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Effect of Flipped Learning Approach on Students' Achievement in Geography

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ABSTRACT

Flipped Learning Approach (FLA) is a constructivist method of teaching which has gained prominence in the 21st Century as a key driver to academic achievement. However, its efficacy in a Kenyan Geography classroom has not been adequately established. Kenyenya subcounty recorded the lowest mean score of 3.976 in Kisii County which is below the overall county mean of 4.875 over the period between 2019 to 2023. The purpose of this study was to investigate the effect of FLA on students' achievement in Geography in subcounty secondary schools in Kenyenya subcounty, establish the performance of the students taught the topic Internal land forming processes using Flipped Learning Approach, establish the performance of students taught the topic Internal land forming processes using conventional methods and to determine the differences in performance between students taught using flipped learning approach and those taught using conventional methods. The study was based on Jerome Bruner's constructivism theory which argues that learning takes place when a learner constructs mechanism of learning in his or her unique version of knowledge. The study used Solomon Four Non-Equivalent Group Design. The sample size of the study was four (4) Geography teachers from the four (4) subcounty public secondary schools and four classrooms consisting of 260 form two Geography students which were randomly assigned to experimental and control groups. Instruments for data collection were Geography Conceptual Understanding Achievement test (GCUAT, Observation Checklist, and Interview schedule for Geography Teachers. Data was analysed using mean, standard deviation, t-test and ANOVA. Interviews were qualitatively analysed using thematic analysis. The findings indicates that there was a statistically significant difference in mean scores between students taught using FLA , E_1 (M = 70.97) and E_2 (M = 70.4) compared to those taught using conventional methods C_1 (M = 50.63) and C_2 (M = 49.57). These findings indicates that FLA significantly improved students' conceptual understanding of the topic Internal Land Forming Processes in Geography. This study recommends that Geography teachers should integrate the use of FLA in teaching Geography and Ministry of Education should incorporate it for training of in-service teachers.

Key words.

Keywords: Flipped Learning Approach, conventional teaching, Achievement, Geography.

INTRODUCTION

As a student-centred instructional model, Flipped Learning Approach is grounded in the constructivist theory of learning (Strayer, 2012). According to constructivism, knowledge is actively constructed by the learner, not passively received from outside. The flipped classroom approach aims to create student

centred learning environment in which students take care of their own learning and become more interactive in class. Furthermore, students in the flipped learning environment are given more opportunities to develop higher order thinking under teacher guidance and peer support as compared to those in class lectures that require low level thinking skills in Bloom's (1984), taxonomy which are now replaced with instructional videos (Berrett, 2012). Most of the subjects that are said to have been affected are STEM disciplines (i.e Science, Technology, Engineering and Mathematics), hence these subjects appear to have received much attention among early adopters of Flipped learning (examples are a Microsoft excel course by Ball, Davies and Dean , 2013, a statistics course in Strayer, 2012 and Chemistry course by Bergmann and Sams, 2012). These studies have generally reported the benefits of flipped learning such as increased classroom interaction, saving the learner and teacher's time for active learning and improved academic achievement. By contrast the use of lectures as instructional methods seems to be of little significance to humanity disciplines such as Geography which requires learners to assimilate information and construct knowledge. To date, little research has rigorously studied how flipping a Geography classroom can enhance student's achievement in Geography.

Proponents of FLA such as Supiano (2018), Bergmann and Sams (2012), Goodwin and Miller (2013) indicated that this approach not only boosts student achievement but also ameliorates the achievement gap through increased student–teacher interaction. The increased contact with students may make instructors more responsive to students' needs, which could be particularly beneficial for lower-achieving students who might otherwise not seek out assistance. However, these studies were general in nature and this necessitated subject specific study to unravel the effect of FLA on student's achievement in Geography. Geography teaching focusses on skills such as map reading and interpretation, statistical analysis of data, photograph work and interpretation and fieldwork. These skills are adaptable to the use of FLA and therefore significant hence suitable for this study.

Prior studies that compared flipped learning approach with conventional methods and techniques found that there was greater academic success in groups where the flipped learning was used (Aycicek & Yanpar-yelken, 2018; Ozdemir, 2017; Ozyurt & Ozyurt 2018; Turan, 2015). There results showed that flipped learning had a significant impact on student's academic achievement. While the studies cited demonstrate the effectiveness of flipped learning in improving academic achievement in various subjects, including those outside of Geography, there appeared to be a gap in comparative studies specifically focusing on Geography education. There was need for research that directly compares the effectiveness of flipped learning with conventional teaching methods in Geography classrooms to understand its impact on student achievement in this subject.

In Kenyenya Sub County the mean standard score (M.S.S.) for Geography is (3.976) which is below the average county mean of 4.875. Students' performance in this subject at KCSE levels has been below average in the past five (5) years in the Sub county. **Table 1.1** shows the performance of Geography in Kisii county whereby Kenyenya sub-county has been ranked the lowest.

Table 1.1: KCSE Mean scores in Geography for public subcounty secondary schools in Kisii county from 2019 to 2023

Name of sub-county	Year 2019	2020	2021	2022	2023	Average/mean
Masaba South	5.24	5.36	4.60	4.68	4.79	4.934
Kisii Central	5.84	5.28	5.09	5.96	5.48	5.53

Nyamache	5.19	4.82	5.24	5.68	5.31	5.248
Kitutu Central	4.84	5.21	5.36	5.24	5.36	5.202
Gucha	4.96	4.78	4.36	4.97	4.93	4.80
Kenyenya	4.21	4.20	4.00	3.79	3.60	3.976
Kisii South	4.37	4.68	3.97	4.78	4.94	4.548
Marani	4.78	5.02	5.04	5.36	5.37	5.114
Gucha South	4.97	4.78	4.89	4.60	4.27	4.702
Etago	4.96	4.99	4.98	4.67	4.98	4.916
Sameta	4.78	4.94	4.76	4.45	4.33	4.652
Overall mean						4.875

Source: Kisii county Quality Assurance and Standards office

Table 1.1 illustrates the performance of Geography in Kenya Certificate of Secondary Education (KCSE) examinations of the 11 sub-counties in Kisii County between the period of 2019 to 2023. A comparison of mean scores of geography performance for all the sub counties in Kisii county was made for the period 2019 to 2023 as shown in table 1.1. Kenyenya sub county had the lowest mean score of 3.976 compared to other sub counties. This was even lower than the county overall mean of 4.875 as shown in table 1. This indicated that there might be pedagogical challenges that may be addressed through innovative approaches such as Flipped Learning Approach. Therefore, the purpose of this study was to investigate the effect of FLA on students' achievement in Geography in subcounty secondary schools in Kenyenya subcounty, establish the performance of the students taught the topic Internal land forming processes using Flipped Learning Approach, establish the performance of students taught the topic Internal land forming processes using conventional methods and to determine the differences in performance between students taught using flipped learning approach and those taught using conventional methods.

METHODOLOGY

Four groups of participants; the Experimental Group One (E_1), Experimental Group Two (E_2), Control Group One (C_1) and Control Group Two (C_2) were used. Groups E_1 and E_2 formed the experimental groups which received treatment (Flipped learning) while C_1 and C_2 formed the Control Groups that did not receive treatment. Groups E_1 and C_1 did a pre-test while E_2 and C_2 did not. All groups received the post-test at the end of the course. In order to avoid interaction of students from different groups that may contaminate the results of the study; one class from a school constituted one group of students. The selected classes were randomly assigned to the experimental and control groups (Borg & Gall, 1996; Mugenda & Mugenda, 2003)

The study employed the use of purposive sampling technique to select four (4) public sub county school and 4 teachers of Geography from the selected schools hence four intact classrooms. Out of these, two classrooms were taught the topic "Internal Land forming Processes" using Flipped Learning Approach while two classrooms were taught the same concept using conventional methods. The power of purposive sampling lies in selecting information that is rich in cases for in-depth analysis of central issues being studied (Kombo & Tromp, 2006). Simple Random sampling technique was employed in selecting the participating schools in cases where there was many schools with similar characteristics. The same was applied in schools with more than one stream (Mugenda & Mugenda, 2003). A total of four (4) intact classrooms whose number of students were 68,65,72 and 55 were selected. This totalled to 260 students.

Upon receiving a letter of approval from School of Post Graduate Studies of Maseno University, the researcher sought permit from Maseno University Scientific and Ethical Review Committee (MUSERC). After receiving the permit from MUSERC, the researcher also sought permit from NACOSTI (National Commission for Science Technology and Innovation) and proceeded to collect data.

The consent of the learners was sought from their principals and Geographyteachers and the purpose of the study was explained to them. Thereafter, students in the study were randomly assigned into the four groups experimental group 1 (E1), experimental group 2 (E2), control group 1 (C1) and Control group 2 (C2). A pre-test was conducted in experimental group (E1) and one control group (C1) in order to measure the student entry behavior and performance in Geography before the treatment. In experimental group E1 and E2 Flipped Learning Approach was used while in control groups C1 and C2 conventional teaching method was used.

At the end of the treatment period the posttest was administered. The Test was constructed by the researcher based on the Kenya Certificate of Secondary Education (KCSE) Geography examination questions of the previous years on "Internal Land Forming Processes" The researcher supervised the teaching and scoring of the pretest and post-test. The researcher also used the observation checklist to ensure that all the requirements of the Flipped classroom were adhered to.

RESULTS AND DISCUSSION

The findings are based on performance of the students taught the topic Internal land forming processes using Flipped Learning Approach, performance of students taught the topic Internal land forming processes using conventional methods and differences in performance between students taught using Flipped Learning Approach and those taught using conventional methods.

Performance of Students Taught the Topic Internal Land Forming Processes Using Flipped Learning Approach

The Experimental groups E_1 and E_2 were taught using Flipped learning Approach. The students were assessed out of 100 with a test on the Topic Internal Land forming processes. The Geography Conceptual Understanding and Achievement Test (GCUAT) was administered to students exposed to flipped learning (Experimental Group). The scores were then entered into Statistical Package for Social Science (SPSS) software for analysis. The post test mean scores and their standard deviations are presented table 4.1

Table 4.1 Students' Geography Conceptual Understanding Post-test Mean Scores and their Standard Deviations

Group	N	Mean	SD
E1	68	66.68	16.47
E2	72	64.81	12.05
Total	140		

The scores in **table 4.1** reveal that the GCUAT mean scores for experimental groups E1 (M = 66.68, SD = 16.47) and E2 (M = 64.81, SD=12.05) were higher as a score of 60 and above translates to grade B which is good performance.

Performance of Students Taught the Topic Internal Land Forming Processes Using Conventional Methods

The control groups C_1 and C_2 were taught Geography concept on the internal land forming processes using conventional methods. The students were assessed out of 100 with a test on the Topic Internal Land forming processes. The Geography Conceptual Understanding and Achievement Test (GCUAT) was administered to both students in groups C_1 and C_2 students under conventional teaching (Control Group). The scores were then entered into Statistical Package for Social Science (SPSS) software for analysis. The post test mean scores and their standard deviations are presented table 4.2.

Table 4.2 Students' Geography Conceptual Understanding Post-test Mean Scores and their Standard Deviations for groups C_1 and C_2

Group	N	Mean	SD
C1	65	40.66	10.47
C2	55	46.46	11.32
Total	120		

The scores in **table 4.2** show that the GCUAT mean scores for students in control groups C_1 and C_2 were as follows : C1 (M = 40.66, SD = 10.47) and C2 (M = 46.46, SD = 11.32). The scores portray that students had challenges in understanding the concepts taught in the topic Internal land forming process as their scores are as shown in the table are at 40 which translates to a C(minus).

Differences In Performance in the topic Internal land forming processes between Students Taught Using Flipped Learning Approach and Those Taught Using Conventional Methods.

The control groups C_1 and C_2 were taught Geography concept using conventional methods while the Experimental groups E_1 and E_2 were taught using Flipped learning methods (out of class text reading, educational videos). The students were assessed out of 100 with a similar test on the Topic Internal Land forming processes. The Geography Conceptual Understanding and Achievement Test (GCUAT) was administered to both students exposed to flipped learning (Experimental Group) and students under conventional teaching (Control Group). The scores were then entered into Statistical Package for Social Science (SPSS) software for analysis. The post test mean scores and their standard deviations are presented **table 4.3.**

Table 4.3 Students' Geography Conceptual Understanding Post-test Mean Scores and their Standard Deviations

Group	N	Mean	SD
E1	68	66.68	16.47
E2	72	64.81	12.05
C1	65	40.66	10.47
C2	55	46.46	11.32
Total	260		

To find out whether there was any significant difference in the GCUAT meanscores among the four groups a one-way ANOVA test was used. The results are shown in table 4.4

Table 4.4 Analysis of variance (ANOVA) of the post test scores of GCUAT:

Scale	Sum of Squares	Df	Mean Square	F-value	p-value.
Between Groups	31970.839	3	10656.946	66.559	.000
Within Groups	40988.896	256	160.113		
Total	**72959.735**	**259**			

The ANOVA test results in **table 4.4** show that the difference in mean scores for groups E_1 C_1 and E_2 C_2 were significant at 0.05 level in favour of Experimental groups, F (66.559) = 0.000, P<0.05. The ANOVA test results therefore indicates that there is a statistically significant difference in conceptualizing Internal Land forming processes topic in Geography between students taught using Flipped Learning Approach and those taught using conventional methods. However, the results in **table 4.4** did not reveal where the differences came from since it involved four groups, hence there was need for further analysis. In order to reveal the differences, further analysis was conducted using Scheffe's multiple comparison test. The results are shown in **table 4.5**

Table 4.5 Scheffe's Multiple Comparison of the Posttest Scores on GCUAT for the Four Groups

Scale	Mean difference	p-value
E_1 Vs C_1	24.834	.000
E_1 Vs E_2	1.871	.862
E_1 Vs C_2	20.257	.000*
C_1 Vs E_2	22.963*	.000*
C_1 Vs C_2	4.577	.287
E_2 Vs C_2	18.386	.000

*The difference is Significant at α= 0.05 significance level, (P<0.05)

Table 4.5 shows that the difference between post- test mean scores on GCUAT for Experimental and control is statistically significant at α= 0.05 . When Experimental group (E_1), was compared to control group (C_1), experimental group (E_1) and control group (C_2), control group (C_1) and experimental group (E_2) ,experimental group (E_2) and control group (C_2), the difference was found to be statistically significant, (P<0.05). The table indicates that the relationship between the Experimental groups and the control groups is statistically significant. This postulates that Flipped Learning Approach improved students' Achievement in Geography than the conventional teaching Approach. The significant differences in post-test mean scores between the experimental (FLA) and control (conventional teaching) groups can be attributed to how FLA promotes deeper learning through active engagement and reflection. In FLA, students are not passive recipients of information but are actively involved in the learning process. This was evidenced in groups E1 and E2 where students were actively involved in their studies where they were seen to lead discussions in their classrooms. This active engagement leads to better retention and understanding of the material, which is reflected in the higher post-test scores. Additionally, the comparison of different groups (E1 vs. C1, E1 vs. C2, C1 vs. E2, C1 vs. C2, E2 vs. C2) shows that the FLA group consistently outperformed the control group, indicating the effectiveness of FLA in improving student achievement in geography. This finding supports Bruner's constructivist aspect of Predisposition towards learning , as it suggests that providing students with the opportunity to actively engage with the material leads to better learning outcomes.The findings of this research are consistent with that of Almusawi, (2014) on the effect of Flipped Learning Approach in acquisition of Geographical concepts

who found flipped learning enhanced students to acquire geographical concepts as compared to their counterparts who were in the conventional classroom. Similarly, Ezeudu and Gbendu (2020) found that, students taught Geography using flipped learning approach obtained higher mean scores than those of their counterparts taught the same topics with conventional lecture method. Fulton, (2012) after flipping high school math classes found that the percentage of students passing the state test had increased from 29% to 73.8%. Also, Clintondale (MI) High School flipped all its ninth-grade classes in 2010 and realized that failure rates dropped by as much as 33 percentage points (Clintondale High School, 2013; Greg Green, 2012). This shows that FLA can improve student achievement tremendously. Zengin (2017) also found that Flipped learning Approach increased students' academic achievement in mathematics and the findings revealed that it doubled the students´ academic achievement.

CONCLUSION OF THE STUDY

The study concludes that the use of Flipped Learning Approach increases academic achievement in Geography as compared to the use of conventional teaching approach. Furthermore, the study highlights how Flipped Learning promotes active engagement among learners. By shifting the conventional lecture-based instruction outside the classroom through pre-recorded lectures or out of class text readings, students have the opportunity to engage with the material at their own pace and revisit challenging concepts as needed. This active involvement enhances comprehension and encourages students to take ownership of their learning process.

IMPLICATIONS FOR FLIPPED LEARNING APPROACH

The study's insights into FLA can help improve students' understanding and performance in Geography by providing an engaging and interactive learning environment. FLA encourages active learning and deeper comprehension of geographical concepts, which leads to higher achievement levels in assessments and exams. Teachers can use the findings of this study to critically evaluate their current teaching methods, identifying strengths and areas needing improvement. This reflection may prompt teachers to adopt more innovative and student-centered teaching strategies, enhancing their effectiveness in the classroom. The Ministry of Education and school management boards can use the study's findings to design and implement professional development courses that focus on FLA. By prioritizing the improvement of teaching pedagogies, these courses can enhance teacher accountability and responsibility towards students' academic success.

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