Using Action Learning, Concept-Mapping, and Value Clarification to Improve Students' Attainment in ICT Concepts in Social Studies: The Case of Rural Learning Ecologies

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Abstract

Robust teaching strategies are needed in rural learning ecologies to deepen students' attainment of Information and Communication Technology concepts in social studies due to the demands of the information age. Accordingly, this study utilized a quasi-experimental design to compare the effects of three instructional strategies on conventional lecture method. 170 students participated in the study for ten weeks. Results affirmed that concept-mapping instructional strategy is the most appropriate strategy to teach ICT concepts in social studies rural learning ecologies. It was also observed that the treatment in this study was sensitive to gender and academic abilities.

Key words: Action Learning, Concept-Mapping, Value Clarification, Secondary school students', Academic attainment, ICT concepts, Social Studies, Rural learning ecologies.

Introduction

Social Studies has evolved as a global discipline that not only studies man in his immediate environment, but also studies his complementary relationship with his environment. Amosun, Ige and Choo (2015) affirmed that Social Studies has emerged as the punctilious elixir that is potent to correct immoral behaviours and inculcate in students a sense of decent behaviour. Krutka and Carano (2016) remarked that the primary raison d'etre of social studies is to assist students emerge as global citizens. It should be noted that these scholars pointed out that this mission is an uphill task for teachers as this demands that they use a variety of teaching and learning methods to help students understand the big ideas in Social Studies.

The National Council for Social Studies (NCSS 2010; Ige and Hlalele, 2017) emphasized that an adequate definition of Social Studies should have two marked features namely the promotion of civic competence and integration of varied academic areas. It is consequent on these that Ige and Hlalele (2017) argued that any definition of Social Studies should holistically describe the

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mission of the subject in the school system as well as highlight the benefits of Social Studies to young learners whose training has great potentials for different nations of the world. In this experiment, I tried out three instructional teaching strategies, namely action learning, concept-mapping, and value clarification, on conventional lecture method to determine the impact on selected secondary school students' in social studies concepts.

Instructional Strategies and Students' Attainment in Social Studies Concepts

Scholars have affirmed the benefits of students' learning cooperation via collaborative activities to achieve curricular goals (Chung & Park, 2015; Jang, 2011). These collaborative activities, designed to solve educational or civic problems of common interest, are at the heart of action learning. Action learning has become applicable in different fields of learning consequent on its ubiquity in solving nagging social problems. Researchers remarked that action learning has become more effective in developing leaders and practitioners than conservative teaching strategies (Anderson & Coleman, 2014; Scott, 2017). O'Neil and Marsick (2014) emphasized that experiential programmes, case study, simulation and outdoor adventure aerobics are not action learning strategies, even though these activities involve action. The views of these scholars might not be unconnected with the nucleus of experiential programmes, case study, simulation and outdoor adventure exercises being non-factual work in actual time, which was corroborated by O'Neil & Marsick (2007, 2014). Researchers interested in action learning should note that evidences from the works of previous scholars show that di-elemental features are key markers of action learning; these are: collaboration by students on social problems to which solutions seem elusive, and discussion among students on the difficulties encountered in solving the nagging social issues, and reporting progress made (see Coghlan and Coughlan, 2014; O'Neil & Marsick, 2007). At present, action learning has been applied in the different continents of the world, and it appeared in education, commercial, public, and non-profit sectors. The action learning inquiry strategy deployed in this study is based on these two core elements.

Concept-Mapping and Students' Attainment in Social Studies Concepts

Miller et al. (2009) noted that concept mapping, otherwise called ' semantic networking' or ' frame network' is used in varied milieu to aid learning and instruction. The global acceptance enjoyed by concept mapping showed in the findings of Nesbit and Adesope (2006) that five

hundred research articles made appreciable reference to the scholarly application of concept - mapping strategy from 1997 to 2006. Burkhardt (2006) stated that Novak and his group presented concept maps as diagrammatic representations to visually document knowledge or visualize connections among concepts. Burkhardt (2006) went on to further provide information that concept mapping originated from constructivism which emphasized that previous knowledge is requisite to learners' acquisition of new concepts.

Research has shown that concept mapping is built expressly on Ausubelian (see Ausubel, 2000) assimilation theory of meaningful learning and consistent with constructivist pedagogical principles. On the other hand, Farrell (2001) argued that concept maps originally evolved from cognitive psychologists who applied it to scaffold how humans store and utilize their knowledge to execute various tasks. The explanation of Farrell (2001) implies that concept maps are used by learners to construct knowledge or put their opinions on problematic societal issues into interwoven frames. Despite the advantages inherent in the use of concept maps for teaching and learning, some scholars have argued that its use is too complex and time consuming (Farrell, 2001; Kagan, 1990). This study adopted Kane and Trochim's (2007) definition of concept mapping as an innovative structured conceptualization technique that provides lenses to describe how learners' view a social issue of mutual interest.

Value clarification and students' Attainment in Social Studies Concepts

Manning (2017) stated that value clarification is an opinion-gap quest which necessitates that learners reach consensus which must be convergent. Oliha and Audu (2015) defined value clarification as the process of determining the outcome of an action which emanated from humanistic psychology. Goetz (2014:24) affirmed that value clarification is used to increase performance in different spheres of life. Despite the strengths of value clarification, Goetz (2014:24) warned researchers that value clarification comprises a series of strategies which are not tailored to forcing a set of good values on students. This study utilized Metcalf (1971) and Salawu (2000)'s model of rational analysis. The current study identified appropriate teaching strategies to improve students' attainment in social studies concepts. This is consequent on growing demands for innovative teaching strategies that can project the value-laden nature of social studies and solve the societal challenges that are peculiar to the information age.

Variation Theory

The novel instructional strategies tried out in this study are closely related to variation theory, despite claims by Cheng (2016) that the theory was not generally applicable to teaching improvements. Regarding variation theory, Kullberg, Kempe, and Marton (2017) posited that the theory is founded on the strategies that helped learners to handle novel situations in sturdy manners. It could be inferred from the assertion of Kullberg et al. (2017) that variation theory is underpinned by collaborative principles. Bussey, Orgill and Crippen (2012) went further to state that variation theory provided a framework that accounted for how a student would experience a fact or occurrence in a certain way, and how two students in a common class would understand a concept at different levels. Hsu and Wang (2014) stated that variation theory, which emanated from 'phenomenography' is founded on a learning that requires students to find out the salient aspects of an occurrence on which they hitherto did not focus, and to concomitantly infer those salient aspects into their focal awareness.

Despite Fraser, Pillay, Tjatindi, and Case (2007)'s assertion that variation theory is more relevant to learning than teaching methods, the systematic variation of the contents of the instructional strategies such as action learning, concept-mapping, and value clarification evaluated in this study are closely aligned to the principles underlying variation theory of learning. Kullberg et al. (2017) pointed out that Marton and Booth (1997) theory of variation in relation to learning emphasized that variation is a necessary component in teaching to enable students observe what is to be learnt. For instance, in this study, teaching strategies such as value clarification involved the assessment of civic issues and problems by the students drawing on real life situations. In line with the position of Marton and Booth (1997), the selected students presented tentative value decisions on the concept learnt, and advanced reasons for collectively arriving at such a decision, while the facilitator asked value-embedded questions to assess the value assumptions in the position taken by each group of students on the concepts presented.

A recent study conducted by Durden (2018) affirmed that variation theory highlighted the differences between the conceptions of a phenomenon in order to activate conceptual change. The concept-mapping and action learning instructional strategies that were experimented with in this study fulfilled the assertion of Durden (2018). This is consequent on the clarification of the

objectives of the group by the students that participated in the experimental activities. The participants analysed the selected ICT concepts in social studies using action activities, and drawn concept-maps to make inferences from the selected ICT concepts. The students analysed these concepts using interaction and reflection before implementing the solutions suggested to each problem. These actions were repeated until new directions of acquiring knowledge about the selected ICT concepts are found.

Ting, Tarmizi, Bakar, and Aralas (2018) stated that crucial aspects of learning refer to those important features that demanded students' attention in order to see the object of learning appropriately. The experimental strategies in this study enabled the selected students who are of varying academic abilities to analyse the salient features of the ICT concepts which they would not observe during regular school lessons taught using conventional lecture methods by teachers in the selected learning ecologies.

Research Hypotheses

1. There is no significant main effect of treatment on students' attainment in ICT concepts in social studies.
2. There is no significant main effect of gender on students' attainment in ICT concepts in social studies.
3. There is no significant main effect of academic ability on students' attainment in ICT concepts in social studies.

Research Objectives

This study determined the most effective method of teaching social studies concepts of ICT type among action learning, concept-mapping, value clarification instructional strategies and conventional lecture method. It also verified the nuisance effects of gender and academic ability on students' attainment in social studies concepts.

Method

Research Design

The study adopted a quasi-experimental design of pre-test, post-test, control group type to determine the effect of the instructional strategies on students' attainment in social studies concepts. The schematic representation of the design is presented below:

$A_1 X_1 B_4$ _____ Rural learning Ecology I

$A_2 X_2 B_5$ _____ Rural learning Ecology II

$A_3 X_3 B_6$ _____ Rural learning Ecology III

$A_4 X_4 B_7$ _____ Control Group

where A_1, A_2, A_3, A_4 are pre-test measures of experimental groups 1, 2, 3 and the control group.

A_1 - Action Learning Instructional Strategy

A_2 - Value Clarification Instructional Strategy

A_3 - Concept- Mapping Instructional Strategy

A_4 - Conventional lecture method

The study further utilized a 4x2x3 factorial matrix which comprised instructional strategy at four rungs of treatment namely action learning, value clarification, concept-mapping, and conventional lecture method, confounding variables of gender at two rungs i.e. male and female; and academic ability at three rungs, namely low, average, and high. The three hypotheses tested in this study were done at 0.05 alpha level. ANCOVA (Analysis of Covariance) was utilized to process the data gathered in this study consequent on its higher power which enables it to filter out the initial differences in the covariates (Ige, 2012; Ige, 2013; Ige, 2018; Ige and Hlalele, 2017; Piwowar, Thiel & Ophardt, 2013). The magnitude of performance across the four groups was determined using Estimated Marginal mean aspect of Analysis of Covariance.

Participants

The primary population of this study consisted of students at the secondary stage of education in

four rural learning ecologies in Akoko, Nigeria. 170 students' subjects were purposefully selected from eight intact classes in secondary schools situated in these four rural learning ecologies. These subjects were interested in participating in the study, and their schools offered social studies at the Junior Secondary School level.

The researcher took written informed consent from the School Governing Bodies of the selected secondary schools in the four rural learning ecologies. The researcher in company of research assistants and teachers provided adequate information on the study to the students and clarified their queries. Students that showed interest in the study were assured they could disengage at any time they so desired.

Data Collection Tools

The instruments listed below were used for data collection.

1. Action Learning Teaching Guide

2. Concept-Mapping Teaching Guide

3. Value Clarification Teaching Guide

4. Conventional Lecture Guide

5. Social Studies Test for Rural Ecologies

6. Academic Ability Test

7. Research Assistants Evaluation Sheet

Data Collection

The action learning teaching guide emanated from Afolabi and Iroegbu (2012) and Marquardt's (2004) outlines on action learning. The contents of the guide included clarification of the objective of the action learning team, grouping subjects to reflect gender and academic ability distribution of the students, assembling weekly to discuss the selected social studies concepts, and how to learn them using action activities, determining the goal, and developing peculiar action activities through discussion and reflection on novel academic activities to solve the identified civic problems. Repetition of the cycles of action activities is required until new paths are found, and transfer of learning occurs.

The value clarification teaching guide was designed using Metcalf (1971) and Salawu's (2000) model of rational analysis. The teaching guide contained identification and clarification of civic values, collection and organization of civic facts, group evaluation of civic issues, and problems using tangible personal experiences, presentation of tentative value decisions, and evaluation of the value principles in group decisions by the teacher.

The concept-mapping instructional guide was developed from previous studies carried out by Ige (1998) and Miller, Koury, Fitzgerald, Hollingsead, Mitchem, Tsai and Park (2009). The teacher brainstorms to make a list of facts or important ideas related to the concept. These ideas are organized by the teacher and coded into groups to construct a concept map. The teacher lays out the ideas with the integral ideas closest to the main node in groups and sub-groups. The teacher draws lines to connect nodes to show relationships among the groups and sub-groups. The teacher evaluates by asking oral questions about the maps, scores the steps used in solving problems, and gives assignment.

The conventional lecture module was used by the teachers for the control group. The information and communication technology concepts are introduced by the teacher. The teacher subsequently goes on to discuss the concepts one after the other and give notes to the students on the concepts. The teacher asks questions from the students, summarizes the lesson, and gives assignment.

The Academic Ability Test (AAT) taken from Ige (2001) was used to measure the students' ability to perceive and process a given set of information. The test was a modified version of the Sigels cognitive style test. It consisted of twenty cards of pictorial representations. The first picture on each card is coded 'A', the second 'B', and the third 'C' for easy identification. The students are expected to identify two of the three pictures that have common characteristics, choose any two pictures from the three in each group that they feel are complementary, and give reasons for such a choice. The test was first administered on sixty students and re-administered after a two-week interval on the same group of students. The correlation coefficient of the two sets of responses was computed using Pearson Product Moment Correlation, and the stability coefficients of r= 0.60 to 0.72 was obtained.

The ICT Concepts in the Social Studies Test (ICTCSST) which was taken from Ige (2013) was used to evaluate students' attainment of ICT concepts in social studies. The achievement test has 23 multiple choice items with a correct option from answers with options a-d. Five questions were generated at knowledge level, eight questions on comprehension domain, and ten questions on application domain. The reliability of the questions using KR-20 was 0.78. The research assistants' evaluation sheet was used to evaluate the adherence of the teachers to the outlined procedures for the experimental and the control groups. In this study, ICT concepts that were selected in Social Studies are information and communication technologies, problems of information and communication technologies, and social issues and problems. ICT were evaluated with questions such as: One of the ills Information Communication Technology (ICT) is (a) browsing anti-social sites on the internet (b) downloading scholarly articles (c) chatting with friends (d) sending electronic mails; Accessing websites which depict children engaging in sexual conduct with prohibition as child sexual abuse in most countries is called? (a) children fraud (b) child pornography (c) scam (d) none of options a-c. Examples of questions that assessed Problems of information and communication technologies are: A social problem that arose due to the evolution of internet in Nigeria is called (a) drug abuse (b) computer crime (c) prostitution (d) corruption; The use of information technology by terrorist groups and individual to further their agenda is known as (a) al quada (b) osama bin laden (c) spam (d) cyber terrorism; The website where individuals can file complaints of internet fraud globally is called (a) www.ic3.gov (b) www.naijapals.com (c) www.npfnigeria.org (d) www.google.com.

Social issues and problems were evaluated with questions such as: One effect of crimes committed using ICT on the corporate image of a country is? (a) loss of foreign investors (b) economic melt down (c) economic development (d) economic harassment; Which of these cannot be used to solve contemporary social problems in Nigeria? (a) government policies (a) civil society participation (c) personal discipline (d) lack of parental care.

These test items were constructed at knowledge, comprehension, and application levels (See Dees, 2009; Ige, 2013).

Data Analysis

The data were analysed using IBM SPSS 25.0. Analysis of Covariance (ANCOVA) and Estimated Marginal Means aspect of ANCOVA were used to analyse the data. In employing ANCOVA to compare the mean for improvement brought about by the teaching strategies on students achievement, the pretests were used as a covariate. The underlying assumptions for conducting ANCOVA were observed. The only exception was academic ability which was systematically varied at low, average, and high, and activelycontrolled during the experimental activities. The level of significance was set at .05, while the effect size was shown using partial eta squared (η^2). Scholars asserted that an effect size is small at .01, moderate at .06, and large at .14 (Cohen, 1998; Piwowar, Thiel, & Ophardt, 2012; Richardson, 2011; Ige, 2018). The Estimated Marginal Means was used to indicate the magnitude of academic achievement in the experimental and control groups. Descriptive statistics such as Mean and Standard Deviation were utilized to show the performance in the experimental groups across gender and academic ability.

Findings

There is no significant main effect of the treatment on students' attainment in ICT concepts in social studies.

Table 1

Effect of treatment on students' attainment in social studies concepts

Dependent Variable: Post_Student_Attainment

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	12952.715[a]	22	588.950	17.393	.000	.722
Intercept	3307.954	1	3307.954	97.689	.000	.399
Students_Achievement	307.775	1	307.775	9.089	.003	.058
Treatment	4121.294	3	1373.765	40.570	.000	.453
Gender	173.214	1	1 73.214	5.115	.025	.034
Academic_Ability	26.121	2	13.061	.386	.681	.005
Treatment * Gender	25.211	3	8.404	.248	.863	.005
Treatment * Academic_Ability	235.060	5	47.012	1.388	.232	.045
Gender* Academic_Ability	37.085	2	18.543	.548	.580	.007
Treatment * Gender* Academic _Ability	33.127	5	6.625	.196	.964	.007
Error	4977.714	147	33.862			
Total	87706.000	170				
Corrected Total	17934.612	169				

a. R Squared = .722 (Adjusted R Squared = .681)

Table 1 shows that there is a significant effect of the treatment on students' attainment in social

studies education concepts (F $_{(3,147)}$ =40.570; p> 0.05; **η²**=.453). The first hypothesis is therefore rejected. The ANCOVA output shows there is a significant difference in the attainment of subjects taught using action learning, concept-mapping, value clarification and conventional lecture method. There is no significant main effect of gender on students' attainment in social studies concepts.

Table 1 reveals that there is a significant main effect of gender on students' attainment in social studies education concepts (F $_{(1, 147)}$ =5.115; p>0.05; **η²**=.034). Hypothesis two is therefore rejected. There is no significant main effect of academic ability on students' attainment in social studies education concepts (F $_{(2, 147)}$ =1.388; p<0.05; **η** ^{2}=.045).

Table 2

Magnitude of Performance across groups

Treatment	N	Mean	Std.Error
INTERCEPT			
Pre-achievement Score	170	14.753	-
Post Achievement Score	170	23.085	.723
TREATMENT			
Experimental I (Action Learning Strategy)	24	16.724 [a,b]	1.271
Experimental II (Value Clarification Strategy)	93	15.571 [a]	.891
Experimental III (Concept Mapping Strategy)	24	38.682 [a]	1.846
Control (Conventional Lecture Method)	29	19.244 [a]	1.649

  a. Covariates appearing in the model are evaluated at the following values: Students_Achievement = 14.7529.
  b. Based on modified population marginal mean.

Table 2 shows that subjects exposed to concept-mapping instructional strategy (Exp. Group 3) had the highest change in attainment in social studies concepts (38.68), followed by conventional lecture method (19.244), followed by action learning instructional strategy (16.724), and value clarification instructional strategy (15.571). The output of the Estimated Marginal Mean shows that male subjects (24.655) performed better than female subjects (21.516). Subjects with high academic ability (23.727) benefitted most from the treatment, followed by average academic ability (23.088) and students with low academic ability subjects (22.601).

Effects of treatment on Students' Attainment in ICT Concepts in Social Studies

The repeated measures of ANCOVA shows a significant change in the academic attainment of ICT concepts over time, $F_{(1,169)}$ = 69.840, p=.000, **η** ^{2}=.292. The descriptive statistics showed a

significant change in the academic achievement of the experimental groups over time than the control groups, $F_{(3,166)} = 129.580$, p=.000, η^2=.438. The efficacy of the teaching strategies in the experimental groups could be summarised as follow: the pretest scores showed that concept-mapping strategy (X=23.33, SD=10.21), had the highest mean score, followed by action learning strategy (X=14.25, SD=4.63), followed by conventional lecture method (X=13.44, SD=3.60), and value clarification strategy (X=13.08, SD=3.52). However, the post-test mean score revealed that concept-mapping strategy (X=23.33, SD=10.21) emerged the most effective strategy for teaching ICT concepts in social studies.

Posttest Performance Across Groups

Concept-Mapping Instructional Strategy

The descriptive statistics shows that male students with high academic ability had the highest posttest achievement (X=44.40), followed by male students with low academic ability (X=44.00), and students with average academic ability (X=40.60). Female students in this group with low academic ability (X=40.00) had the most change in knowledge of ICT concepts in social studies, followed by average academic ability students (X=39.67), whilst students with high academic ability had the least posttest attainment (X=38.89).

Action Learning Instructional Strategy

Female students with low academic ability (X=15.33) exposed to action learning had a higher posttest attainment score in ICT concepts in social studies than students with average academic ability (X=14.14). Male students with low academic ability (X=20.86) also benefitted more from this treatment than their counterparts with average ability (X=16.00). It should be noted that the output of the SPSS excluded the male and students that were in the high academic ability group.

Conventional Lecture Method

Males with low academic ability (X=23.00) in the control group had the highest posttest mean, followed by males with average academic ability (X=20.18), and male participants with high academic ability (X=16.00) had the least achievement in ICT concepts in social studies. Females with average academic ability (X=18.40) had the highest mean score, followed by the low

academic ability group (X= 18.00), and females with high academic ability (16.67).

Value Clarification Strategy

Male participants in the high academic ability group had the most considerable attainment in ICT concepts in social studies (X=18.00), followed by males with average academic ability (X=17.31), and males with low academic ability had the least attainment (X=13.33) in this treatment group. On the other hand, females with average academic ability (X=15.67) benefitted most in this treatment group, followed by females with high academic ability (X=14.89), while female participants with low academic ability had the least attainment (X=10.50).

Discussion

In this study, I experimented if teaching strategies (action learning, concept-mapping, value clarification) would improve students' attainment in ICT concepts in social studies compared to conventional lecture method. The first thread of analysis was the effect of the instructional strategies on the attainment of students that took part in the study on the ICT concepts selected from the social studies syllabus (hypothesis one). The attainment of the selected students in ICT concepts improved after exposure to the treatments provided in the experimental groups. The participants exposed to the concept-mapping instructional strategy experienced the greatest change in their knowledge of ICT concepts. This outcome illustrated the effectiveness of concept-mapping instructional strategy on the attainment of students in non-urban learning ecologies in social studies.

During the experimental activities, concept maps were constructed and used as an instructional tool during the lessons because of the rural geographical locale of the students. The current outcome of this study concurs with the findings of Morfidi, Mikropoulos, and Rogdaki (2017) who detected that concept-mapping approaches provoked noteworthy changes in poor readers' scores in expository text. Nesbit and Adesope (2006) attributed the efficacy inherent in the concept-mapping instructional strategy in this study to the adventitious (extrinsic) cognitive load in ordering nodes in a bi-dimensional space to clarify relatedness with a single symbol, to integrate the connected concepts and categorically labelling links to establish relationship. The emergence of concept-mapping instructional strategy as an appropriate teaching mode for ICT in Education confirmed Molinari's (2017:300) assertion that concept-maps enable learners to be

aware of the gaps and inconsistencies in their knowledge of a subject-matter which help them to adjust, modify, and reorganize such knowledge.

This study has provided empirical proofs that teachers in rural learning ecologies can kindle students' attainment in social studies concepts utilizing concept maps in their lessons. The advantages are evident in this study, which demand that teachers should methodically use concept-maps in teaching global concepts in the social studies curriculum. Morfidi et al. (2007) however warned that indiscriminate use of mapping to acquire content curricula information might lead children over-dependence on this instructional strategy. These researchers suggested further enquiries to verify the phase and modalities to use when adopting concept mapping instructional strategy to deepen the learning of difficult concepts.

In the current study, it is not unlikely that the two previous teaching practice programmes the research assistants underwent at the selected schools might have contributed to the result. The maps on the selected concept in social studies were constructed by the researchers, the outcomes of this study might be different if the students had been allowed to construct the maps themselves. Consequently, caution should be exercised when using the variant of concept maps that proved effective in this study.

The conventional lecture method emerged as the second most effective strategy in teaching ICT concepts in this research. The conventional lecture method that was used in this study was not modified, it is synonymous with the type used by Ige (2013), and Ige (2018:159) in which the instructor introduced the concepts to be learnt, discussed facts in sequence, gave notes to the students on the selected concepts, asked stimulating questions, and gave take-home assignments to the students. However, the efficacy of conventional lecture method in this study was contradictory to the outcome of a study conducted by Ige (2018:92) that found that the conventional lecture method promoted the negative attitude of students to civic education concepts in mountain learning ecologies. This finding is also antithetical to the discovery of Ige and Hlalele (2017:2702) that the conventional lecture method is the least effective strategy of improving students' learning outcome in civic education concepts. Ige and Hlalele (2017:2704) hinged this assertion not only on the results of their experiment but affirmed that the conventional lecture method became inferior whenever it is paired with experimental teaching strategies.

The efficacy of the conventional lecture method in this research could also be attributed to the composition of students in this group. In this group, there are four students with low academic ability, twenty-one students with average academic ability, and four students with high academic ability. The composition of this group implies that students with low and average academic abilities learnt ICT concepts best when the conventional lecture method is used, while this strategy is the least preferred mode of acquiring knowledge of ICT concepts by the high academic ability group. The post student-achievement mean output obtained in the results of this study attested to this inference.

Contrary to the declaration of Ige (2018) on the benefits inherent in action learning instructional strategy, this strategy proved inconsequential on students' attainment in ICT concepts in social studies. This finding corroborated Vince, Abbey and Langenhan (2018:94)'s discovery that action learning could potentially present scholars with an assortment of personal and organizational dynamics that weakened the efficacy of this strategy to question organized thoughts, works, and interactions (see appendix I).

Value clarification instructional strategy turned out to be the least effective mode of teaching ICT concepts in social studies. This finding contradicted Ige (2018)'s finding which affirmed that value clarification instructional strategy was more effective than the 'chalk and talk' method used by instructors in schools in mountainous settlements. Despite the ineffectiveness of value clarification strategy in this experiment, twenty-eight students in the average academic ability group, and fifty-eight subjects with high academic ability benefitted most from this treatment group, while the outcome was unfavourable to seven students in this group that were of low academic ability.

Considering the second hypothesis, it was hypothesized that gender would not significantly affect the attainment of the participants in ICT concepts in social studies. The outcomes of the data analysed in this study showed that male participants gained more from the treatment groups more than their female colleagues. The descriptive statistics showed that male participants with high academic ability benefitted the most from concept-mapping instructional strategy. Males of low academic ability had the best attainment in the group that used conventional lecture method and action learning, while male participants of high academic ability had the highest attainment mean score. This finding contradicted the outcome of a research conducted by Ige and Hlalele (2017:2702) which affirmed that gender had no influence on students' academic attainment in

civic education concepts. The influence of gender on the academic attainment of students in ICT concepts in social studies observed in this study implies that the instructional strategy i.e. concept-mapping is only beneficial for teaching male students in non-urban learning ecologies.

Academic ability had no significant influence on students' attainment in ICT concepts in social studies. This implies that the teaching strategies that are found worthy to teach ICT concepts in this study are not academic ability specific. It could be inferred from the findings that the concept-mapping instructional strategy used in this study is open to students of any ability level. This outcome confirms earlier findings by Ige and Hlalele (2017:2702) that academic ability was inconsequential on the achievement of learners in civic education. A plausible explanation for the non-sensitivity of academic ability on students' attainment in this study might be attributed to the teaching practice the research assistants had at the selected learning ecologies. The research assistants who were pre-service teachers had familiarised with the subjects during their teaching practices in these learning ecologies, which might have enabled students of varied abilities in this research to adapt to the teaching environment created in the treatment groups.

Conclusion

In this disquisition on students' attainment in ICT concepts in social studies, the connections between concept-mapping, action learning, value clarification, conventional lecture method and students' attainment in ICT concepts in social studies were demonstrated. These analyses had led me to suggest that concept-mapping instructional strategy and conventional lecture method are potentially effective in teaching ICT concepts in social studies in rural learning ecologies. These two strategies of teaching are underpinned by different principles and assumptions which are useful in different learning ecologies to teach ICT concepts. The emergence of conventional lecture method as a suitable strategy to teach ICT concepts in social studies have implications for the retention and use of this strategy and conventional lecture method to teach ICT concepts in social studies. The blend could be made up of topics randomly allocated to each of these strategies on a weekly basis. It is suggested that teachers identify the concepts that students have found difficult from their experiences teaching social studies and civic education concepts in rural schools and allocate such to concept-mapping instructional strategy.

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