process where students interacted with each other and the teacher to learn the content of map reading together. With such involvement, students become highly motivated and developed positive attitudes towards map reading thereby leading to high level of performance in map reading. Therefore, it was not surprising to find out that students' performance had greatly improved because active learning strategies enhanced creative and critical thinking in the students as well as enabled better understanding of the content of map reading. In addition, students were able to retain and transfer knowledge of map reading acquired into solving problems effectively. The findings also confirmed the expectation that students' performance will be improved when taught with active learning strategy. This implies that the activity based learning enhanced students' positive attitudes and improved students' performance in map reading. This finding is in line with Adewoye (2008), Wermar (2009), Bosede (2010), Abakpa and Iji (2011) and Farrel (2016), whose study revealed that active participation of students in learning brings about better understanding of concepts, improves performance and increased students' confidence which as well build a positive attitude.

Furthermore, the lower performance experienced by students from the control group is related to the negative attitude that the students had for map reading even after their exposure to its content. The lecture method used for the control group encouraged boredom and idleness in students thereby enhancing negative attitudes and low performance in students. This shows that lecture method is not suitable to teach map reading as discovered over time by the findings of some researches. For instance, the study by Nazimuddin (2015) revealed that utilising traditional approach has negative effect on students' attitude and performance in school subjects. Nazimuddin further discouraged teachers from using the traditional approach for all forms of instructions in the school setting.

The findings on the difference between map reading performance mean score of the secondary school students in the experimental and control groups before the intervention indicated that the pre-test performance of the students in the two groups were poor although the experimental group performed significantly better than the control group. This implies that there is a significant difference between the pre-test mean scores of the experimental and control groups in map reading. It was surprising to find out that the difference between the performance mean scores of the students from the two groups was significant even when both groups seem to have shallow knowledge of map reading. The expectation was that, the performance mean scores of both groups will be similar in the pre-test. This implies that the difference in the performance mean scores was based on some factors not included in the study. On the contrary, Dawal (2016) discovered that the pre-test performance of the experimental group is not significantly different from their counterparts from the control group. Okoro (2021) also found that there is no significant difference in the pre-

test performance of students in map reading. The finding further indicated that before the commencement of the intervention, the experimental group might have had more knowledge of the content of map reading than their counterparts in the control group. The previous knowledge could have been acquired from either the virtual lessons organised by the various television stations or from the students' previous classes or from the students' personal studies or other means not mentioned. The entry knowledge had placed the students in the experimental group far above those from the control group.

Furthermore, the findings on the difference between map reading performance mean scores of the secondary school students after the intervention revealed that there is significant difference between the post-test performance mean scores of experimental and control groups of secondary school students in map reading. It was not surprising but was expected to obtain that result because of the exposure of the students to active learning strategies. This implies that exposing students to active learning strategies improves their performance in map reading. The mean gain between the pre-test and post-test of the students from the experimental and control groups indicated the difference. The findings showed that a higher mean gain was obtained from the experimental group than the control group which indicated that the treatment affected students' performance in map reading. With this, it means that active learning strategies do increase students' performance in map reading. In agreement with this finding is Abakpe and Iji (2011) who also discovered that the students exposed to activity based learning had significant improvement in their performance in Mathematics and sciences. Dawal (2016) and Okoro (2021) also found a significant difference in the performance of students taught using student-centred method and those taught with conventional method in favour of the experimental group.

## **CONCLUSION**

The findings from the study indicated that the pretest performance of students in the two groups were poor and almost at the same level and that there was improvement in students' performance after exposure to teaching learning package. The improvement in performance cut across gender with the male students performing better than the female students even after exposure to treatment. A further investigation showed that the difference in the performance of the students based on gender was not significant. Lastly, the findings of the study also revealed that there is significant difference between post-test mean scores of the experimental and control groups in map reading. This indicates that teaching and learning package do increase students' performance in map reading.

## **RECOMMENDATIONS**

Based on the findings of the study, the following recommendations are made:

1. Geography teachers should adopt teaching and learning technologies in their instructional process. Such technologies will provide opportunities for students' active participation in the learning task which in turn will improve their performance.
2. Workshops and seminars should be organized to create awareness and train geography teachers on the use of teaching learning technologies for teaching map reading. This will expose the teachers to the usefulness of the technologies in their instructional process.
3. Further trainings in form of in-service should be approved for geography teachers in the area of teaching and learning technologies. This will equip them on the operations of these technologies.
4. Government should make available the necessary map reading learning materials that will encourage the geography teachers towards utilizing them in instruction.

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