Effects of Computer-assisted Teaching Strategies on Students' Social Behaviours in Rural Learning Ecologies: A Model for South Korea's Rural Schools

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ABSTRACT Researchers have stressed the importance of civic education in finding solutions to civic problems. This paper examined the upshots of computer-aided and blended teaching strategies on students' civic attitudes, as well as the confounding effects of cognitive ability and gender. The study adopted the pretest-posttest, control group, quasi-experimental design using 3 x 2 x 3 factorial matrix. Seventy-eight students were selected in six intact classes in rural learning ecologies and randomly assigned to experimental and control groups. The research instruments utilized were: Students' Civic Attitudes Questionnaire (r=0.88), Cognitive Ability Test (r=0.72), Computer-aided and Blended Teaching Instructional Programme in Civic Education for experimental groups and Teachers Instructional Guide on Conventional (Class) Lecture Method for the control group. Three research questions were answered. Data was subjected to Analysis of Covariance (ANCOVA), Estimated Marginal Means, and Scheffe's Pairwise Comparison. There was a significant effect of treatment on students' civic attitudes ($F_{(2; 61)}$ = 3.82, $p < 0.05$; $\eta^2 = .10$). The students' taught with computer-aided teaching strategy had higher adjusted attitude mean score ($\bar{\chi} = 106.02$), than the control group (105.61), and the blended teaching strategy group (= 75.73). It was, therefore, recommended that teachers in rural learning ecologies in South Korea should explore the utilities inherent in Information and Communication Technology based strategies to teach civic education concepts.

INTRODUCTION

The vital role played by Civic Education in the development of desirable attitudes in youths needed for effective participation in the information age is practically missing in educational disquisition. The integral goal of educational institutions in 21st century is the groundbreaking responsibility of training young citizens for democratic 'coming times'. It is premised on the functions of school in preparing young citizens for participation in democratic societies. This is captured in the assertion of Cohen and Chaffee (2012) that the 'engaged citizens' in innumerable societal spheres participate in the social activity through blogging, spurning, to involvement in municipal movements and assembling other civic actors to register a vote, and contest for elective offices. The qualities described by Cohen and Chaffee (2012) as 'civic attitudes' are

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germane to this study. The computer-assisted teaching approaches to develop students' civic attitudes in six rural learning ecologies are deployed in this study. The teaching strategies were mounted on the machine that triggered the third revolution in education (see Ige 2012, 2013; Ige and Hlalele 2017) to enable students in rural learning ecologies develop and exhibit civic attitudes similar to their colleagues in urban learning ecologies when they interact in virtual learning communities on sensitive public debates.

Computer-aided Teaching Programme and Students' Learning Outcomes

Computer offers innumerable opportunities that are beneficial to learning across trans-disciplinary boundaries. There is virtually no discipline in any educational institutions across the globe that has not integrated the use of computers, and other related devices in her teaching-learning process. Scholars declared that with speedy expansion of computer technology and

its associated influence on nations of the world, schools must evolve teaching strategies that will enable students to meet the socio cultural dynamics of the 21st century (Shoemaker 2013; Maninger and Holden 2009; Uibu and Kikas 2008). Shoemaker (2013) utilized the experimental paradigm of non-equivalent control group type to evaluate the impact of computer-aided instruction on fifth grade mathematics learners and achievement, and discovered that computer-aided instruction has no significant effect on the selected students' academic achievement. However, the treatment significantly influenced the attitudes of under-achieving students in fifth grade mathematics. Kposowa and Valdez (2013) in their study discovered that students who used laptops performed better in English Language and Mathematics than students without laptops. These scholars consequently advocated that teachers should make profound usage of technological devices in their teaching-learning activities. It should be noted that the contents of the computer-aided strategy utilized in this study were put on laptop computers for participating students in rural learning ecologies.

Blended Teaching Strategy and Students Learning Outcomes

Blended teaching strategy emanated from the need for teachers to develop 21st century compliant teaching strategies to maximize learners' achievement in schools. Movahedzadeh (2011) corroborated the statement that the prominent role played by technology in the transformation of the learning space led teachers to re-plan their traditional courses using a hybrid model, otherwise known as 'blended learning'. Many nations of the world opened their stance on twenty-first century education consequent on the inescapable use of the Internet (Bell 2016). Blended learning means different things to different teachers and it varies across schools in the world depending on the objectives of the lessons being taught. In this study, blended teaching strategy connotes an admixture of computer-based learning and conventional lecture method due to limited availability and expensive nature of Internet access in rural learning ecologies.

Education in South Korea

Evidences from literature shows that basic and middle educational institutions have no close substitute in South Korea. This situation might not be unconnected with what Hundt (2010) affirmed as the 'Sino-centric regional order from 1300 to 1900' which enabled South Korea to benefit from intimate cultural, mercantile, and diplomatic ties with China in a system of legitimate social scale and informal egalitarianism. Byun and Park (2017) stated that primary schools, that is, Grades 1-6, middle schools, that is, Grades 7-9, and high schools, that is, Grades 10-12 are the components of the Korean K-12 education system. An earlier study by Byun et al. (2012) reported that this part of the education system is characterized with completion of school assignments by location of residence. This is accompanied by learners reliance on private tutoring due to learners quest to improve low school grades, and score high on entrance examinations. The location of the countryside schools makes it difficult for learners to take advantage of the private tutoring initiatives. It is consequent on the disadvantages posed by location to learners in rural schools in South Korea that the computer-aided strategies utilized in this study are proposed for countryside schools in South Korea.

Rural Learning Ecologies

Rural learning ecologies connote schools and their communities in rural geographic locations (Hlalele 2014; Cloud 2005). Jackson (2016) described a learning ecology as a 'person in environment' and 'person in activity' concept. These imply the personality of the learners and other supporting factors in the ecosystem of their rural geographical locations, as well as peculiar activities that defines the learners in a rural context. The concept of rural learning ecologies not only included schools, but other factors in the social ecology of the learners. Hlalele (2013) affirmed that a learning ecology cultivates and reinforces the formation of communities which are constantly evolving, majorly self-organizing and sharing with each other. The schools utilized for this study have these features, and are the major schools servicing the educational needs of the rural communities in which they are located. From the observation of the researcher, and his assistants, the study was conducted in the selected schools at a time the civic participation of the students needed to be improved. The utilization of the selected schools is premised on Collins (1997) phenomenon of 'geographic iso-

lation' which has caused the paucity of teaching staff, which in turn has grave consequences for the reconfiguration of civic dispositions of learners in these schools.

The present study carried out a systematic inquiry to examine the outcome of computer-aided instructional strategies on learners' civic attitudes in rural learning ecologies. It also established the debilitating effects of gender as well as cognitive ability on the civic attitudes of the selected students, and answers the following questions:

1. What are the effects of computer-aided and blended teaching strategies on students' civic attitudes?
2. Which of the teaching strategies has the most effect on students' civic attitudes?
3. What are the reciprocal effects of computer-aided teaching and blended teaching strategies, gender, as well as academic ability on students' civic attitudes?

METHODOLOGY

Research Design

The pretest-posttest control group quasi-experimental design was adopted for the study. A 3x2x3 factorial matrix that comprised instructional strategy at tri-levels of treatment (two experimental groups and one control group), intervening variables of cognitive ability at three levels (low, average, and high) and gender at two levels (male and female) was utilized.

Selection of Subjects

The respondents involved in this study comprised seventy-eight students at the Junior Secondary School cadre. These students in six intact classes were selected for the study because civic education is offered in the selected schools.

Ethical Procedure

The researchers took permission from the management of the schools selected for the study. The researcher sought the permission of the selected School's Management Team. Information about the study was given to the students before the commencement of the study to avoid frustration of both the participants and the researchers. The students were assured of the free-will to disengage at any time without fear of victimization.

Civic Education Concepts Selected for the Study

Five concepts that were basic to the formation of functional citizenship skills such as citizenship, social issues and problems, negative behaviours, values and communication (Ige 2013; Amosun et al. 2015) were selected from the civic education curriculum. Previous studies have attested to the efficacy of the selected concepts in developing functional skills (Ige 2012; Ige 2013; Amosun et al. 2015; Ige and Hlalele 2017).

Instrument and Procedures

Computer Assisted Instructional Programme in Civic Education (CAIPCE)

The CAIPCE was constructed by the researchers to direct the research assistants in experimental group one. This was put to use to ensure adherence to the research process. CAIPCE was validated by educational researchers at a university in Nigeria. The researchers' comments were used to correct *CAIPCE* to promote appropriateness of the instructional programme for participating students as well as curriculum objectives.

Blended Instructional Programme in Civic Education (BIPCE)

The BIPCE guided the research assistants in experimental group two. The BIPCE combined face to face with computer-assisted instructional drawing on the civic concepts selected for the study. Citizenship, problems of ICT and values were animated and put into slides on Microsoft PowerPoint, while the remaining concepts namely ICT, social issues and problems were taught face to face (Ige and Hlalele 2017). Researchers in the field of social studies education in a Nigerian university validated BIPCE. The comments of these researchers were used to amend BIPCE.

Teachers' Instructional Guide on Conventional (Class) Lecture Method

The TIGCLM guided research assistants in the control group. The TIGCLM contained the

civic concepts selected for the study. The TIG-CLM is made up of these steps:

- The teacher introduces the concept
- The teacher discusses facts or ideas on the concepts in steps
- The teacher gives notes on the concept
- The teacher asks questions
- The teacher gives assignment to students (Ige 2012, 2013; Amosun et al. 2015; Ige and Hlalele 2017).

Cognitive Ability Test

The Academic Ability Test (AAT), an amended form of the Sigel's academic ability test was adapted from Ige (2001) and utilized to evaluate the learners' academic ability. The academic ability test comprised 20 cards of pictorial images. The first pictorial image on each card is coded 'A', the next 'B', while the third is coded 'C' for easy recognition. The learners are instructed to spot two of the three pictures that posess shared characteristics, any two pictures in each group that are complementary, and reasons should be given for such a choice. Methodologically, the test was administered on 60 students in intact classes. It was also re-administered after a two week interval on the selected students. The correlation coefficient of the two sets of responses was computed using Pearson Product Moment Correlation, it yielded a stability coefficients of r= 0.60 to 0.72.

Students' Civic Attitudes Questionnaire

The civic action, interpersonal and problem-solving skills, and political awareness sub-scales of Civic Attitudes and Skills Questionnaire developed by Moely et al. (2002) were used to elicit responses on the civic skills of the respondents in rural learning ecologies. The Civic Skills Questionnaire consisted of two sections. Section 1 gathered information on the demographic information of the students. Section 2 of the instruments has three sub-scales namely civic action, interpersonal and problem-solving skills, and political awareness. The civic action attitudes sub scale has statements such as: *'I plan to be involved in my country', 'I plan to participate in a community action programme', 'I plan to be involved in programmes to help clean the environment' and 'I plan to help others who*

are in difficulties' (Bringle et al. 2004). These statements inform the framework on which the current study is based. An estimated á co-efficient value of 0.81 was got using split-half method. Examples of statements in the interpersonal and problem-solving attitudes sub scale are: *'I can listen to other people's opinions', 'I can successfully resolve conflict with others', 'I can think logically in solving problems' and 'When trying to understand the position of others, I try to place myself in their positions'*. The estimated reliability co efficient of the sub scale using cronbach alpha is 0.74. The political awareness attitudes sub scale contain statements like: *'I am aware of current events', 'I understand the issues facing this nation',' I am knowledgeable of the issues facing the world' and 'I plan to be involved in the political process'*. In this research, the calculated á co-efficient value was 0.88 employing Cronbach alpha for this sub scale. The items in the research instrument were structured on a six-point Likert format varying from strongly disagree (1) to strongly agree (6). The total Cronbach's co-efficients of the three sub scales was 0. 86, this was done by adding the responses of the students in each of the three sub scales in Section B. The scores on the first two sub scales were then regressed in contrary to the third sub scale (Aremu 2005; Ige 2015).

Experimental Group 1: Computer-Aided Teaching Strategy

The steps are as follows:

Step 1: The research assistant grouped the students along gender and cognitive ability lines that is, representation of male and female students with low, moderate and high abilities

Step 2: Each group is given a laptop with the contents to be learnt on the screen. A group leader is appointed.

Step 3: The research assistant presents a brief introduction on the selected topic

Step 4: The research assistant unveils the lesson to the students, while the group leader transit from one animated Microsoft Powerpoint slides to the other on behalf of the group.

Step 5: The research assistant takes questions on the lesson presented.

Step 6: The research assistant clarifies the students' questions.

Step 7: The teacher asks each groups to discuss on the lesson.

Step 8: At the end of each group discussion, the leader of the group presents the group's findings.

Step 9: The research assistant summarize the lesson with main the points presented by each group leader.

Step 10: The research assistant directs the group leaders to close the animated Microsoft PowerPoint slides and shut down the laptop computers.

Experimental Group 2: Blended Teaching Strategy

The group alternated between Computer-aided Teaching and Conventional Lecture Method throughout the duration of the study. The steps followed by the research assistant are:
- Introduction of concepts
- Discussion facts or ideas on the concepts in sequence
- Presentation of notes on the concept
- Use of questions to evaluate the concept taught
- Students are given assignments

And the ten steps described for Experimental Group One (Ige and Hlalele 2017).

Control Group: Teachers' Instructional Guide on Conventional Lecture Method

The TIGCLM comprised the highlighted steps in the blended teaching strategy mode.

The treatment lasted for ten weeks in the selected schools. The Posttest was subsequently administered on the experimental and control groups.

Data Analysis

The data collected was subjected to Analysis of Covariance (ANCOVA) using the pretest scores used as covariates. The Estimated Marginal Mean aspect ANCOVA was used to determine the magnitude of performance across the groups.

RESULTS

Table 1 shows that the main effect of treatment (Computer-aided and Blended teaching strategies) on students' civic attitudes is significant ($F_{(2, 61)} = 3.82$; $p > 0.05$; $\eta^2 = .11$). Partial eta square (η_p^2) indicate the effect size, it is small at 0.1, medium .06 and large at .14 (Piworwar et al. 2013). The magnitude of performance across the treatment groups is unveiled on Table 2. The variation got shows a significant difference in the civic attitudes of students exposed to computer-aided teaching strategy, conventional lecture method, and blended teaching strategy.

Table 2 shows that with a grand mean of 98.31, students exposed to computer-aided teaching strategy (Exp. Group 1) had the greatest attitudinal mean score (106.02) followed by students exposed to conventional lecture method (105.61) and students exposed to Blended Teaching Strategy (75.73). The result showed

Table 1: ANCOVA output on students' civic skills
Dependent Variable: Post_Civic_Attitudes

Source	Type III sum of squares	df	Mean square	F	Sig.	Partial Eta squared
Corrected Model	47895.682[a]	16	2993.48	5.498	0	0.591
Intercept	13882.542	1	13882.542	25.5	0	0.295
Pre_Civic_Attitudes	9834.772	1	9834.772	18.065	0	0.228
Treatment	4162.459	2	2081.23	3.823	0.027	0.111
Gender	325.116	1	325.116	0.597	0.443	0.01
Academic_Ability	2904.619	2	1452.309	2.668	0.078	0.08
Treatment * Gender	267.915	2	133.958	0.246	0.783	0.008
Treatment * Academic_Ability	3542.552	3	1180.851	2.169	0.101	0.096
Gender * Academic_Ability	1732.259	2	866.129	1.591	0.212	0.05
Treatment * Gender * Academic_Ability	2105.536	3	701.845	1.289	0.286	0.06
Error	33209.498	61	544.418			
Total	899568	78				
Corrected Total	81105.179	77				

R Squared = .591 (Adjusted R Squared .483)

Table 2: Estimated marginal means on students' civic attitudes

Variable	N	Mean	Std. Error
Intercept			
Pre-Civic Attitudes Score	78	88.71	-
Post Civic Attitude Score	78	98.31	3.307
Treatment			
Experimental I (Computer-assisted Teaching Strategy)	26	106.019	7.373
Experimental II (Blended Teaching Strategy)	14	75.733	7.297
Control Group (Conventional Lecture Method)	38	105.612	4.427

that computer-aided teaching strategy had the greatest effect on the respondents' civic attitudes. This is consequent on the fact the independent variables, cognitive ability, and gender accounted for 59.1 percent $(.591)^2$ of the total variation in the civic attitudes of the students.

The implication of the results on Table 2 is that there is a significant difference in the civic attitudes of the treatment groups (Computer-aided and Blended teaching strategies) and participants in the control group (Conventional Lecture Method). This implies that significant differences existed in the civic attitudes of computer-aided teaching strategy ($\overline{X}$= 106.02), Conventional lecture method ($\overline{X}$= 105.61), and Blended teaching strategy ($\overline{X}$= 75.73). To ascertain the sources of the significant difference, Scheffe's post-hoc pair-wise comparison was conducted and presented on Table 3.

Table 3: Scheffe's pair-wise comparisons of civic attitudes across the treatment groups

Treatment	Mean	Exp. 1	Exp. 2	Control Group
Exp. I	106.019		*	
Exp. II	75.733	*		*
Control	105.612		*	

* Implies that there is a significant difference

The result in Table 3 reveals that the source of the reported significant differences emanated from the civic attitudes mean scores of students in experimental groups 1 and 2, and civic attitudes mean scores of students in experimental group 2 and the control. The two-way interaction on Table 1 shows that showed no significant effect on students' civic skills ($F_{\{3, 61\}}$ = 1.29; p< 0.05; η^2 =.06). This implied that civic attitudes of the students civic did not vary significantly among students with low, moderate, and high ability levels. Therefore, the attitude of the students was not sensitive as a result of exposure to different strategies of teaching.

DISCUSSION

This enquiry is part of global efforts engineered at training young citizens in rural learning ecologies for functional participation in the information society. With the deployment of computer-related devices to enhance the civic participation of learners in urban learning ecologies, it becomes extremely urgent to design teaching and learning platforms that ensures learners in the rural geographic terrains are not 'left behind'. Thus, the cynosure of this study is to explore the efficacies of computer-aided and blended teaching strategies on students' civic attitudes in rural schools. The current study has revealed that computer-aided teaching strategy positively influenced students' civic attitudes in rural learning ecologies. This finding corroborated the position of Hew and Cheung (2014) on using blended learning to promote attitudinal change towards student's immediate nations. The revelation from the analysis of data gathered in this study further attested to the ubiquity of the computer in modern day teaching-learning process. This finding is congruous with some prior studies (Kposowa and Valdez 2013; Ige 2012; Bottge et al. 2014).

One of the rare findings of this study is the efficacy of the conventional lecture method over the blended teaching strategy. It should be noted that the dawn of the information age spurred educational researchers to develop and experimented with new strategies of teaching. Babayemi et al. (2016) stated that the outcomes of several teaching experiments negated the use of conventional lecture method consequent on its 'teacher addicted' nature. The opinions of these scholars might not be unconnected with the non-participatory nature of conventional lecture method. It is evident from the current study that

conventional lecture method can be used to fos-
ter students' civic attitudes in rural learning ecol-
ogies where computer-aided teaching devices
are inaccessible. This negates the outcomes of
previous studies (Ma and Lee 2007; Lombardy
2007) on the potency of blended teaching strat-
egies in enhancing students learning outcomes,
and Ige and Hlalele (2017) that discovered that
computer-aided and blended teaching strategy
considerably enhanced students' academic at-
tainment than the conventional lecture method.
The results of this study have shown that this
might be an exception in teaching experiments
aimed at fostering the civic attitudes of students
in rural learning ecologies.

CONCLUSION

One of the defining features of South Korea
is her socio-cultural attachment to transference
of culture from one generation to another, which
emanated from the ancient Confucian affirma-
tion that 'human is transformed through educa-
tion', and the belief that only the enlightened
has the reserved privilege to administer her pub-
lic cum societal political structures. Without this
privilege some South Korean rural learning ecol-
ogies lost relevance as Seoul and other major
cities have translated to become the nation's
dominant political and economic hubs. Few
schools in rural Korea have stayed open conse-
quent on dwindling enrolment trends, despite
South Korea's government robust funding to
these schools. Despite these challenges, learn-
ers in rural schools in South Korea have contin-
ually spend lengthy periods in 'Hagwon' i.e.
academy or cram school to excel in important
examinations and continuous assessments to
enable them have favourable ability rating from
higher education institutions. Reports abound
that despite the sparse population of learners in
these rural schools, government has been pro-
viding free computer laboratories equipped with
modern Information and Communication Tech-
nology equipment. The availability of these lab-
oratories in rural schools in South Korea is one
of the basic implement needed in the computer-
assisted teaching strategy.

RECOMMENDATIONS

The computer-aided teaching strategy de-
ployed to foster students' civic attitudes in this
study is hereby proposed for usage in South
Korea's countryside's schools. This will enable
South Korea to realize her mission of helping
the children that remain in rural schools keep
pace with their counterparts in urban schools in
Korea's educational system which is reputed as
one of the most competitive academic systems
in the comity of nations. The computer-aided
instructional programme has the prospects to
diminish the lengthy time spent by learners at
'Hagwon' in South Africa if supported with the
relevant Internet facilities. It is believed that
these recommendations would help rural schools
in South Korea to regain their relevance, and
compete favourably with schools in urban learn-
ing ecologies.

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REFERENCES

Amosun PA, Ige OA, Choo KKR 2015. Impact of a
participatory cyber crime prevention programme
on secondary school students' attainment in crime
prevention concepts in civic education and social
studies. *Education and Information Technologies,*
20(3): 505-518.
Aremu OA 2005. A confluence of credentialing, career
experience, self-efficacy, emotional intelligence, and
motivation on the career commitment of young
police in Ibadan, Nigeria. *Policing: An Internation-
al Journal of Police Strategies and Management.*
28(4): 609-618.
Babayemi JO, Ahmed AA, Yisau, SO, Babalola GT 2016.
Effect of enhanced conventional lecture method on
students' achievement in basic science in Oyo State,
Nigeria. *International Journal of Educational Bench-
mark*, 5(2): 74-88.

Bell DVJ 2016. Twenty first century education: Transformative education for sustainability and responsible citizenship. *Journal of Teacher Education for Sustainability*, 18(1): 48-56.

Bottge BA, Ma X, Gassaway L, Toland MD, Buttler M, Choo S 2014. Effects of blended instructional models on math performance. *Exceptional Children,* 80(4): 423-437. DOI: 10.1177/0014402914527240.

Bringle RG, Philips MA, Hudson M 2004. The Measure of Service Learning: Research Scales to Assess Student Experiences. Washington, DC, US: American Psychological Association. http://dx.doi.org/10.1037/10677-008. From <http://psycnet.apa.org/index. cfm?fa=search.displayRecordanduid=2003-88367-008> (Retrieved on 12 June 2017).

Byun SY, Park H 2017. When different types of education matter: Effectively maintained inequality of educational opportunity in Korea. *American Behavioral Scientist,* 61(1): 94-113.

Byun S, Kim KK, Park H 2012. School choice and educational inequality in South Korea. *Journal of School Choice,* 6: 158-183.

Chandler AM 2010. South Korea: Paradox of Rural Education. PRI. From <https://www.pri.org/stories/2010-12-23/south-korea-paradox-rural-education> (Retrieved on 15 October 2013).

Cloud A 2005. *Educating for a Sustainable Future.* Sydney: Commonwealth of Australia.

Cohen AK, Chaffee BW 2012. The relationship between adolescents' civic knowledge, civic behaviour and their self-reported future likelihood of voting. *Education, Citizenship and Social Justice,* 8(1): 43-57.

Collins BC 1997. Training rural educators in Kentucky through distance learning: A model with follow-up data. *Teacher Education and Special Education*, 20(3): 234-248.

Hew KF, Cheung WS 2014. Using Blended Learning. *Springer Briefs in Education.* DOI 10.1007/978-981-287-089-6_2.

Hlalele D 2013. Sustainable rural learning ecologies-a prolegomenon traversing transcendence of discursive notions of sustainability, social justice, development and food sovereignty. *T.D: The Journal for Transdisciplinary Research in Southern Africa, Special Education,* 9(3): 561-580.

Hlalele D 2014. Creating sustainable rural learning ecologies in South Africa: Realities, lessons and prospects. *Journal of Human Ecology*, 45(2): 101-110.

Hundt D 2010. China's 'Two Koreas' policy: Achievements and contradictions. *Political Science,* 62(20): 132-145.

Ige OA 2012. *Action Cyber-Crime Prevention Programme in Civics and Social Studies: The Nigeria Experience*. Germany: Lambert Academic Publishing.

Ige OA 2013. *Impact of An Action Cyber Crime Prevention Programme on Secondary School Student's Learning Outcomes in Civic Education and Social Studies Concepts.* PhD Thesis, Unpublished. Nigeria: University of Ibadan.

Ige OA, Hlalele DJ 2017. Effects of computer-aided and blended teaching strategies on students' achievement in mountain learning ecologies. *Educ Inf Technol.* doi:10.1007/s10639-017-9598-x.

Ige TA 2001. Concept of mapping and problem-solving teaching strategies as determinants of achievement in secondary school ecology. *Ibadan Journal of Educational Studies,* 1(1): 290-301.

Jackson NJ 2016. Exploring Learning Ecologies. First Edition. Chalk Mountain. ISBN 9780993575907. From <http://www. normanjackson.co.uk/uploads/1/0/8/4/10842717/exploring_ learning_ ecologies_ chapter_ 1.pdf.> (Retrieved on 9 April 2017).

Kposowa AJ, Valdez AD 2013. Student laptop use and scores on standardized tests. *Journal of Educational Computing Research*, 48(3): 345-379.

Maninger RM, Holden M 2009. Put the textbooks away: Preparation and support for a middle school one-to-one laptop initiative. *American Secondary Education,* 38(1): 5-33.

Moely BE, Mercer E, Sterett H et al. 2002. Psychometric properties and correlates of the civic attitudes and skills questionnaire (casq): A measure of students' attitudes related to service-learning. *Michigan Journal of Community Service Learning*, 8(2): 15-26.

Movahedzadeh F 2011. Improving students' attitude toward science through blended learning. *Science Education and Civic Engagement*, 3(2): 13-19.

Piworwar V, Thiel F, Ophardt D 2013. Training inservice teachers' competencies in classroom management. A quasi-experimental study with teachers of secondary schools. *Teaching and Teacher Education*, 30: 1-12.

Shoemaker TL 2013. Effect of Computer-aided Instruction on Attitude and Achievement of Fifth Grade Math Students. A Dissertation Submitted to Liberty University, Lynchburg VA. From <http://www. digitalcommons. Liberty.edu/cgi?article= 1790 and context= doctoral.> (Retrieved on 2 December 2016).

Uibu K, Kikas E 2008. The roles of a primary school teacher in the information society. *Scandinavian Journal of Educational Research,* 52(5): 459-480.