

EXAMINING THE ROLE OF COMPUTERS IN THE TEACHING AND LEARNING OF GEOGRAPHY AT ADVANCED LEVEL: A FOCUS ON SIX HIGH SCHOOLS IN WARREN PARK/ MABELREIGN DISTRICT, ZIMBABWE

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Abstract

The advent of modern technology has been a welcome development in education. It is a development that was envisaged to make teaching and learning easier, enjoyable and accessible to all who require it. E-learning has now been used to support the traditional methods of teaching and learning. The introduction of computers in education has witnessed a change from the traditional approaches to teaching to the use of computer assisted instruction (CAI). To support the use of modern technology, the Zimbabwean government has distributed computers to both primary and secondary schools. To complement government effort, parents and other stakeholders through School Development Committees, School Development Associations and Old Students Associations have contributed to the acquisition of educational resources that include computers. All these efforts were meant to facilitate teaching and learning in schools. Despite these efforts the performance in Geography at Advanced level has remained low compared to other subjects. The purpose of the study was to examine the extent to which computer assisted instruction (CAI) has been utilised in the teaching of Geography at Advanced level. The study also made an analysis of other approaches used in the teaching and learning of Geography. The study used the mixed methodology and the descriptive survey design. Data was collected using structured questionnaires, open-ended questionnaires, and face-to-face interviews. The six schools were conveniently sampled and the respondents were randomly selected. The study concluded that there are many factors that have contributed to poor performance in Geography at A level. Some of the factors that emerged were lack computer skills for both teachers and pupils. There was limited use of computers in map work. Other areas that did not receive serious consideration in the teaching and learning of Geography were field work and hands-on approach to teaching and learning Geography as a subject. The study recommends that there be a paradigm shift in terms of the methods used in the teaching and learning of Geography at Advanced level.

Key words: Performance, E-Learning, Advanced Level, Computer assisted learning, Teaching and Learning, Computer Assisted Instruction (CAI).

Background to the study

Geography as a subject plays a pivotal role in helping people understand and appreciate environmental issues among other benefits. Geography touches on different aspects of life that include the economy, the environment and environmental management, population and migration, meteorology and climatology among other aspects. Concerns for the world economy and environment have been demonstrated by different international organisations and agencies such as the United Nations, United Nations Environmental Programme (UNEP) and United Nations Educational Scientific and Cultural Organization (UNESCO) among others. Such concerns have seen the establishment and convening of conferences such as the World Economic and Environmental Conference (WEC). On a similar note, the Southern African Development Community (SADC) has put in place strategies to implement different conventions on environmental management and climate change. In addition to that the SADC has come up with environmental policy goals that focus on improving people's lives through sustainable environmental management practices. Another commitment by SADC is the use of environmental education as a strategy to promote sound environmental management. It is within this context that the proper teaching becomes important, not only for the purpose of passing examinations, but sustainable development.

The teaching and learning of Geography has tangible benefits to both the society and the individual. These include the benefits of understanding the physical and social environment. At the same time it helps the individual to develop skills and abilities that enable the individual to function efficiently within the community. Such skills include problem identification skills, observation and analytical skills, interpretation and problem solving skills. One of the outstanding benefits of teaching and learning Geography is that it provides education for sustainable development. As such, acquiring the knowledge of current affairs and the environment has proved to be very attractive in terms of job opportunities. The area of Geography and Environmental Studies has also been found to be highly rewarding in terms of remuneration. These notable factors have contributed to students choosing Geography as one of the subjects they study at Advanced level in Warren Park/ Mabelreign District. However, despite the interest shown only a few students managed to pass Geography with at least a grade E. Information from the Zimbabwe Schools Examination Council (ZIMSEC) shows a low performance in Geography, Biology, Accounting and Art over the years 2012, 2013 and 2015. According to ZIMSEC (2015) the percentage pass rate at A' level was 82.09 % in 2012. The three highest performing subjects were Food Science (96.95%), Ndebele (94.07%), and Literature in English (90%). In the same year, the three subjects with the lowest pass rates were Biology (55%), Geography (54.27%) and Accounting (38.27 %). In 2013 Geography appeared again among the bottom three subjects with the lowest pass rate. A similar trend was noted in 2014, in which Geography registered a percentage pass rate of 36.01% and with 15061 registered candidates (ZIMSEC, 2015). This was the second highest number of candidates registered in a subject. This in a way appeared to confirm students' preference to Geography and Environmental management related courses as noted above.

The statistics above confirm that most of the students studying Geography at Advanced level were not performing well. While the above represent performance at national level. This scenario has been observed in schools in Warren Park/Mabelreign District, Harare. This raises a number of questions as to the methods used in the teaching and learning of Geography. The inclusion of environmental topics into advanced level syllabus of the Zimbabwe schools examination council(ZIMSEC) has brought about changes in the manner

Geography has to be taught. Such topics require that teaching and learning have to be environment linked in order for students to learn from their experiences. At the same time the use of computers was aimed at enhancing teaching and learning in Geography through computer assisted instruction (CAI). It has been argued that computer assisted instruction has actually transformed the classroom and revolutionised teaching and learning. As such, CAI has made teaching and learning more effective, learner-centred, interactive and diverse in character,

Statement of the problem

The study of Geography is central to sustainable development within communities. As noted in the statistics above, the number of students who registered for Geography was comparatively high. This may be an indication that students appreciated the significance of Geography in sustainable development. The main problem is that most of the students were failing Geography at Advanced level, thereby jeopardising their career prospects. This low performance can be attributed to teaching methods employed in the teaching of Geography at advanced level. The question is: To what extent has computer assisted instruction been utilised in the teaching and learning of Geography at Advanced level?

Purpose of the study

The purpose of the study was to assess the extent to which computer assisted instruction was being utilised in the teaching and learning of Geography at Advanced level in Warren Park/Mabelreign District, Harare.

Objectives

The study was guided by the following objectives:

- To identify methods used in the teaching and learning of Geography at Advanced level.
- To identify the extent to which computers are being used in the selected schools.
- To assess the extent to which teachers and students are conversant with computer programmes used in the teaching and learning of Geography at Advanced level.
- To identify challenges associated with the use of computer assisted instruction in the teaching of Geography at Advanced level.

Research questions

The study aimed at finding answers to the following research questions:

- What are the approaches used in the teaching of Geography at Advanced level?
- How have schools used computers in the teaching and learning of Geography at Advanced level?
- To what extent are teachers and students conversant with computer programmes relevant to the teaching of Geography at advanced level?
- What are the challenges associated with computer assisted instruction in the teaching and learning of Geography at Advanced level?

Assumptions

The study is based on the following assumption:

- The available computer programmes have not been fully utilised by teachers and students to enhance teaching and learning in Geography.

Significance

By undertaking a study on the role of computer assisted instruction in the teaching of Geography at Advanced level, the study will assist school heads and Geography teachers and students on how best they can improve performance in Geography. The study is also important to the ministry of education, and policy makers as they can come up with strategies and policies that enhance computer assisted instruction (CAI) in schools. The study also provides an overview on the extent to which computers are being utilised to enhance teaching and learning of Geography. The study is therefore a useful indicator of the significance of the computer as a teaching and learning aid.

Delimitations

The study focused on six high schools in Warren Park/Mabelreign District of Harare which offered Geography at Advanced level. High schools in Warren Park/Mabelreign District were selected because they were easily accessible to the researcher. The study was restricted to an assessment of how computers were used in the selected schools during Geography Advanced level lessons. It focused on form five classes and form six classes.

Limitations

The study used the descriptive survey method of research, where the questionnaire, the observation method and interview methods were utilised to obtain data. The method is not without limitations. The questionnaires for instance, presented a number of problems. Firstly, the researcher had to persuade respondents to cooperate in completing a questionnaire, of which some agreed while some declined. Another limitation of the study is that the conclusions were drawn from data collected from the selected six schools and as such the findings refer specifically to the six schools.

Review of related literature.

Teaching and Learning Methods used in Geography.

Different methods have been used in the teaching of Geography. Good teaching is a result of the different methods that enable students to learn and at the same time there no single best method of teaching. Such a position supports the idea that if students are to learn effectively, they have to be exposed to different methods of teaching and learning. What is of key importance is that the different methods that students are exposed to have to take cognisance of the students' learning styles. The learning styles of the students to a large extent determine the methods to be used when teaching. As such teaching methods are equally important as

they are a scientific way of presenting subject matter which takes into consideration the psychological and physical requirements of the student. The methods to be adopted in the teaching of Geography depend on a number of factors. These include observation method, field work, excursion method, laboratory method, demonstration method, lecture method, project method, descriptive method, and comparative method (Basha, 2004). The advent of modern technology in education has brought in new methods of teaching. These are learning through technology, computer assisted instruction and E-learning.

Lecture method

One of the commonly used methods in teaching is the lecture method. The lecture method is characterised by the use of an organized verbal presentation of the subject matter which is at times augmented by visual aids and is also characterised by the active participation of the teacher in delivering information. It has been observed that the method is commonly used in colleges and other institutions of higher learning. At that level lecturing involves uninterrupted talk from a teacher to students who are passive recipients of information. It is characterised by one-way communication. It places more emphasis on the presentation of the content and the activities within the classroom are teacher-centred, teacher-controlled and information centred. Basha (2004) observes that the lecture method has a number of advantages that have seen its continued use despite new interventions in teaching Geography. Such advantages include the following: it is economical as it can benefit a large number of students at any given time; it allows for the quick dissemination of information and is easy to follow. On the other hand Basha (2004) notes that the lecture method is characterised by a number of weaknesses which include the following: negligible participation of students; ignores the need to develop students' faculties; it fails to cater for individual needs and differences; fails to promote the participatory approach to learning; does not develop any scientific skills in students; and tends to be authoritarian. Other weaknesses associated with the lecture method are that it is not student-centred, as it ignores the practical aspects of learning and that it is knowledge centred rather than development centred.

The discussion method.

The discussion method can be used across disciplines. It goes beyond the stage of giving information as propagated by the lecture method, as it helps students to process information. One major advantage of the discussion method is that it can be used to complement other teaching and learning methods. Discussion sessions differ from lectures in that students are more active than in the lecture method as they are directly involved and that the discussion method promotes personal contact. In addition to that the discussion method is interactive in nature and as such contributes to the development of personal skills, social skills and language skills as they interact and share. Discussions can be done in groups of varied sizes, making it possible to use the method in classes all sizes and disciplines. The discussion method has a number of advantages in the teaching of Geography. These include giving students opportunities to formulate principles in their own words and to suggest the applications of these principles; they help students to become aware of and define problems; and can increase students' sensitivity to other points of view and alternative.

Students also take turns in leading discussions. This contributes to the development of leadership skills among students. Through discussions students are able to talk purposely about the course material and the role of the teacher is to facilitate learning. There are aspects that have to be considered for a group discussion to be effective. These include taking time to

plan and review the subject matter; making decisions on the time to spend on the discussion; and developing clear goals for the discussion (Middendorf, 1994).

The question and answer method.

The question and answer method has its origins in the ideas of the Greek Philosopher Socrates. The question and answer approach performs many functions which include assessing the students as the lesson progresses, ensuring participation of students during the course of the lesson, its use cuts across all teaching situations; and can quickly assist in establishing where students are having difficulties in the subject. As noted by Middendorf (1994) the question and answer method can be used to arouse interest and curiosity concerning the topic, and to focus attention of the learner on a particular issue or concept. The method develops an active approach to learning, at the same time stimulating students to ask questions, at the same time structuring a task in a way that maximises learning. It also performs a diagnoses role since specific difficulties inhibiting students' learning are identified and rectified. The method also provides an opportunity for students to assimilate and develop thinking skills. Questions can be low order or high order. Such questions cater for the different levels of the students in cognitive development. The questions that teachers ask invite students to take part in the lesson and share experiences; at the same time provide a platform for interaction between students and teachers and interaction among students.

The Computer and Computer Assisted Instruction

The teaching and learning methods employed within the school have an impact on pupils' progression through their course. The school, therefore, endeavours to expose students to a variety of teaching approaches. Methods employed may include lectures, questions and answers, experiential, self directed, problem-based learning, computer-assisted learning, case studies, demonstrations, film/video, role play, tutorials, small group work clinical skills teaching and discussion. Information technology has revolutionised the education system through different forms of presentations that include power point presentation, excel and multimedia among others. The advent of new technology in education has put a teacher in the 21st Century in a complex position as he/she is at the crossroads with the past, present and future.

In response to these new demands in education, some professional institutes have designed packages to assist teachers by introducing electronic tools in education. From a simple slideshow and overhead projector, computers have made inroads into the teaching field to help teachers impart knowledge and information to students in a more effective manner with the benefit of making the learning process a fun experience for teachers and students. On a similar note, Becker (2000) asserts that the computer may be used by teachers for consequential activities such as worksheets and homework, assignments, quizzes and tests. These activities are assigned so that students can practise and demonstrate skills mastered. Becker (2000) further asserts that classroom teaching is sometimes viewed as an activity in which resources for serving individual clients are brought to bear against a population of individual clients to be saved. Therefore, adequate resources are required for effective teaching using computers. In a classroom setting, computers may not be practically effective unless there is a sufficiently favourable ratio of students to computers.

There are a number of ways schools can use computers in teaching and learning of subjects including Geography. As noted by Rallis (2000) the computer has been used to replace the chalkboard as what the teacher or student notes down can be projected on the screen. Such notes are then shared by the whole class and can be saved for future use. When using computers power point can be used in place of slides and uploaded to course web page.

Power point can be used by both the teacher and student to give presentations in class and also present assignments. Rallis (2000) further notes that the internet can also be used outside the classroom as they can be tasked to read specific web pages as assignments. Apart from the power point, course web pages, internet, online discussion forums and student created web pages can be used in teaching and learning (Rallis, 2000). There can also be integration of web sites with teaching of lessons and class presentations. In addition to that students can share and discuss through chat and discussion platforms, thus providing an interactive environment.

Studies by different scholars have demonstrated the advantages of using computer assisted instruction over the traditional methods. Gibson, Cartledge and Keyes. (2011) conducted a comparative study on the teaching of reading through the computer and traditional method and concluded that computer assisted instruction had advantages over the traditional method of teaching English. The use of computer assisted instruction is also supported by Rani (2007) who investigated the effects of computer assisted instruction on language achievement of children with learning disability. Rani (2007) concluded that computer assisted instruction method was much more superior to the traditional methods.

The limitations of using Computers in teaching and learning

There are a number of concerns that have been raised in relation to the use of computers as teaching and learning tools. Some of the challenges are related to the classroom set-up as the room size and arrangement make it difficult to bring a computer cart for all students to view the screen; there may be too much lighting in the rooms if there are no curtains or blinds; and access to the internet may be limited (Rallis, 2000). There is a substantial amount of time required to set up equipment that supports use of computers. On the other hand the use of computer assisted learning is premised on the assumption that teachers and students are computer literate, which is not the case in most schools. There Geography lesson for example does not have to be used to teach computer literacy, otherwise students may not have enough time to focus on the Geography syllabus.

Other challenges relate to connectivity. Connection to the internet may be slow and unreliable. Computer assisted instruction has to go beyond the classroom. In developing countries there are still challenges related to access to computers and laptops let alone the internet. In some cases, students may have the gadgets, but lack of connectivity disadvantages them.

On the other hand, computer assisted instruction places high demands on the teacher who is already overburdened by large class sizes. The large class sizes compromise the individualised and personalised teaching and learning demanded by computer assisted instruction. As such, for the teacher, creating computer based materials for the class and learning the necessary skills and up-dating information can be time consuming. There are a number of benefits that can accrue through establishing a web site, but maintaining it is time consuming as there is need to always check that external links are working and to monitor online class discussions. Monitoring is necessary since some students may use the computer for other purposes that are not related to education.

The Research Methodology

The study used the mixed methodology and the descriptive survey design. The mixed methodology gave the researcher the opportunity to ask questions that required both quantitative and qualitative responses. The mixed methodology assisted in offsetting the weaknesses of both qualitative and quantitative methodologies when they are on their own.

Data was collected using structured questionnaires, open-ended questionnaires, observations and interviews.

The Population and the Sample

The population comprised all the secondary schools in the district. The sites of six secondary schools were conveniently sampled. The respondents who comprised ten Advanced level Geography teachers and sixty students were randomly selected.

Data Analysis

Data was qualitatively analysed based on themes that emerged from the research questions and responses to the interview and questionnaire questions.

Findings

The sample comprised ten Geography teachers and sixty Advanced level schools. On qualification, 60% of the teachers had Diplomas in Education and they had specialised in the teaching of Geography at teachers' college and 40% of the teachers had degrees in which Geography was their main course. The students comprised 30 doing form five and another 30 doing form six in the six selected schools. The average age of the students was eighteen. The findings from the data are discussed under sub-themes below.

Teaching methods in Geography

To ascertain the extent which teachers and students in the sample utilised computer assisted instruction in the schools, they were asked to indicate the methods they used in the teaching and learning of Geography at Advanced level. They were asked to rank the teaching and learning methods according to how often they used them. They were ranked on a scale of five to one with the method often used being awarded a five and the least used being awarded a point. They selected from the following methods: lecture; fieldwork; question and answer; project method; discussion and computer assisted instruction. Responses by teachers and students indicated that the commonly used method in the teaching of Geography was the lecture method as it accumulated three hundred and forty five points out of a possible three hundred and fifty, thus representing 99% of the total points. The method with the second highest points was the question and answer method with a cumulative total of three hundred points, thus representing 86% of the total points. The top two methods commonly used in the schools are teacher centred. This may suggest that when it came to the development of scientific skills in Geography, students were being disadvantaged in many ways. As noted by Basha (2007) the overuse of the lecture method disadvantaged students in many ways which included negligible participation of students, denying students opportunities to explore and the failures by the methods to develop students' faculties. The over-reliance on the two methods may have a negative impact on the students' attitudes towards the learning of Geography as a subject.

On the contrary, the two methods that received the least ratings were fieldwork and computer assisted instruction. Fieldwork had an accumulative total of one hundred and forty points, representing 40% of the total; whereas computer assisted instruction had the least with a cumulative total of seventy points, representing 20% of the total. This appeared to suggest that while schools had computer laboratories, computer assisted instruction was not one of the preferred methods of teaching and learning and the reasons for this scenario were varied.

The relevance of the computer in the teaching and learning of Geography

While the use of the computer in teaching and learning of Geography was minimal, both teachers and students acknowledged that the computer as a teaching tool was of great importance. They noted that it provided for easy access to information through the use of the internet. Apart from computers and laptops provided by schools, students can now use phones to access information through the internet. Computer assisted instruction can be in different forms. These include drill-and-practice, tutorials, games, simulation, discovery and problem solving. When asked to indicate how they normally used the computers, teachers noted that they used them mostly for preparing teaching documents such as schemes of work, lesson plans, preparing registers and storage of data. This appeared to support observations by the National Center for Education Statistics (NCES) (2000) that teachers tended to use computers for creating instructional material, administrative record keeping, and to access model lesson plans. It would appear that teachers had a tendency to use the computer as a writing tool more or less like a type writer rather than a tool to assist in the actual teaching and learning of subjects such as Geography. This may be due to a number of reasons, which may include limited functionality on the extent to which the computer can aid teaching and learning.

Other benefits noted by both teachers and students included the view that the computers motivate both the teacher and the student as teaching and learning are made easier, funny and enjoyable if well planned. The computer also motivates students in that it allows pupils to acquire more information which could not have been provided by the teacher during the lesson. However, it was noted that computer assisted learning was not fully implemented due to the shortage of computers in the schools, and lack of internet connectivity.

Challenges in the implementation of computer assisted instruction

A number of challenges that impede on the full implementation of computer assisted instruction in schools were identified. These can be categorised in terms of the origin of the challenge. For example, some challenges are resource related. This appears to support observations by Rallis (2000) who noted that the use of computers was at times affected by the size of the rooms in schools which were not initially designed for computer use and at the same time setting up equipment to support computer assisted learning could be time consuming. Other challenges noted by respondents relate to the time allocated for each lesson on the time-table and the need to complete the syllabus within a specified time. Some teachers and students noted that they lacked the requisite skills that would make them function within a computer assisted lesson. They noted that some of them were not computer literate. Computer assisted instruction, is manageable in classes that are relatively small. From observation, it was noted that some of the classes had as many as fifty students. Another challenge was the need for constant monitoring of students so that they did not abuse the internet facilities.

CONCLUSIONS

From the above findings, the study came up with the following conclusions:

- The commonly used methods in the teaching of Geography at Advanced level were the lecture method and the question and answer method. The least used methods were fieldwork and computer assisted instruction. In that regard, the teaching of Geography in the schools was predominantly teacher-centred.

- Computers were not being fully utilised in the teaching and learning of subjects such as Geography.
- Most teachers and students lacked competencies that would make computer assisted instruction effective.
- The teaching and learning of Geography at Advanced level was characterised by many challenges. These included large classes that teachers had to manage; limited resources as some schools did not have enough computers to support computer assisted learning; lack of computer proficiency in teachers and students; time constraints as teachers had to race against time to complete the syllabus; the classrooms were too small to accommodate the required computer equipment to support computer assisted instruction; and poor internet connectivity.

RECOMMENDATIONS

The study came up with the following recommendations:

- There is need to in-service teachers on the use of modern technology in the teaching of Geography, as teaching and learning methods have to focus on developing skills that help the students understand and appreciate of the social environment and physical environment.
- The role of teaching and learning through computer assisted instruction has to be emphasized at school level. Schools have to invest in acquiring modern technology that makes learning fun and enjoyable.
- Computer Studies have to be introduced at the earliest level for students to acquire computer skills which have a spill-over effect on the teaching and learning of other subjects through the computer assisted instruction method.
- Schools have to liaise with service providers for internet connectivity and new classrooms that are to be constructed have to accommodate the use of modern technology in education.

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