

# Use of Portfolio Assessment Technique in Teaching Map Sketching and Location in Secondary School Geography in Jos, Nigeria

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## Abstract

This study investigated the use of portfolio assessment technique in teaching map sketching and location in geography in Jos, Nigeria. It adopted a quasi-experimental design. Two schools were selected using a table of random numbers from a population of 51 schools in Jos South and assigned to each of experimental and control group. The experimental group consisted of 49 students while the control group had 52 students. Three hypotheses were formulated for the study. Hypotheses one and three were tested using t-test for correlated samples statistics while t-test for independent samples statistical technique was employed in testing hypothesis two. The instrument used for data collection was a Geography Achievement Test (GAT). The two groups were given a pre-test after which the experimental group was taught map sketching and location using portfolio assessment technique while discussion method was employed to teach the control group. The same test was later administered on the two groups. The findings of the study revealed that portfolio assessment helped in improving students' performance in map sketching and location, where the experimental group recorded higher mean gain scores of 33.32 as against 1.65 gain scores recorded for the control group. Results of the t-test analysis revealed that a significant mean difference existed between the pre-test and post-test GAT mean scores of the experimental group. Gender was found not to have significant effect on the post-test GAT of the experimental group. The study recommended that teachers and schools should employ portfolio assessment technique in teaching to help improve performance in secondary school geography.

**Keywords:** Portfolio assessments, teaching map sketching and location, geography

## 1. Introduction

Geography is concerned with how man interacts with his physical and cultural environment. It focuses on the earth surface and the way in which the human race lives and uses the earth. Geography is relevant in creating awareness about what happens in man's environment. Many of current world issues locally and globally have a bearing on geography. For instance, geography helps to solve the problem of global warming as it affects countries and regions, food and energy security, degradation of land and soils from overuse and misuse and how it affects economy of places among others. Geography, through Geographic Information System (GIS) enables meteorologists to detect and warn on dangers of heavy torrential downpours that could lead to flooding, erosion and other hazards as was the case in many parts of Nigeria in the year 2012. The same warning was also given in 2013 which helped people to put on measures to protect against associated dangers. Geography uses GIS, remote sensing and satellite imagery to better understand the world's constantly changing natural and human landscapes. This makes geography relevant in training the mind in understanding the world around us, thereby developing in the child, the ability to adapt to his/her changing environment.

The purpose of teaching geography in secondary schools is to enable students to have a sound knowledge of their environment, understand and explain physical features, have a sense of responsibility towards their society, appreciate the problems and peculiarities of other people and be able to think critically (Federal Ministry of Education (FME), 1985). Geography has five basic themes recommended at all levels of education which are location, place, movement, region and interaction which enable students to read courses in the Sciences, Environmental sciences, Social Sciences and the Arts. Students who offer geography have opportunity to read professional courses like Land Surveying, Urban and Regional Planning, Architecture, Estate management, Military Studies and Business Administration. Geography is also relevant in studying meteorology, climatology, geomorphology, earth science, geographic information system (GIS), remote sensing, and environmental studies like surveying, urbanization and building, which promise better economic rewards and employment opportunities to students (Osodo, Indoshi & Ongati, 2010). The importance accorded geography has made some schools in Jos to make geography compulsory for all their students up to senior secondary two classes.

Despite the importance accorded to geography, students still perform poorly in the subject in schools and in external examinations (Alimi & Balogun, 2010; Rahamneh, 2012). Results of WAEC analysis for schools in Jos show the average credit percent in senior secondary school certificate examination in geography for some

schools to be as low as 3.2% and 3.7% (Education Resource Centre, Jos, 2007-2012). Many factors have been identified to be responsible for poor performance in geography, which range from student, teacher, and parent to school factors (Bangbade, Ogunyandi & Elochukwu, cited in Alimi & Balogun, 2010; Rahamneh, 2012). Other factors that could affect performance in geography include; students' attitude, teachers' attitude, quality of teachers, inadequate instructional materials and inadequate facilities such as the geography laboratory and gardens as well as poor assessment among others (Adeyemi, 1999). These result in students' negative attitude, inadequate coverage of syllabus and poor teaching and assessment techniques among others (Alimi & Balogun, 2010).

Some of the methods used in teaching geography identified are lecture method, demonstration and discussion methods which have been criticized (Sofowora & Egbedokun, 2010) to be inadequate because these methods reduce opportunities for students to develop their critical thinking. From the researchers' interaction with geography teachers in Jos, it was revealed that the teachers make use of discussion, project, lecture and demonstration methods which are teacher-centered to teach the subject and administer tests that require students to respond by simple memorization of facts and ideas. These methods do not allow students opportunity to construct their own meaning out of instructional process. There are hardly any records of students' best work collected and kept to monitor students' progress in geography contents except marks which students obtain from continuous assessment.

Map sketching and location is an aspect of geography in the Nigerian school curriculum which requires students to draw maps and locate features on the maps. It demands that students should draw maps of Nigeria, West Africa and Africa and to locate and name major areas of agricultural and mining activities, relief and drainage patterns, climate, vegetation and soils and transportation systems. It is intended to give the students opportunity to recognize position of places and distribution of economic activities over the earth surface and also provide students the ability to prevent and curb identifiable environmental hazards such as flooding, erosion, land and soil degradation among others. This aspect of geography enable students to study and understand their environment, explain physical features, have a sense of responsibility towards their society through critical thinking, and be able to appreciate the problems and peculiarities of other people (Federal Ministry of Education (FME), 1985; Amosun & Oderinde, 2008; Akintade, 2012). This makes geography relevant in training individuals to understand their world and develop the ability to adapt to changes in their environment (Federal Republic of Nigeria (FRN), 2004).

Map sketching and location accounts for 60 out of 80 marks allotted to Geography Paper Two, Human and Regional Geography, in the Senior Secondary School Examinations conducted by West African Examinations Council (WAEC) and the National Examinations Council (NECO). It has the highest number of items of between five and six which is about 56 percent of nine examination questions each year in external examinations and accounts for 30% of final score of candidates in geography each year. This implies that, having problem with map sketching and location may lead to poor performance in geography and deny students a credit pass that will qualify them to read geography and other geography related courses in higher institutions. Furthermore, this may lead to little or no expertise in professional courses like climatology, GIS, remote sensing, environmental studies, earth science and urban studies, which have better economic rewards (Osodo, Indoshi & Ongati, 2010). It will also limit the employment opportunities which geography as a course offers to students (Lambert & Roberts, 2006; University of Vermont, 2009; Palin, 2011; Royal Geographical Society, n.d) since a credit in geography serves as criteria to qualify students for admissions to read many courses in the university. From the proportion of items allocated to map sketching and location each year, the researchers assume that any attempts made to improve students' achievement in this aspect of geography may help to improve students' general performance in geography.

Among the factors identified to affect performance in geography are poor teaching and assessment techniques. Assessment and evaluation are important in decision making in the education system (Beets, 2007; Ugodulunwa, 2008). This implies that the success of every education system depends to a great extent on how students are assessed and evaluated. The need for effective assessment and evaluation can therefore not be overemphasised. No wonder, the Nigerian education system (FME, 1985) prescribed teaching and learning strategies for geography so as to equip students with skills relevant to them and society. The teaching and learning of geography is planned to enable students to construct and apply geography knowledge to real life situations. The curriculum is developed in such a manner that will offer students opportunity to discuss what to engage in and the assessment criteria to employ. This implies that the teaching and assessment procedures have to be congruent.

For instance, the FME prescribe that the learning of geography should employ the use of fieldwork, discovery method, models, games and simulations, observation and practical work. That is, teaching and learning of geography should employ methods that emphasize integration of assessment and instructional process (Beets, 2007) to adequately prepare students for multiple opportunities. Supporting this view, Pinar (2011) posits that due to changes in our way of living and for rapid improvement in technology, learning habits should change in

educational programmes to increase student learning and success levels and to have students who could apply knowledge gained in school to real world problems. This implies that the geography curriculum should be made such that it will meet up with the demands of the new outcomes-based education system so as to contribute to a broader agenda of national reconstruction. For instance, it has been suggested that environmental education should be introduced in schools to open up new opportunities for students to advance their geographical knowledge at school level (Beets, 2007; Mohaeka, 2013). Through this, records of students' activities should be kept as continuous assessment records to be used as evidence of student learning.

The foregoing implies that there are some approaches and techniques that allow students the opportunities to contribute in knowledge construction and to take part in decisions about learning outcomes instead of being just passive learners. These are student-centred strategies that teachers could adopt to get students involved and engaged in the instructional process as active learners. Some of these techniques are referred to as authentic assessment techniques. Authentic assessment techniques engage students in challenging experiences and in constructing their own meaning through collaborative learning and enable students to use multiple modes of expression of mastery, stimulating critical thinking in students and increase interest thereby improve students' performance in school subjects.

These techniques are conveniently built into performance assessment, portfolio and self-assessment, that engage students in performing tasks, self-assessment, observations, demonstrations, constructed-response items, projects and exhibitions, interviews, writing samples and portfolio, using authentic assessment tools such as performance assessment, exhibitions, observational scales and portfolios. The tools assess real-world problems and engage students in discourse and social learning, thereby guiding them to constructively direct their learning. These techniques are considered potent in this regard because as assessment techniques, they have instructional process and assessment knitted together and demand students to learn subject area contents by applying knowledge and skills as obtained in real world.

Evidence exists in literature about the claim that portfolio assessment helps to improve instruction and student learning (Allen, 1998; Reeves, 2004). Research findings (Alsadawi, 2008; Fan and Zhu, 2008; Shumei, 2009). The studies have shown that portfolio assessment helps to improve learning and performance in geography. Portfolio assessment is seen as a technique that involves and allows students to present the best pieces of their work over time indicating progress and achievements made, while teachers support through questioning and dialoguing with learners (engaging learners) until mastery is attained. It collects best pieces of students' work and allows students to reflect on and self-assess their work through integrative learning as they construct their own meaning, allowing flexibility in measuring students' accomplishments, with students judging the worth of their work for improvement of achievement levels. Portfolio assessment enables students to self-evaluate and build their own knowledge as they produce their best pieces and related materials that depict the students' efforts, accomplishments and achievements in different subject areas (De Valenzuela, 2002; Davis & Ponnampuruma, 2005). It assesses multiple dimensions of students' progress at different levels of achievements, thereby providing opportunities for collaborative learning where teachers and students work together to set and evaluate the learning goals.

The use of portfolio assessment produces different in-depth evidence about student talents, abilities and learning for decisions about students and instruction (McLaughlin & Vogt, 1996). Portfolio assessment highlights regular classroom instruction through its collection of students' best work samples over time, revealing learners' capability and progress (Zhang, 2009). It facilitates co-operative learning where students engage in peer-assessment to measure their performance based on genuine samples of work submitted for considerations. It requires planning instructional process bearing in mind activities that students would engage in that will be relevant to them in solving real life problems.

The theory backing the use of portfolio assessment technique is the constructivists' theory developed by Jean Piaget and Vygotsky. Constructivism theory posits that human beings generate and build their own knowledge and meaning from an interaction between their ideas and experiences (Kristinsdottir, 2001; University of Alberta, 2002; Educational Broadcasting Corporation, 2004; Learning – Theories.Com, 2008). Constructivism sees the learner as actively involved in creating new meanings, where teacher dialogues and helps learner to make meaning out of learning content until mastery is attained. It is a student-centred strategy which suggests that instruction and assessment should be built together such that in planning for an instructional process, what should be assessed and how it should be assessed should be planned alongside. The portfolio serves as an avenue for promoting student reflection and demonstration of focus and responsibility for learning development in all disciplines because it involves learners through active participation during instruction.

The portfolio is a potent alternative to avoid any incompatibility between learning process, product assessment as well as to take care of any discrepancy between information needed and information derived, which the constructivists have observed is experienced in standardized testing. Portfolio assessment is result oriented; reporting students' progress by providing the depth and breadth of students' capabilities through biographies of their work samples as evidence of students' accomplishments that is encouraged in constructivism.

The use of portfolio enables students with learning problems to discover and utilize their potentials in school (Darling-Hammond, Aneess & Falk, 1995). Among the factors known to affect students' performance in geography is gender though there is lack of consensus on the effect of gender on students' performance in geography. Gender difference was found in some studies (Akintade, 2012; Butt, Weeden & Wood 2004; Obadaki & Omowumi, 2013) while the studies of Kubiako, Janko and Mrazkova (2012) found no gender difference.

The purpose of the study was to use portfolio assessment technique to teach map sketching and location in secondary school geography to determine its effects on students' performance in geography. In order to achieve the purpose of this purpose, the following hypotheses were formulated and tested at .05 level of significance:

1. There is no significant difference between the pre-test and posttest geography performance mean scores of the experimental group.
2. There is no significant difference between the posttest geography performance mean scores of experimental and control groups.
3. There is no significant difference between the posttest geography performance mean scores of male and female students exposed to portfolio assessment technique in teaching map sketching and location.

## 2. Method

The study employed a quasi-experimental design where two public Senior Secondary Schools offering geography in Jos South Local Government Area of Plateau State were used. The two schools were assigned to experimental and control groups using a table of random digits. The schools were given a test in map sketching and location after which the experimental group was taught map sketching and location using portfolio assessment while the control group was taught map sketching and location using discussion method. The two groups were later given the same test and the results collected were analysed to determine any significant mean difference between their pre-test and post-test performance mean scores.

The population of this study consists of all the 51 senior secondary schools in Jos South that offer geography and has presented candidates for West African Examinations Council and National Examinations Council Senior Secondary Certificate Examinations (SSCE) between the periods 2007 to 2012. A sampling frame of all the schools was drawn from which the two schools were selected using a table of random digits and were randomly assigned to each of experimental and control groups. This was done by marking a starting point on the sampling frame from where the researchers moved down and recorded the first two two-digit numbers that were not all zero and not greater than 51 to obtain the two public schools. The experimental school had 49 students while the control school had 52 students. All the students found in each of the two selected schools were used as sample for the study.

The instrument used for data collection was a Geography Achievement Test (GAT). The GAT was developed using a table of specifications based on the Senior Secondary Geography Curriculum and SSCE Human and Regional Geography questions for the years 2007-2012. The GAT had two sections, one and two. Section one sought information on personal data of the students while section two contained seven restricted essay items on map sketching and location. The instrument covered items on drawing maps of Nigeria, West Africa and Africa and locating features of various earth resources, industrial and economic activities, relief, climate, vegetation and soils on maps.

Content validity of GAT items was established to ensure adequate representation of each content area and the appropriateness of items in terms of comprehensiveness and clarity of language. Two tables of specifications were employed (one for cognitive and another for psychomotor objectives) in drawing the items so that each content area is given its appropriate proportion of items based on the number of period(s) spent to teach it and the behavioural objectives for lesson delivery. The GAT was further subjected to scrutiny of experts. One expert each in Geography Education and Geography and Planning and two experts in Educational Tests and Measurement were given the GAT to judge appropriateness and comprehensiveness of the items. Their suggestions, corrections and criticisms guided the production of the final copy of the items. The same test was administered to both the experimental and control groups as pre-test and posttest. Data collected from the two administration of the GAT were analysed to determine any significant difference in the mean scores of the two groups.

The reliability co-efficient of internal consistency of the GAT was estimated to be 0.88. This was estimated using the Cronbach alpha method of estimating reliability developed by Cronbach in 1951 to determine the homogeneity of the GAT items. The Cronbach alpha method is appropriate in establishing the reliability coefficient of essay items and items with more than one point value. This method reveals the extent to which the GAT items are consistent in their measurement of students' skills and knowledge on map sketching and location.

Two research assistants were given a four-day's intensive training in the operation of portfolio

assessment technique to facilitate data collection. These were geography teachers in the sampled schools who have B.Sc. and Postgraduate Diploma in Education or B. Sc. (Ed.) qualifications. They trained on how to develop, use and manage the portfolio. The training involved identifying and explaining the guidelines and criteria for the portfolio assessment for all the topics taught under map sketching and location. It also involved how to determine the purpose of the portfolio keeping the students in mind, identifying the learning outcomes to cover in the portfolio, determining what students will engage in during the portfolio development and identifying criteria for judging merits. The training was given by the researchers and one other expert in Educational Tests and Measurement. Portfolio assessment was used in teaching map sketching and location for 12 weeks. Students were made to submit samples of their work. The best sample out of every four submissions were selected, scored, evaluated and recorded for every student. The control group was taught the same topics under map sketching and location using discussion method for the same 12 weeks. Teachers in the control group also have the same qualifications as those in the experimental group; they engaged students in discussion of each topic under map sketching and location during instructional process after which a post-test was administered on the two groups. The mean scores of the two groups were collected and analysed using t-test for correlated samples as well as t-test for independent samples statistical techniques.

### 3. Results

Table 1. Results of t-test analysis of difference between pre-test and post-test geography performance (GAT) of experimental group

Group	Test	N	Mean	SD	df	t-value	p-value
Experimental	Pre-test	49	12.33	6.55	48	-20.24	0.00
	Post-test	49	45.65	12.86			

$P < .05$

Table 1 reveals that the geography performance means scores of experimental group on pre-test and post-test were analysed using t-test for dependent samples statistical technique. The result indicates that a statistically significant difference exists between the pre-test and post-test mean scores of the experimental group. The mean performance of experimental group on the post-test ( $M=45.65$ ;  $SD=12.86$ ) was significantly higher than their mean performance on pre-test ( $M=12.33$ ;  $SD=6.55$ );  $t(48) = -20.24$ ,  $p < 0.05$ . The effect of treatment, that is, mean performance of experimental group on the post-test was different from pre-test at 95% confidence level. Hence, we reject the null hypothesis because our data did not provide sufficient evidence for us to retain it. Therefore, we conclude that performance mean score of the experimental group in the post-test was significantly different from their pre-test mean score.

Table 2. Results of t-test analysis of difference between post-test GAT mean scores of experimental and control groups

Group	Test	N	Mean	SD	df	t-value	C
Experimental	Post-test	49	45.65	12.86	99	13.14	0.001
Control	Post-test	52	10.37	7.49			

$P < .05$

Table 2 reveals that the geography performance mean scores of experimental and control groups on posttest GAT mean scores were analysed using t-test for independent samples analysis. The result indicates that a statistically significant difference exists between the posttest performance mean scores of the experimental and control groups. The mean score of experimental group on the posttest ( $M=45.65$ ;  $SD=12.86$ ) was significantly different from the posttest mean score of the control group ( $M=10.37$ ;  $SD=7.49$ );  $t(99) = 12.32$ ,  $p < 0.05$ . Hence, we reject the null hypothesis because our data did not provide sufficient evidence for us to retain the null hypothesis and conclude that the posttest performance mean score of the experimental group was significantly different from the posttest performance mean score of the control group.

Table 3. Results of t-test analysis of difference between post-test mean scores (GAT) of the experimental group due to gender

Gender	N	Mean	SD	df	t-value	p-value
Male	19	47.33	10.68	48	12.32	0.201
Female	30	44.72	11.43			

$P > .05$

Table 3 reveals that no significant difference exists between the post-test geography means scores of males ( $M=47.33$ ;  $SD=10.68$ ) and females ( $M=44.72$ ;  $SD=11.43$ );  $t(48) = 12.32$ ,  $p > .05$ . The result indicates that the post-test performance mean score of males is not significantly different from post-test the performance mean score of females. Table 3 reveals that the mean performance of the experimental group due to gender was not statistically different at .05 level. The null hypothesis was therefore retained since our data did not provide sufficient evidence for rejection. It was therefore concluded that there is no significant difference between the

post-test performance mean scores of male and female students exposed to map sketching and location using portfolio assessment technique.

#### 4. Discussion

The finding that high mean gain scores were recorded on the posttest GAT of the experimental group agrees with earlier findings (Alsadawi, 2008; Fan and Zhu, 2008; Shumei, 2009) that portfolio assessment helps to improve student learning and performance in geography. This indicates that use of portfolio assessment in teaching map sketching and location did help improve students' mean performance in that aspect of geography. It means engaging students in knowledge construction where best samples of their work are submitted over time as portfolio collections led students to develop competence in performing tasks in map sketching and location. The practice probably led students to achieve mastery which manifests in the students' improvement in their GAT mean scores. This implies that portfolio assessment proved a more effective technique for improving performance in map sketching and location aspect of geography. The implication of the foregoing for educational practice is that teachers should use portfolio assessment to teach map sketching and location to help improve students' performance in geography.

The finding that the mean performance of the experimental and control groups in the post-test was significantly different in favour of the experimental group supports the findings of earlier studies (Alsadawi, 2008; Fan & Zhu, 2008; Shumei, 2009) that portfolio assessment does help improve learning and achievement in school subjects. It means that portfolio assessment was more effective for improving students' performance in GAT than the discussion method employed to teach the control group. This is probably because keeping best samples of students' work enable them to improve on previous work samples in relation to set standards for performance until mastery is attained. This suggests that teachers should employ portfolio assessment in teaching map sketching and location to help improve students' performance in school geography.

The finding reveals that no significant difference exist between post-test performance mean scores of male and female students' in map sketching and location when taught using portfolio assessment technique. The finding of gender difference is in line with that of Kubiako, Janko and Mrazkova, (2012) who found that gender does not affect students' performance in geography but contradicts Obadaki and Omowumi (2013) who found that girls perform better in geography than boys and Butt, Weeden and Wood (2004) who also found that boys underachieve in geography. This result implies that gender does not have any significant effect on performance mean scores of students exposed to map sketching and location using portfolio assessment technique. Thus, students' performance in map sketching and location is independent of gender when taught using portfolio assessment technique. It also suggests that teachers should employ portfolio assessment to teach students in order to reduce any gender difference in students' performance in geography.

#### 5. Conclusion

This study intended to use portfolio assessment to find out if it will help improve performance in secondary school geography. The findings of the study have shown that portfolio assessment helped to improve students' performance in map sketching and location. It indicates that students' engagement in portfolio collections enabled them in meaningful knowledge construction over time that led to their improved performance in the geography test. This was revealed from the performance gain scores recorded in the GAT for the experimental group as compared to control group. It suggests that portfolio assessment technique is an effective technique that can help improve student learning and success levels. This means that portfolio assessment does help to improve students' test scores when used for the purpose of improving classroom pedagogy. It can also help to make learning more relevant to students as it collects and keeps records of students' efforts, accomplishments, capabilities, achievements and progress in learning as obtained in real life. Hence, there is need to use portfolio assessment technique to improve students' performance in secondary school geography. Teachers and schools should adopt the use of portfolio assessment technique not only for improving students' performance but also for making learning more meaningful and relevant to learners as applicable in real life.

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