

The Contribution of Geography Teachers' Use of Computer Applications on Students' Academic Achievement

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Abstract

The study aimed to assess the contribution of Geography teachers' use of Computer applications on students' achievement in Tanzania. The study employed a qualitative approach and a single case study design to gain deeper information from the informants. Twelve (12) secondary school teachers teaching geography subject in four public secondary schools were employed as a sample together with Twenty (20) secondary school students studying geography subject. Qualitative data collected from interviews conducted with the key informants were analysed thematically by considering six steps: familiarization with the data, generation of initial codes, searching for themes, reviewing themes, refining themes, and writing-up process. The results revealed that, Geography teachers use Computer applications to prepare classroom activities, to actual teaching, making evaluations and to convert complex concepts into simple ones to make the students understand. The study concludes that using Computer applications by Geography teachers simplifies teaching and assists students to participate effectively in the learning process. It is recommended that teachers should use Computer applications when teaching their students. Schools should have adequate Computer applications facilities with teachers' training to achieve their students' educational improvement in Geography. Moreover, the government should ensure the usefulness of Computer applications in secondary school education to encourage teaching and learning and realise students' achievement.

Keywords: computer applications, geography subject, public secondary schools, student academic achievement

1.0 Introduction

The high failure rates of students in Geography subject have created concerns among education stakeholders, regarding the use of computer application (Narzullaevna & Nilufar, 2021). For instance, Yotham and Ndabi (2023) reported the failure of Malaysian and German students in the Geography subject. Such failure is attributed due to lack of Computer applications among teachers. Thus, the use of Computer applications is essential

to simplify the accessibility of teaching and learning materials, which allows deeper understanding and, hence, achievement of students in schools (Francis, 2017). In America, a study by Yilmaz (2021) found that Computer applications are widespread and impactful in people's lives. The result shows that, in 2015, 90% of Americans aged 18 to 29 years used Computer applications. Similarly, the study done in Iraq by Kadhim (2020) found that many secondary school Geography teachers are confident and aware of using Computer applications in teaching and learning processes because they have been trained in Computer applications.

Additionally, African countries need students to achieve more in Geography. For instance, a study by Anlimachie (2019) points out that most Ghanaian students consistently perform poorly in Geography subject examinations. Likewise, the study by Tanyanyiwa and Madobi (2021) in Zimbabwe shows that a lack of appropriate Computer applications facilities limited the engagement of Geography teachers and students in classroom activities. The study by Constance and Masarurwa (2018) in Botswana shows that Geography teachers have inadequate skills in using Computer applications in teaching. In South Africa, Ramaila and Molwele (2022) assert that using Computer applications by Geography teachers promotes active learner engagement and interaction in classroom activities, resulting in student academic achievement in the subject.

Even if African students in secondary school achieve poorly in Geography; Kunwar (2021) related private and public schools and found that private school students perform better than public schools because using Computer applications in private schools is highly concerning compared to public schools. This implies that Geography teachers have limited skills in using applications like Microsoft Word, Microsoft PowerPoint, Microsoft Excel and others related to teaching and learning Geography subjects. The results show that Geography teachers rarely use Computer applications in the classroom due to inadequate Computer applications skills (Kunwar, 2021)

In Tanzania, the poor student academic achievement rates in Geography have created concerns among education stakeholders regarding student achievement. Thus, the achievement of students in Geography still needs improvement (Selemani, Ndume, &

Kisanga, 2021). The teacher's practice of using Computer applications in teaching and learning Geography will improve the success of students' academic achievement, even though its usability remains inconsistent among the teachers. The study by Amani (2021) opines that Computer applications skills training are valued to increase practical uses of Computer applications in secondary schools. Government efforts are being made to deliver Computer applications training to all secondary school teachers by 2025 (Mandari&Koloseni, 2022). Moreover, a study done in Tanzania by Mwaluko., Musamas., and Tarmo (2023) found that most Geography teachers in secondary schools never use Computer applications in teaching. However, a few teachers use computers to facilitate Geography content due to poor resources and training for teachers.

Even though Geography is a subject taught in Tanzania's secondary schools, it needs to use Computer applications efficiently and soundly understood by the students. Still, some teachers do not use Computer applications when teaching Geography, which demoralizes the students' active engagement and affects their learning achievement. Therefore, this study intended to assess the contribution of teachers' use of computer technology in teaching Geography subject to secondary school students' achievements.

2.0 Literature review

The use of Computer applications by teachers will provide the best learning environment for their students to be creative and achieve their learning objectives (Turkle 2015). The teacher uses Computer applications during classroom activities to improve students' sense of discovering and solving problems during their learning activities (Tanti, Maison, Syefrinando & Daryanto, 2020). Likewise, Aghaei (2020) explained that improving computer facilities affects the teaching of Geography subjects and the rising practice of using creative technology to help teachers' instruction and learning in the growing power of Computer applications in academic settings. However, in Romania, a study by Goga and Roşu (2021) revealed that using new technologies in Geography teaching helps students understand facts more quickly and easily, interact with classroom activities, and motivate development.

Furthermore, in America, the study by Yilmaz (2021) found that 59% are Internet users, 49% are social media users, and 67% are mobile users. Technology is widespread and an impactful part of people's lives. Also, in 2015, 90% of Americans aged 18 to 29 used computer technology. A study in Iraq by Kadhim (2020) found that many Geography teachers know Computer applications for teaching Geography subject because they have been trained in them. The Computer applications are used at all levels of educational fields, including secondary schools.

In Africa, there needs to be better achievement of students in Geography subject, whereby using Computer applications in teaching and learning will promote active learner engagement and interaction in classroom activities, resulting in student achievement in the subject (Ramaila & Molwele, 2022). Contrary to the study by Tanyanyiwa and Madobi (2021) in Zimbabwe, a lack of appropriate Computer applications facilities limits the Geography teachers' and students' ability to perform classroom activities. The study done by Constance and Masarurwa (2018) in Botswana shows that Geography teachers need to improve their use of computer technology programs due to limited skills related to teaching and learning Geography. The results show that Geography teachers rarely use computer technology in the classroom on the teaching due to inadequate Computer applications.

In Tanzania, the failure to achieve students in Geography still needs to be solved. For instance, Amani (2021) found that student academic achievement is increasing through using Computer applications in learning activities, particularly in Geography subject during teaching and learning. Although Computer applications are commonly applied to teaching and learning across various subjects, including Geography, still their use of computers are needed for students to learn about natural resources and the environment and develop practical skills to preserve the surroundings for economic and social development (Yotham & Ndabi, 2023). However, Yotham and Ndabi (2023) opine that there are still poor student performance rates in Geography. They further indicate that nearly 47% of students fail to achieve better in 2016 to 2020.

Despite using Computer applications in teaching Geography, Some Geography teachers hesitate to do so due to a lack of skills and resources. The main problem lies in

understanding how the use of Computer applications by Geography teachers in teaching subjects will affect students' academic achievement. Therefore, this study assessed how the poor achievement of students in Geography subject would be solved by using Computer applications by Geography teachers in teaching subjects.

3.0 Materials and Methods

3.1 Research Approach and Design

This study employed qualitative research approach which aimed at assessing key informants' experiences and views on the contribution of teachers' use of Computer applications in teaching Geography to public secondary school students' achievement. On top of that, the study employed a single case study design to get deep information from the informants.

3.2 Participants

The study being qualitative had a target population that involved four public secondary schools with the total of 32 key informants, of whom 12 were Geography teachers from four secondary schools and 20 were secondary school students out of 450 students studying in Iringa Municipality. The key informants were selected purposively among the target population because they had enough data regarding the problem under exploration. For example, Geography subject teachers are expected to supervise, manage and facilitate learning activities for their students, making assessments, teachings, evaluating, and even mentoring students, in subject wise. The students were also encouraged to participate in the study because they are the ones in whom teachers invested their pedagogical and knowledge important to their achievements.

3.3 Data Collection Methods

The study employed interview method to gather information from the key informants. Such data collection method was very crucial as it enabled the researcher to cover all questions targeted the key informants.

3.4 Data Analysis and Ethical Considerations

Thematic analysis was used to analyse interview data collected from the teachers and the students. Six steps noted by Maguire and Delahunt (2017) were considered by the

researcher. Such steps included: (i) familiarization with the data – the researcher read all the interview transcripts collected from the geography teachers and students; (2) generation of initial codes – the researcher creates some codes based on the collected data so that to organize them in a meaningful and systematic way. Each segment of data that captured something relevant was coded; (iii) searching for themes – the researcher searched for specific issues related to the research questions. All themes searched were descriptive as they described patterns in the data relevant to the research questions; (iv) reviewing themes – the researcher reviewed the identified themes by modifying and developing the preliminary themes in order to make them sensible and supportive to the data; (v) refining themes – the researcher also refined the themes and presented them in a way that related to each other; and (vi) writing-up process – the researcher started writing the organized themes with related excerpts in a paper.

The researcher observed the following ethics before, during and after data collection. Firstly, the researcher obtained the research permit from the Director of Postgraduate Studies at Ruaha Catholic University that introduced her to the government authorities such as in the District Executive Director, District Secondary Education Officer, and Heads of Schools. Secondly, the researcher sought informed consent from the key informants by explaining the purpose of conducting the study so that whoever feels to withdraw from participating in the study could have done so and those wishing to participate in the study do so. Thirdly, the researcher explained to the key informants that whatever they speak will be confidential as no any information spoken by one the key informants and the researcher will be shared to other people. That is, even their names were not considered during the interview process and during data compilation. Lastly, the researcher acknowledged all the sources used in the paper write-up process to avoid academic dishonesty.

4.0 Results and Discussion

The contribution of Geography teachers' uses of computer applications in teaching to students' academic achievement in the subject, Tanzania were the main issue of the study. The questions were asked in the interview method regarding the contributions of Geography teachers' use of computer applications in teaching to student academic achievement in the subject in public secondary school. The result and discussion under the study are presented

hereunder in sub themes which are generated from the teachers' use of computer application, particularly in teaching, learning and as well as specific subject areas using the computer applications.

4.1 The Use of Computer Application in Teaching

In order to indicate the contribution of Geography teachers' use of Computer applications in teaching on students' academic achievement, questions were provided to Geography teachers related to the way they apply skills, use available and suitable Computer equipment in teaching. The equipment used in teaching Geography subject while applying computers includes projectors, printers, photocopiers, laptops, desktop computers, etc. Geography teachers use them to project notes and keep records of students, and teachers reduce the costs of purchasing hard copies of text, reference books, and other studying materials. This makes more available, and currently, soft and printed learning materials are used. It was said that teachers who use Computer applications in classroom activities contribute positively to their students' achievements, as supported by one teacher from school "B" who said: "I used MS PowerPoint during teaching and learning activities by projecting the lesson notes in the classroom so the students could view and take on their exercise books" (Interview with Geography Teacher from School B, 26th February 2024).

In support of that, the Geography teacher from school A had this to say:

I am using a projector presentation to show various geographical concepts, such as pictures and videos. Most concepts concern the environment, landforms, and volcanic eruptions in the form of three and four students. But for forms one and two, I use hard copies of printed studying materials to show lesson notes and diagrams during my classroom teaching because it simplifies teaching, attracts students' involvement and participation in learning, and builds interest in the Geography subject (Interview with a teacher from School A, 26th February 2024).

This finding are similar to the findings of the study by Constance and Masarurwa (2018), who assert that Geography teachers use Computer applications such as PowerPoint

presentations to show pictures and diagrams, and, in some cases, they watch videos and documentaries. Mollel, Minami, Munezero, and Ngayinteranya (2022) show that Computer applications impacted the improvement of innovation, and learners challenged themselves to learn Geography. The use of Computer applications is very significant in teaching Geography subject to perform classroom activities (Kadhim, 2020).

Moreover, the lack of computer equipment facilities and good Computer applications infrastructures in schools is denied in some schools. However, the distribution and availability of computers in secondary schools are unequal. Some schools have more Computer equipment, while other schools are faced with outdated Computer equipment, which affects the teachers and students who use them. This interrupts the possibility of the teacher performing their classroom duties with the support of Computer devices.

One of the Geography teachers from school A opined that:

I do not use Computer applications because there is a lack of computers in our school. The Computer equipment available in schools needs to be updated, discouraging me from integrating it and finally making teaching and learning less accessible. Even though it helps in searching for learning materials related to Geography, I usually search for the diagrams and some of the explanations by using my private computer and smartphone devices (Interview with Geography Teacher from School A: 26th February 2024).

In support of the argument raised by the teacher of school B

Even if Computer applications are used extensively in the teaching and learning process by projecting the lesson in the classroom, sometimes, due to a large number of students available in the classroom and poor power supply, such electricity causes difficulties in integrating computer devices frequently (Interview with Form4 Geography Student₁₈ from School B: 23rd February, 2024).

This finding is similar to the study done in Europe by Karunakaran and Dhanawardana (2023), who assert that in some schools, Computer applications devices are restricted from being used outside the special room, reducing their utility. Also, Wakhungu (2023) conducted a study in Kenya that showed that the need for Computer applications facilities denied using Computer applications in learning Geography subject. The study shows that 97% of the classes are not equipped with Computer applications facilities, which leads to minimal student achievement. Furthermore, according to Mollel, Minami, Munezero, and Ngayinteranya (2022), Geography teachers need more Computer skills in using applications programmes such as online and websites and software related to teaching and learning Geography subject. The results show that Geography teachers rarely use Computer applications in the classroom due to a lack of motivation and confidence.

Moreover, a few studies revealed that teachers' use of Computer applications is widespread due to the availability of computer skills and training, and the researcher shows that adequate computer resources could also promote students' achievements. However, Geography teachers still refuse to use it in teaching and learning. This implies that schools need to take serious action to overcome the hindrances facing Computer applications as presented, such as the availability of resources, infrastructures, maintenance, and frequent training, which will provide computer improvement and useful Computer applications devices for secondary school teachers.

4.2 In learning

Computer applications are important for students' achievement in Geography. During the interview with teachers, it was observed that, it simplifies the teaching and learning process also it makes classroom activities more interactive and actively engage the learners, which increases their ability and interest in problem-solving.

One teacher from school D asserted that:

There are so many important computer technologies in our school daily duties as teachers such as it attracts my students to study Geography increases performance in school, and promotes achievement in combination with Geography subject such as CBG,

HGK, EGM and other related studies related to the subject. Also, the use of computer technology influences the attention of students in classroom activities, which supports teaching and learning activeness and brings relevant features to students relating to specific geographical concepts and content (Interview with Form₃ Geography Student₁₈ from School C: 26th February 2024).

In support of students from School B:

It helped us describe several features on the earth's surface, such as real presentations of landforms, environmental events, and social matters, through videos, diagrams, and maps projected or printed in hard copies during Geography classroom periods (Interview with Form₃ Geography Student₃ from School B: 26th February, 2024).

This finding concur with the findings of the study in New Zealand by Hogan (2020), which asserts that Computer technology is a means of getting students engaged in their learning and ultimately taking charge of their learning. The use of Computer applications in the Geography subject is significant in improving students' achievement.

The result shows that students tended to be engaged when they were engaged in learning activities designed using Computer applications. According to Wambura (2017), students agreed that computer applications in education facilitate learning because they are a source of studying materials, improve student understanding, and save time.

Computer applications are mostly used in schools, but different circumstances could hinder their integration and utility. One student from school A responded as follows:

Even though computer devices like projectors help us learning by doing Geography subject specifically in practical Geography topics such as Survey, Photography and Map work and Map interpretation, but the problems that I experienced when using computer applications firstly is adequacy of skills and enough knowledge on how to use it, secondary accessibility of the resources and facilities

in our school (Interview with Form₃ Geography Student₃ from School A: 26th February, 2024).

One student from school B responded as:

In our school, there needs to be more computer equipment for the number of students, and are there computer rooms and even specific classes and time for learning. Also, school is affected by the shortage of electricity supply because it is not constantly supplied (Interview with Form₃ Geography Student₃ from School B: 26th February, 2024).

The findings are similar to the findings of the study done in Ilala, Tanzania by Wambura (2017) shows that unskilled Computer Application Geography teachers lead to unskilled students and incompetence as a result of inappropriate computer applications facilities. In the educational environment, Computer applications have become a part of our everyday lives; the use of Computer applications in educational programmes supports the learning process. The Computer applications training should be provided to meet students' needs since computer applications are required (Ndume, Kisanga & Selemani, 2021). Therefore, Computer applications may increase learners' participation. Computers help students and teachers achieve subject knowledge (Patil, 2020). On top of that, Kadhim (2020) asserted that based on the use of Computer applications devices, it is very significant that Computer applications should be used at all levels of the educational field, especially from primary to secondary schools.

4.3 Specific Subject Areas Using Computer Applications

Most of the teachers had a positive view of the use of computer applications. They believed that, computer applications generally simplify the whole process of teaching and learning, save time, help solve different and difficult geographical problems around the school and in life, and help students make memoranda and prepare different Geography projects.

On top of that, one student from school C had this to say: "Computer application is supportive since it reduces the burden of searching Geography materials easily and provides

them which has boosted the academic performance of students” (Interview with Form₃ Geography Student₃ from School: 28th February, 2024).

Addition to that, another student from school A claimed that “Computer applications help me to learn practically as I see many features of the earth’s surface, such as the atmosphere and its zone, landforms and others” (Interview with Form₃ Geography Student₃ from School A: 26th February, 2024).

Similarly, a European study by Narzullaevna and Nilufar (2020) revealed that students’ use of Computer applications increases their proximity to the lesson, which may increase their interaction with Geography concepts and other disciplines by discovering complex geographical processes. This makes the students controls their knowledge, organize personal work and reinforce new materials. Also, teachers who use Computer applications can organize and monitor learning for each student, quickly evaluate, and increase students’ attention and interest in Geography. According to Mollel, Minami, Munezero, and Ngayinteranya (2022), Computer applications impact the improvement of innovation; learners challenge themselves in learning Geography, and it plays a big part in learning. The school should have enough resources to develop Computer applications skills.

Computer applications in Geography specifically depend on their integration with the nature of content and concepts, such as topics or the suitability of the equipment, so that they could bring achievements in teaching and learning. Teachers and students use Computer applications in classroom activities based on specific subject areas and concepts. It enables teachers to display teaching aids such as project diagrams and geographical illustrations. Also, it shows pictures and videos of different features like volcanic eruptions and other related concepts, which help the students to view and depict the features in real things. As a result, it brings the interest and attention of the student.

One of the Geography teachers from school D responded that:

The use of Computer applications, especially in our school students, is based on developing creativity, which brings critical thinking, communication, and presentation skills to students as they learn

through projected videos and pictures. They also build fun learning environments as students interact with computer applications (Interview with Geography Teacher from School D, 27th February, 2024).

In support of that, the Geography teacher from school A responded as follows:

Computer applications have many effects on students' achievements, but they mostly bring students together to find various learning notes and other studying materials; they allow the students to observe pictures and diagrams using computer technology devices simultaneously. In short, they promote active and collaborative learning, leading to much achievement in Geography subject (Interview with Geography Teacher from School D: 28th February 2024).

Inculcate a sense and ability for self-study, self-confidence, and self-advancement in new frontiers of science and technology, as well as academic and occupational knowledge and skills. Develop readiness to join the world of work. Secondary educational competencies based on making students critical, creative thinking and problem-solving communication and digital literacy whereby Computer applications plays a very vital role in contributing or meeting the curriculum demand (MoEST, 2019).

Moreover, Computer applications have achieved great success in Geography subject. However, some negative effects, like the scarcity of constant power supply, the lack of skills to utilize it, and even the availability of computer resources and equipment in sampled schools, are experienced.

One of the Geography teachers from school D responding to this question said:

Computer technology has a negative effect on teaching and learning because it requires a lot of time to prepare a lesson, especially organizing and preparing devices like projectors. I spend a lot of time, which reduces the lesson duration because sometimes more

than ten to twenty minutes are lost (Interview with Geography Teacher from School A: 27th February, 2024).

Similarly, a European study by Tanyanyiwa and Madobi (2021) revealed that the need for appropriate computer technology facilities limited students' ability to study and engage in classroom activities. Mollel, Minami, Munezero and Ngayinteranya, (2022) added that Geography teachers need more computer technology skills in Computer applications programs like online websites and software for teaching and learning Geography subject. The results show that Geography teachers rarely use computer technology in the classroom. It depends on the teacher's motivation and confidence. Therefore, the school should have enough resources and facilities to allow good use of Computer applications skills and hence the achievement of students in Geography.

5.0 Conclusions

Based on the study findings, it is proper to conclude that training of teachers in computer applications and basic operation programs is necessary for assisting students. Students' involvement and participation in using computers to perform different assignments is one of the areas of emphasis. The computer facilities and resources according to educational needs are not adequate hence affecting students to participate actively and interact in the learning process.

6.0 Recommendations

It is recommended that the school's settings should be considerate, ensuring all the educational needs of the students are met. Also, teachers should use Computer applications in teaching and learning activities positively and encourage their students to achieve their Geography subject goals. The teacher should also apply much of their time assisting their students with subject matters related to Geography subject.

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