THE USE OF VIDEOS AND ANIMATIONS TO IMPROVE LEARNERS'

ACHIEVEMENT IN NAMIBIAN SENIOR SECONDARY CERTIFICATE

GEOGRAPHY

IN SELECTED SECONDARY SCHOOLS IN OHANGWENA REGION

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Approval Page

This research has been examined and approved as meeting the required standards for partial fulfilment of the requirements of the degree of Master of Education (10MEET).

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Abstract

Multimedia usage as an instructional tool in education is an important way of communicating the 21st century language to the digital natives of the 21st century. Several models have been put forward to suggest how multimedia use in education may improve the learners' academic achievements. However, little research has been done to investigate how multimedia influences the academic achievements of learners in Geography. Therefore, this study was conducted to investigate whether the use of video and animations (multimedia) improves learners' performance in Namibia Senior Secondary Certificate Geography in Ohangwena Region. The population of this study was all Grade 12 learners studying Namibian Senior Secondary Certificate Geography from all secondary schools in Ohangwena Region. A quantitative research design in the form of a quasi-experimental pre-test/post-test control design was used to collect primary data in order to answer the main underlying question for the study and to test the research hypotheses. A pre-test was given to all the participants, followed by an experimental treatment to the experimental group and then a post-test to both the experimental group and the control group. A *t* test was run to help in finding answers to the main underlying question. After the experiment, the results show that the experimental group performed slightly higher than the control group (Experimental group: M=19.33, SE=1.06; Control group: M=18.08, SE=.86). This shows a *p* > .05, thus no sufficient evidence to reject the null hypothesis. Overall, this study suggests that multimedia usage in education improves learners' performance, although not significantly. Therefore, awareness of the power that the usage of multimedia tools in education has, specifically its influence on the academic performance of Grade 12 Geography learners, could provide a useful tool in increasing the likelihood that teachers and all

the stakeholders in education can incorporate in everyday planning of what happens in classrooms to help improve the Grade 12 Geography results. However the results are contrary to what several authors who wrote strongly on the influence of multimedia on the academic performance of learners stated. Based on the results, it should however be borne in mind that this study was only conducted once and on a small group of learners over a short period of time. The results point to the fact that educators may not use multimedia as the only tool for teaching, but rather use it as a support and mediating tool only to complement their work.

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List Of Abbreviations and Acronyms

NSSC – Namibian Senior Secondary Certificate

NSSCO – Namibian Senior Secondary Certificate Ordinary

ICT – Information and Communication Technology

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Dedication

This study is dedicated to my mom Albertina Popinawa Mwetulundila and my late daddy Gabriel "Menier G." Shilongo who brought me up and inspired me throughout my life. It is also dedicated to my son Teuyanoshinge Caleb for the joy he always brings me, even during the hardest time of writing this thesis, and to my wife Elizabeth.

Declaration

I, Simon Kaukungwa Shilongo, hereby declare that this thesis is a true reflection of my own research, and that this work, or part thereof has not been submitted for a degree in any other institution of higher education.

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CHAPTER 1: INTRODUCTION

1.1   Introduction

Multimedia in education is a vital tool in contemporary times. It is used by many educators in order to remain competent and to respond to the growing demand by parents, society and the nation for producing learners who excel in specific subjects. It should be noted that if an effective method is employed in teaching Namibian Senior Secondary Certificate (NSSC) Geography, it will result in improved learners' performance. All educators therefore need to make use of multimedia tools in education and to make it an integral part of their everyday classroom activities.

This study aimed at investigating whether the use of video and animations improve learners' performance in NSSC Geography in Ohangwena Region, Namibia. The focus was on secondary schools because learners' performance in NSSC Geography has been poor in recent years. The study was limited to the Grade 12 Namibian Senior Secondary Certificate (NSSC) Geography learners in Ohangwena Region. The study was a comparative quantitative study, whereby a quasi-experimental research design (a non-equivalent pre-test/post-test control group design) was used to answer the research question.

In this first chapter of this thesis, the researcher discusses the orientation of the study whereby the researcher explains the importance of the use of multimedia as a tool in education. The chapter further discusses the statement of the problem, research questions, hypotheses, significance of the study, and limitations and delimitations of the study before concluding with the definition of terms.

1.2   Orientation of the study

In contemporary times, teachers are frequently urged to make use of multimedia technology to teach subject content (Kramsch & Andersen, 1999). This is because multimedia such as animations and videos are without doubt important tools in education. According to Kramsch and Andersen, when these tools are used, learners get to see specific principles and concepts in action, which improves their understanding of those principles and concepts. When multimedia are used as an instructional tool, they help draw the learners' attention and help them to construct meanings faster as the visual component aids the brain in understanding the process involved, which in turn can be used to improve learners' performance through improving their retention and understanding of concepts being taught (Rieber, 1990). Gagne and Driscoll's (1988) information processing model views learning as a cognitive process whereby outside stimuli is changed into new ability. The eyes, mouth, ears, nose, hands serve as the receptors that change stimuli into physical neural information stored in a sensory register. Therefore, when multimedia are used, the learners are able to effectively store the information received.

Multimedia are also useful in teaching language across the curriculum because by using them, learners' linguistic skills are strengthened to a certain extent through learners' access to a variety of multimedia technology, e.g., videos (Kramsch & Andersen, 1999). Thus, various multimedia such as animations and videos have a particular ability to communicate information (Dransch, 2000). Animations and videos are important components of any curriculum that aims to use technology to improve learners' retention and performance (Ringstaff & Kelley, 2009). Mayer (2005) supports animation use in teaching by stating that animations can be used to visualize concepts that are not spontaneously perceived the way they are in the

scientific domain (such as how clouds and rain form) and help clear various misconceptions held by learners. For most Namibian Geography learners, the frequently used way of studying for examinations is memorizing, whether with understanding or not. Thus, multimedia usage in teaching and learning can help learners to get better results if they study through improve the results of memorizing (Nan, 2005).

The Namibian government has acknowledged the importance of Information and Communications Technology (ICT) by referring to the general use of ICT, stating that it plays a role in education both as a subject and as a tool to assist in education delivery (Ministry of Basic Education & Ministry of Higher Education, 2005). The Namibian ICT for Education policy also made it clear that the use of multimedia tools offers opportunities for more learner-centred teaching, thereby giving at-risk learners greater opportunities for learning (Ministry of Basic Education & Ministry of Higher Education, 2005). In addition, the use of multimedia promotes a student-centred way of learning, and therefore when used, the teacher no longer remains the only factor in the learning process. Moreover, it promotes learners' vocabulary acquisition because it increases learners' autonomous abilities in learning (Hai-Peng & Li-jing, 2007).

The traditional method of teaching in Namibia is one where a greater deal of information is poured on the chalkboard. During these lessons, the standard sitting arrangement is where learners sit either in rows or in groups of 4-6 facing the teacher and the chalkboard. In many instances, teachers use the lecturing method to pass the content across to the class. Thus, during such lessons, the channels by which information gets to the learners are mainly visual (text and chalkboard) and auditory (teacher's voice) (Hai-Peng & Li-jing, 2007). Although this form of presentation has

for a lengthy period of time dominated education, today there is more encouraging evidence that students' understanding can be enhanced by addition of visual forms of presentation (Mayer & Moreno, 2002). Modern advancement in graphical technology has made it possible for more varied and dynamic illustration of concepts, for instance, the usage of animated video and computer animations, to show motion and dynamics more explicitly (Price, 2002).

Due to the spatial nature of Geography as a subject, many teachers in Namibia face a challenge of preparing learners sufficiently before taking the final examination in Grade 12. Jain and Getis (2003) report that the acquisition of spatial knowledge in Geography courses is a highly visual process and multimedia can be a useful tool to deliver visual representations of both physical and cultural environments. According to multimedia principles, the use of animations results in a brief sensory image because when a learner pays attention to these animations, parts of the images become represented in the working memory, from where the learner can start to organise different fragments into a coherent picture, which results in learning (Mayer, 2005).

As an educational tool, multimedia opens up immense possibilities of contextualization by textualising knowledge through its representational capabilities (Kramsch & Andersen, 1999). Using multimedia in teaching has the following advantages: Firstly, learners respond to multimedia in a complex way and it gives them the feeling of experiencing information instead of simply acquiring it. Secondly, the learners have more fun from multimedia and learning becomes enjoyable (Hai-Peng & Li-jing, 2007). Hai-Peng and Li-jing further point out that several researchers have proved that learning materials which attract learners' long term attention have positive effects on the memory of new words. This is helpful

especially in Geography where learners need to learn definitions of various concepts and where learners need to know certain keywords for them to be awarded marks on certain answers to questions.

Many scholars such as Jain and Getis (2003) and Ringstaff and Kelley (2009) are in favour of multimedia learning as a tool to improve learners' performance. However, other studies, such as that of Schnotz and Rasch (2005), have found that the use of multimedia does not improve learners' performance. According to Schnotz and Rasch, although the use of animations in a classroom is inherently attractive, they are not always beneficial for learning. Schnotz and Rasch further point out that problems may arise especially when animations modify the learner's cognitive load in an unintended way and this retards learning. This occurs when learners get bombarded with many concepts that they cannot understand and therefore instead of them learning, they end up not learning what the teacher intended them to learn.

In this fast paced digital world, there is lack of time and opportunity for learners to reflect on their learning (Lambert & Cuper, 2016). Reflection and critical thinking enable learners to learn from their experiences, thus, time must be built into classroom instruction for both processes to occur (Henniger, 2003). Lambert and Cuper (2016) advise that while technology is well able to facilitate effective communication in our modern classrooms, today's learners must learn to think deeply about their changing global society.

1.3   Statement of the problem

The Namibia Senior Secondary Certificate Geography examination reports for the last three (3) years (2014, 2015 and 2016) revealed that learners had problems with most spatial topics across the Geography syllabi as learners could not grasp the

various spatial concepts. This is evident in the NSSC Geography statistics for Ohangwena Region for the last three years (from 2014 to 2016), which have shown an average of 26.33% pass rate (A to D symbol), whereas 73.67% of the learners in Ohangwena Region who sat for the NSSC Geography national examination during the same period performed below average (Directorate of National Examination Assessment, 2014, 2015, 2016).

The concern was that perhaps the teaching methods being used are not efficient in addressing learners' needs and learning styles. To tackle the problem at hand, it is important that all available teaching methods are exhausted to determine which method is best in solving the underlying problem. Therefore, this study investigated whether the use of videos and animations can improve learners' academic performance in NSSC Geography in selected secondary schools in Ohangwena Region.

1.4   Research question

Is there a statistically significant difference in the performance of Geography Grade 12 learners taught with videos and animations (audio, moving graphics and text) and that of learners taught with drawings and text only?

1.5   Hypotheses of the study

H_0: There is no statistically significant difference in learners' academic performance in Grade 12 NSSC Geography between learners taught with videos and animations (audio, moving graphics and text) and those who are taught with drawings and text only.

H_1: There is a statistically significant difference in learners' academic performance in Grade 12 NSSC Geography between learners taught with videos and animations

(audio, moving graphics and text) and those who are taught with drawings and text only.

1.6   Significance of the study

This study investigated whether or not the use of multimedia in teaching of specific Geography topics improves learners' academic performance in NSSC Geography in Ohangwena Region.

The findings of this study will contribute to the existing knowledge and perceptions of Namibian educational professionals towards the use of multimedia, thereby giving them a choice whether to embrace the use of multimedia in their Geography lessons or not. The results will also encourage school principals to provide instructional leadership support to Geography teachers in making informed decisions in facilitating the use of multimedia in their classrooms. Furthermore, the study will offer Geography teachers with empirical evidence for using multimedia in their classroom teaching on spatial topics in Geography. The findings of the study may also serve as a motivation for Geography teachers to use multimedia in order to improve the learners' performance in NSSC Geography. The findings will also contribute to the existing literature on multimedia usage in education and may help guide the Ministry of Education to formulate plans and policies on ICT in education.

1.7   Limitations of the study

The limitations of this study were that the duration that school principals granted the researcher was shorter than what the researcher needed to obtain sufficient data. Also, the study was done after normal school hours, and learners were tired and in a hurry to go home, which may have influenced their concentration during this late session. Learners responded differently to the pre-testing and post-testing, realizing

that there was someone observing them, therefore they tried to do their best. To ensure the results were not affected by these limitations, the researcher designed the lessons so they could be completed within the allocated time. Learners were given time (two hours) in all three days of activities to go for lunch and rest before participating in the study.

1.8   Delimitations of the study

The study was conducted in secondary schools in Ohangwena Region that offer NSSC Geography. It targeted only the Grade 12 learners who had Geography as a subject. The study was limited to finding out whether multimedia (animations and videos) improve the academic performance of the learners in Geography. The findings of this study are limited to only one secondary school in Ohangwena Region.

1.9   Chapter outline

The thesis consists of six chapters. The first chapter is the introduction, which includes the orientation of the study, the research questions, the hypothesis that the researcher wanted to test, and other introductory information. This is followed by the literature review under which various sources are reviewed to find out what other scholars have written concerning the usage of multimedia in education. The third chapter deals with the methodology used during the data collection. Chapter 4 presents, analyzes and discusses the findings of the study, while the last chapter concludes the thesis and makes recommendations.

1.10   Definition of terms

Animation: Animation refers to a simulated motion picture depicting movement of drawn (or simulated) objects (Mayer & Moreno, 2002) or artificially generated

movements of pictures or graphics in computer displays, resulting in apparent motion (Park & Gittelman, 1992).

Multimedia is a communication format that integrates several media-text, audio, video and animation, which are most commonly implemented with a computer (Grabe & Grabe, 1998). It also refers to presenting words (such as printed text or spoken text) alongside pictures, such as illustrations, photos, animations and videos (Mayer, 2003).

Multimedia tools: Computers, data projectors, iPads, Wi-Fi, videos, picture presentations used to promote learning (Mayer, 2003).

Multimedia learning: Learning through videos and animations and involves building mental representations from words and pictures (Mayer, 2003).

Cognitive overload: Limited working (conscious) memory and long term memory (Mayer & Moreno, 2003).

Cueing is the addition of non-content information that captures attention to those aspects that are important in an animation, e.g., colouring, arrows (De-Konning, Tabbers, Rikers, & Paas, 2007).

1.11 Summary

This chapter discussed the orientation of the study, the statement of the problem, research questions, hypothesis, significance of the study, limitations and delimitations of the study and the structure (outline) of the thesis before concluding with the definition of terms.

2.1   Introduction

This chapter reviews literature and identifies the conflicts or challenges in multimedia education. The chapter also highlights the theoretical framework that guided this study.

2.2   The use of multimedia in education

Today there are several new features of multimedia which are frequently used in education, including hypertext and hypermedia. Hypertext refers to links among textual items, often indicated by key words set in underlined blue type (Christopher & David, 2005, p. 37). Hypermedia, on the other hand, refers to links that are similar to those used in hypertext, but instead of simply linking text to text, they involve linking various media, such as sound, images, animations and video (Christopher & David, 2005).

According to Lambert and Cuper (2016), the current generation of digital learners in the world is both familiar with and motivated to use multimedia tools. Therefore, educators must harness their power as a teaching and learning opportunity for the next generation of classroom teachers. When multimedia tools are used as active learning tools, they engage learners using 21st century skills and provide a variety of creative digital age reflection opportunities.

2.3   The influence of the use of multimedia on learners' academic performance

Much exposure to different multimedia has caused many learners to establish greater comfort in using electronic communication tools (Engstrom & Jewett, 2005).

According to Prensky (2001), due to the exposure of today's learners to various types of digital tools, learning through videos and animations is a good way of reaching them in their "native language" - a technology language they know better. A study by Schar and Krueger (2000) revealed that when teaching materials take the form of multimedia computer systems, two forms of learner content interactions can be distinguished: those initiated by the learner and the other initiated by the computer system, learning the content from the interactive system increases learning by engaging learners more closely with the material.

Ringstaff and Kelley (2009) also support the use of multimedia in education by referring to them as powerful tools for problem solving, conceptual development and critical thinking. Ringstaff and Kelley assert that this is because multimedia provide learners with opportunities to gather, organise and analyse information and use this information to solve problems. They further point out that today's videos combine the power of visual presentations with interactive and information capability of the multimedia, which helps learners to learn.

Other scholars who favour multimedia instructions such as Anglin, Vaez, and Cunningham, (2004) report that humans have a limited storage in their working memory and unlimited storage in their long-term memory. According to Anglin et al., when multimedia are used effectively, they help learners to build mental "schema". However, they caution that should multimedia instructions be used, careful control should be exercised to reduce cognitive overload because individuals' real intellectual power lies in their knowledge stored in the long term memory. This is in agreement with what Jolly and Horn (2003) caution, that the use of multimedia should be controlled to avoid cognitive overload, whereby it may lead to learners not learning the intended content.

New and readily available innovations such as multimedia often capture educators' imagination. There is certain excitement in promising new ideas and powerful innovations that allow both learners and teachers opportunities that were not previously available.

Grabe and Grabe (1998) are of the view that the use of multimedia has a moderately positive impact on student achievement. The availability of text, sound, animation and video for presenting information and the easy transition among these formats can increase the clarity of explanations. Different methods of representation are potentially suited for explaining or demonstrating different concepts and skills, and multimedia make it easier to give learners these different experiences. For example, it will be much more effective to give a basic explanation of how earthquakes occur at destructive plate boundaries and then show an animated explanation of the whole process to the learners. In this way, the teacher can easily show from the animated lesson several points he or she was making during the basic explanation done earlier.

According to Paivio's (1986) dual theory, imagery and verbal information are stored in different ways. Because of this, experiencing something verbally and through imagery offers advantages because the experience may result in two memory codes instead of one. Learners' exposure to video and verbal input may help them store and retrieve information more effectively than learners who do not have multiple input because multiple representations allow them more direct retrieval options and more indirect retrieval options because of connections with other memory units (Paivio, 1986).

Mayer and Moreno (2003) point out that multimedia are highly helpful when explaining relatively complex phenomena; dual codes are most beneficial when

learners are able to interrelate the codes. For instance, when a learner hears the narration of a phenomenon explained while watching the animated lesson, it results in greater integration of two inputs.

Grabe and Grabe (1998) further highlight other advantages of multimedia in bringing about learning because of the fact that video formats provide experiences that are both more complex and more similar to situations outside the classroom, thereby exposing learners to realistic experiences they may not have encountered directly. Such multimedia therefore provide more information for learners to sort through and think about. When learners are involved in working to process such rich information source, it is one way to engage them in more active learning. This provides learners with efficient access to information presented in different ways.

An argument in favour of multimedia can be made that certain procedures are easier for learners to understand when experienced in multiple ways, thereby increasing the retrieval rate of the information. Integrating video segments in learning activities allows learners to anchor what they learn in a more complex and realistic experience.

Multimedia offers learners some degree of control over the information they experience and they can get help when required. When lessons are presented this way it creates a responsive environment for the learners to meet their own needs. Worth noting also is the fact that multimedia offers more variety than traditional materials; therefore, individual learners can take advantage of this variety to find ways to solve individual difficulties. Many learners in a given classroom have so many individual differences in abilities and capabilities. Methods of learning should therefore be structured in such a way that they can stimulate the senses of individuals because one learns through his or her senses.

According to Agrawal (2009), multimedia make the process of teaching and learning faster and more interesting, and therefore effective. In addition, Gura and Percy (2005), argued that most areas of human intellectual activity have become so dependent on the support of digital technology to offer the youngsters a school of experience, without which they are cheated out of a vital aspect of their education. Therefore, multimedia provide powerful support for teaching and learning because they can provide much information and generate so many customized versions of it. This can help to establish a learning environment in which learners are allowed to follow their own instincts, interests and passions without turning their backs on basic principles and concepts of learning. Gura and Percy (2005) further claim that somethings (concepts and phenomena) are just better understood when they are seen; words, although essential, are not always sufficient to illustrate new concepts to youngsters. Simulations are often interactive, requiring learners to manipulate them in order to complete given tasks. Gura and Percy (2005) further suggest that youngsters can have a better experience of learning if they do so in partnership with others, and multimedia can serendipitously facilitate this approach.

According to Crooks, Verdi, and White (2004-2005), generally the use of animation in problem solving tasks has shown more positive effects compared to static displays. A finding of the study conducted by Crooks et al. (2004-2005) on the effects of animations supports the use of animation to increase recalling. In their study, Crooks et al. found that participants who viewed animated features gave more detailed answers when they were asked than those who viewed static features.

Johnson (2002) adds that the use of animation does not only make the understanding of dynamic concepts or phenomena easier but also encourages learners to apply the techniques shown or used practically, which enhances learning. This is because after

watching an animated lesson, the learners will not just have heard about a process, nor just have seen it, but will also have created their own animation and in doing so, will have gained some understanding of its dynamic and such understanding is communicated. Wentz, Vender, and Brewer (1999) argue that multimedia are useful in understanding complex concepts but only when accompanied by the traditional educational techniques, such as class room lecturing.

Wentz et al. (1999) again argue that multiple representations such as combining verbal and visual representations of the complex concepts facilitate learners' understanding and therefore are very useful in learning situations. Wentz et al. (1999) further argue that dynamic visualization such as animation showing complex dynamic processes may be especially supportive in the construction of elaborated schemata, however, when used, a teacher should be fully involved in order for learning to take place.

Andrienko et al. (2007) also support multimedia, but propose that the addition of cues can be effective. They show support for the use of multimedia by suggesting that it is an effective way to provide materials for learners' analysis and reasoning and for supporting their involvement in problem solving.

2.4   The impact of multimedia on retention of knowledge in learners

In a previous study, Moreno and Mayer (2000a) found that learners scored higher on a transfer test after receiving a narrated animation about lightning formation in which the words were in conversation style (i.e. using first person and second person as well as comments directed at the learner) rather than in formal style (i.e. using third person and no comments directed at the learner). It was further discovered that

learners scored higher on a transfer test after playing an educational science game containing narrated animations (Moreno & Mayer, 2000a).

Mayer (2003) claims that when multimedia instructions are used in education, such as presenting a lesson in the form of words and pictures that are intended to promote learning in a narrated form, the retention of what was taught tends to be higher. According to Mayer (2003), people learn more deeply from words and pictures than from words alone. Mayer further states that learners tend to perform exceptionally both in retention and transfer tests if lessons are presented in both words and pictures (animations).

2.5   Benefits of multimedia on learners

Most learners today are exposed to multimedia technologies from a young age. Research shows that today's digital learners learn more when engaged in meaningful, relevant and intellectually stimulating school work and that the use of multimedia can increase the frequency for this type of learning (North Central Regional Educational Laboratory & Metiri Group, 2003).

Multimedia have numerous advantages for learners when used as instructional tools in education. Hasselbring and Glaser (2000) state that learners of all abilities learn more when they are involved in knowledge construction involving the use of multimedia. Thus, multimedia may help learners of different abilities in learning. Teachers sometimes have difficulties helping some learners who learn at a slow pace, but when multimedia are used, it does improve the pace by which such learners learn because multimedia give deeper and more detailed explanations which teachers may not be able to give or may not give clearly. In addition, Mayer et al. (2004) are of the view that when multimedia are used, it encourages learners to use their

available cognitive capacity for active cognitive processing during learning. This helps the learners to organise the presented material into coherent representations and integrate the pictorial and verbal representations with prior knowledge.

Jain and Getis (2003) state that in physical Geography, the potential of multimedia applications such as animation are particularly appealing and therefore instil a zeal to learn in many learners and usually take away boredom that some learners may experience from only listening to a teacher talking all the time. Jain and Getis further indicate that multimedia are also purported to appeal to a wide variety of learning styles, and when used concurrently with other teaching methods such as narration, a broader range of learners benefit.

Ringstaff and Kelley (2009) further assert that current multimedia instructions can give visual representation to higher-order concepts, using graphics and simulations to link geographic concepts to the real world. To prove how useful multimedia are to learners' learning, Jolly and Horn (2003) argue that since a human information processing system is made up of verbal representations and a visual/pictorial channel assumption, there are certain things that learners can learn well and master when visual presentations are used alongside verbal presentations.

According to Grabe and Grabe (1998), the use of multimedia in education is important because the capabilities of computer simulations are useful in helping learners to grasp many different phenomena that would be difficult to describe with other techniques, thus when learners observe an actual event in any content area, it is nearly always a highly desirable option and learners should not have to rely on simple diagrams or written accounts. Video segments give learners a richer context for understanding the subject matter being taught.

Another benefit of using multimedia in the classroom for learners is that integrated images take up less space in the working memory than verbal information because they are encoded as intact units. Therefore, it is economically stored in working memory, allowing learners to switch attention across an image while simultaneously processing information from related text or narration. This allows learners to make referential connections between the image and the corresponding narration or text without utilizing all the resources of working memory (Crooks, Verdi, & White, 2004-2005).

Animations facilitate learning since they present the micro-steps of processes that are absent from static graphs. By nature, the potential benefit of animated pictures is to demonstrate dynamic processes (Rebetez, 2006). In a study by Rebetez, the results showed improved retention and comprehension (inferences) when learning from animations. Animation improves performance (compared to static) for incidental learning (Rieber, 1991). According to Park (1998), animation is a more effective visual tool than static graphics if the entity depicted is itself an animated event or object. Park further suggests that animation comes with other benefits such as attracting and directing attention to represent domain knowledge that involves movement and also explaining complex knowledge phenomena, such as an illustration of the processes that take place at destructive plate boundaries, which lead to the shaking of the earth. These movements (illustrations) enrich learning (Large, 1996). This is more helpful because they portray a visible sequence of events in real time, or at least proportional to real time (Hegarty, 2004).

2.6 Accessibility of multimedia as a teaching and learning tool

One advantage of multimedia as a tool in education is that they can be made accessible to learners. Jain and Getis (2003) point out that multimedia such as high-resolution graphics, maps, videos and animated images can be made readily accessible to learners, allowing learners to access them at any time for learning and this is another advantage of multimedia in education.

Grabe and Grabe (1998) further state that there are generally various types of multimedia software available for use in the classrooms. The software includes talking books, collections, cooperative problem-solving activities and report makings.

However, the easy accessibility put forward by the above scholars may not necessary be the case in developing countries like Namibia. For instance, in Ohangwena Region where this study was conducted, only few schools may have access to multimedia. This is due to the fact that many schools are in semi-rural areas with no internet and electronic devices that may facilitate the usage of multimedia, thus making accessibility difficult.

2.7 Multimedia as an aid for teachers in the classroom

Multimedia uses multiple forms of text, audio and graphic animations or video to convey information, thus giving today's teachers the opportunity to move from a largely linear learning environment to an increasingly non-linear environment. Such multimedia technologies also allow learners a high degree of choices as they pursue learning with multimedia. Although multimedia classroom tools offer teachers multiple ways of engaging with learners in the learning process, they also come with their own peculiar challenges for teachers. One challenge is that the multimedia tools

do not have equal effects or influence on the learners' learning. Certain multimedia tools promote far more active learning and learners' decision making than others (Lambert & Cuper, 2016; Jacobson & Archodidou, 2000). This calls for teachers to be highly involved so that they can help learners who may benefit little from multimedia application in the classroom.

Ringstaff and Kelley (2009) add that videos, as part of multimedia instruction, have long been a way to present unfamiliar material that would be difficult to conceptualize when it is presented verbally.

Grabe and Grabe (1998) agree that learning activities involving collaboration of the entire class have practical advantages. One of the advantages is that the equipment necessary for using multimedia may not be available in abundance and group based approaches can use available equipment more efficiently.

On the advantages of multimedia for Geography teachers in particular, Johnson (2002) claims that they help teachers to speak more readily in geographical terms. Johnson further claims that where the language and terminology form barriers, multimedia can be used to help overcome these barriers.

On how multimedia impact learners' learning, Grabe and Grabe (1998) argue that learners are intrigued by the uniqueness of multimedia, which in turn helps learners to develop a relationship with the subject. Grabe and Grabe go further to support the use of multimedia by explaining that there are many types of multimedia specifically designed to encourage group work, which is a powerful and practical use of technology in the classroom. These are designed for use with intact classes and require collaboration among learners.

According to Edsall and Wentz (2007), learners have more fun and show more enthusiasm when the material is presented with multimedia. Another advantage that multimedia brings to the teachers besides portraying processes that are visible in the real world (e.g. machine in motion) is that they can also visualize entities that are not visible but that are spatially distributed, e.g., change in air pressure on a weather map (Ainsworth & Van Labeke, 2004) and also abstract information such as statistical concepts (Bodermer, Ploetzner, Feuerlein, & Spada, 2004).

The various scholars referred to in this section write strongly in favour of multimedia. Most of these scholars strongly affirm that there is a positive correlation between the use of multimedia and learners' academic performance. The literature discussed above therefore seems to be in agreement with the assumption made for this study, that there is a statistically significant difference between the performance of NSSC Geography Grade 12 learners taught with videos and animations and that of learners taught with drawings and text only.

2.8   Theoretical framework

2.8.1   Mayer's cognitive theory of multimedia learning

This study was guided by Richard Mayer's cognitive theory of multimedia learning of how people learn from words and pictures. It is based on the idea that people possess separate channels for processing verbal and visual material (dual-channels assumption), each channel can process only a small amount of material at a time and meaningful learning involves engaging in appropriate cognitive processing during learning (Mayer, 2003). It has been suggested that the efficiency and effectiveness of video and animations can be improved by designing measures that take cognitive load into account (Ayres & Paas, 2007). A number of measures have been proposed

to improve the efficiency and effectiveness of video and animations by using visuospatial cueing, i.e., visually highlighting one or more elements in animations and pre-training, i.e., showing animations in pieces or segments (Mayer, Mathias, & Wetzell, 2002).

According to Moreno and Mayer (2000b), the cognitive theory works based on two principles; the cognitive load theory as well as the constructivist theory. The cognitive theory is based on the assumption that (i) working memory includes independent auditory and visually working memories; (ii) humans consist of separate systems for representing verbal and non-verbal information; (iii) for meaningful learning to take place, a learner has to select relevant information in each store, organise information in each store into a coherent representation and make connections between corresponding representatives in each store (Mayer, 1997).

The cognitive theory of multimedia and the above assumptions are illustrated in Figure 2.1 below:
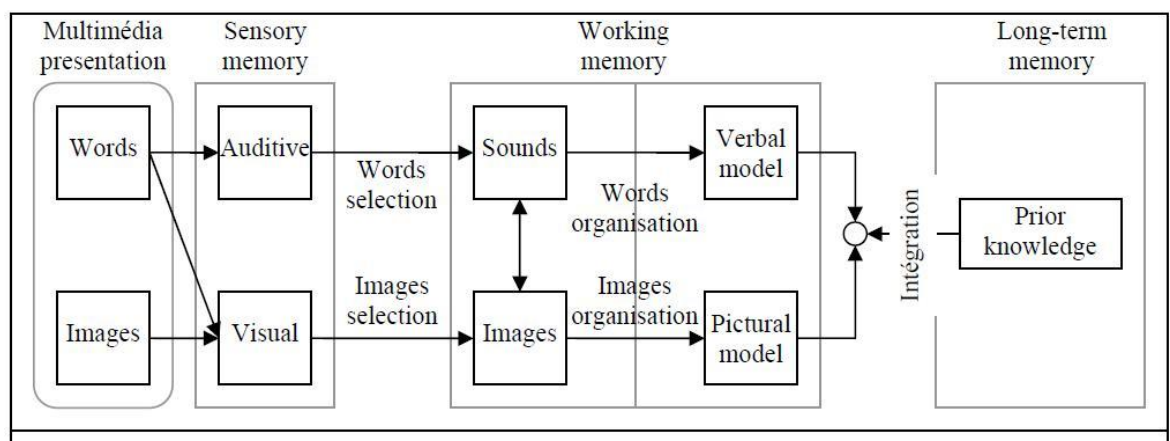
Figure 2.1: Model of multimedia learning (Mayer, 2001)

In this theory, Mayer (2001) argues that a message created with words and corresponding images (where visual and verbal elements are presented together) is better retained than a message created with words alone.
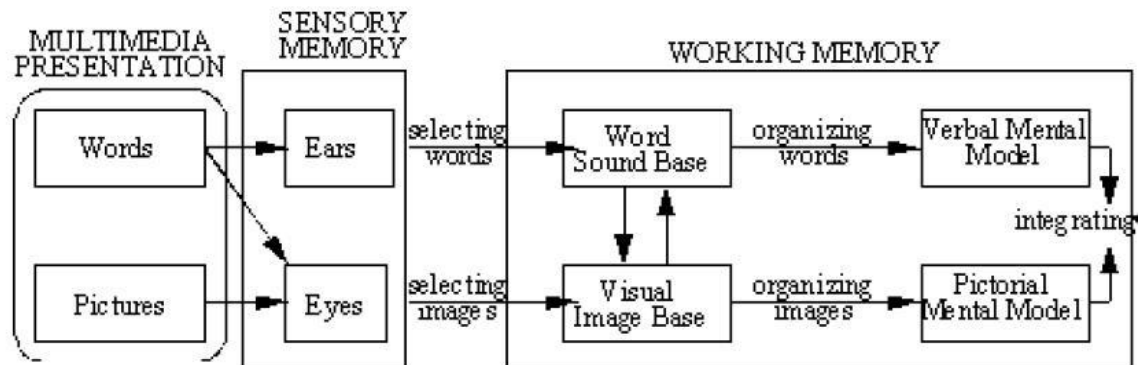
Figure 2.2: An illustration of the cognitive theory of multimedia learning (Mayer, 1997)

According to the cognitive theory of multimedia learning, when hypermedia are used for representing information, learners represent the animation in the visual working memory and represent the corresponding narration in the auditory working memory. When learners are presented with static graphics and when a teacher provides notes in the form of written text followed by the explanation (teacher's narration), learners represent these narrations in the auditory working memory only. Therefore, they have to mentally animate the presented information in order to understand the dynamism of the phenomenon in the auditory working memory (Mayer, 1997; Rebetez, 2006). Thus, because of their ability to hold corresponding pictorial and verbal representations, hypermedia are better able to build referential connections between them, which in turn enhances learning (Mayer, 1997).

2.8.2 Models of multimedia comprehension

When a lesson takes the form of multimedia instruction (video and animations), the assumption by models of multimedia comprehension is that verbal information and pictorial information are first processed separately before being integrated in common mental models (Rebetez, Betrancourt, Sangin, & Dillenbourg, 2008).

Schnotz and Bannert (2003) propose that there are two distinct pathways by which multimedia information is processed: (i) symbolic and (ii) analogic. In the symbolic pathway, there is semantic processing of verbal information which leads to a proportional representation. On the analogical pathway, on the other hand, visual information is first organised according to perceptive rules in a visual image. The proportional representation and the visual image are then integrated into a unique model. This proposal by Schnotz and Bannert is close to the theory of multimedia learning by Richard Mayer, which states that there is a visual working memory for information from video and animations and auditory working memory for the corresponding narration and after different information has been represented in the learners' respective working memories, learners now use both pictorial and verbal representations to build referential connections between them (Mayer, 2001, 2005).

Once mental models have been developed from both multimedia information and from previous knowledge, it becomes possible for learners to generate new information and inferences during and after reading instructions.

During multimedia lessons, mental models of dynamic systems are constructed which involve spatial changes over time (Rebetez, Betrancourt, Sangin, & Dillenbourg, 2008). Narayanan and Hegarty (2003) suggest that the construction of mental models of dynamic systems consists of five processes. It starts with

organisation, which leads to two static mental models (verbal and visual), this is followed by the identification of referential links between modalities. Dynamic mental models are achieved after the identification of cause-effect relationships and rural integration.

In reference to the mental model theory, Rebetez et al. assume that multimedia are ideally suited to support the construction of a dynamic mental model because spatio-temporal relations in the mental model can be directly mapped to spatio-temporal changes in the display, which in turn save the learner from engaging in cognitively demanding mental simulations.

Schnotz and Rasch (2008) propose three possible effects of multimedia instructions on the learner: (i) facilitating effect - multimedia can facilitate the construction of a dynamic mental model, mainly by preventing learners from having to engage in demanding mental simulation; (ii) enabling effect - this refers to the potential that the animated graphics have for allowing the comprehension of dynamic systems that novice learners are unable to mentally simulate. This is made possible by the micro-steps in multimedia instructions; (iii) inhibiting effect - this has a negative effect on learning. Here, Schnotz and Rasch (2008) suggest that the use of animated lessons can inhibit learners from mentally animating the dynamic phenomenon, resulting in shallow processing of information.

Multimedia components get and hold learners' interest, which many researchers believe is important when teaching the video generation (Jonassen, 2000). Mayer and Moreno (2000) refer to the cognitive theory of multimedia which combines the dual coding theory (Paivio, 1986) and the constructivist learning theory (Novak, 1998). From the dual coding theory, Mayer and Moreno (2000) adopted the idea that verbal

stimuli and nonverbal stimuli detected by our sensory systems are processed in different systems of the brain (verbal system and nonverbal system). From the cognitive load theory, Mayer and Moreno adopted the idea that humans are limited in the amount of information that they can process in each channel at one time (Mayer, 2001). They also borrowed an idea from the constructivist learning theory that meaningful learning occurs when learners actively select relevant information, organize it into coherent representations and integrate it with other knowledge (Kim & Gilman, 2008).

Results from a study by psychologists revealed that 11% of the information we get is from the auditory channel, while 83% is from the visual channel (Nan, 2005). Therefore, when multimedia are used in teaching, various video, picture and literal material for learners are presented, thus learners can use both the auditory and visual channels (Nan, 2005).

2.9   Designing a multimedia explanation

Humans can integrate information from different sensory modalities into one meaningful experience, such as when they associate the sound of thunder with the visual image of lightning in the sky. They can also integrate information from verbal and non-verbal information into a mental model, such as when they watch lightning in the sky and listen to an explanation of the event. Therefore, the instructional designer is faced with the challenge to choose between several combinations of modes and modalities to promote meaningful learning (Moreno & Mayer, 2000b).

This study has therefore taken into consideration measures that improve the effectiveness of videos and animations during the investigation.

2.10 Summary

This chapter reviewed relevant literature on the topic under study and highlighted the theoretical framework (Mayer's cognitive theory) that guided the study. The literature focused on the use of multimedia in general and in Geography as a subject in particular, the benefits of using multimedia and the accessibility of multimedia.

The next chapter discusses the research methodology used in the study.

CHAPTER 3: RESEARCH METHODOLOGY

3.1   Introduction

This chapter discusses the methods that were used in the study for the collection and analysis of data. It also discusses the research design, the population, the sample and sampling techniques, the research instruments, data collection procedure and methods of data analysis and the ethical considerations.

3.2   Research design

This study used a quantitative research design to collect the data needed in answering the research question and to test the hypotheses for the study. The quantitative design was chosen because the main objective of this study was to test if there is a relationship between two variables using the data collected from the sample of the population for this study. The quantitative research design was therefore found to be the most suitable for this particular study because it relies primarily on the collection of quantitative data (Johnson & Christensen, 2012) and also because it is the design that aims to determine the relationships between an independent variable and a dependent or outcome variable in a population (Hopkins, 2008). This design therefore was employed to find out if there is a relationship between the usage of multimedia tools in Geography (independent variable) and the learners' performance (dependent or outcome variable).

There are three (3) main types of designs in quantitative research: (i) pre-experimental, (ii) quasi-experimental and (iii) experimental research design. This study was a comparative quantitative study and therefore used the quasi-experimental research design. According to Johnson and Christensen (2012) a quasi-

experimental research design is an experimental research design that does not provide for full control of potential confounding variables. The quasi-experimental research design further has several other designs such as (a) Non-equivalent pre-test/post-test control group design; (b) Time series designs - single group interrupted time-series design; and (c) Counterbalanced designs. The non-equivalent pre-test/post-test control group design was used to answer the research question for this study. This design consists of giving an experimental and a control group a pre-test and later a post-test after an experimental treatment condition has been given to the experimental group (Shadish, Cook, & Campbell, 2002). The main purpose of an experimental study is to determine a cause-and-effect relationship. It enables researchers to identify causal relationships because it allows for researchers to observe, under controlled conditions the effects of systematically changing or more variables (Johnson & Christensen, 2012).

The design for this study required that the participating school should have two groups: (i) an experimental group and (ii) a control group. These two groups were presented with a pre-test followed by the experimental treatment which was administered to the experimental group.

The experimental group was given a specially designed YouTube channel (https://youtube/nPrGba_pPz8) where a created video and animated lesson of Grade 12 NSSCO Geography content was posted. Participants viewed the video and listened to it in a computer lab, using earphones with the help of a teacher who acted only as a supervisor and helped with accessing the content from the internet. The second group (control group) was taught the same content by their teacher, presented in hand-outs with diagrams and illustrations. For both groups, each lesson lasted 40 minutes.

3.3   Population

McMillan and Schumacher (2006, p.47) define a population as "a group of elements or cases, whether individuals, objects or events, that conforms to specific criteria and to which one intends to generalize the results of the study."

This study was aimed at finding out whether there is a statistically significant difference between the performance of Geography Grade 12 learners taught with videos and animations (audio, moving graphics and text) and that of learners taught with drawings and text only, in Ohangwena Region. Therefore, the population of this study was all Grade 12 learners studying NSSC Geography from all secondary schools in Ohangwena Region. There is a total of nine (9) secondary schools in Ohangwena Region. The population of the study was therefore all the Grade 12 Geography learners from the nine secondary schools.

3.4   Sample and sampling techniques

Purposive sampling was employed to select schools for this study. According to Singleton and Straits (2005) a purposive sample is a non-probability sampling technique which involves selecting a subpopulation that is thought to be representative of the typical population. Out of nine secondary schools that offer NSSC Geography in Grade 12 in Ohangwena Region, one school was selected for this particular study. The experimental treatment required the members in the experimental group to have access to a computer, with internet, where they could be able to connect microphones and listen to the multimedia lesson. Therefore, the school chosen had a computer laboratory with all the required items such as internet and microphones.

The chosen school had five (5) NSSC Geography classes. A stratified random sampling was used to select the participants. From the five NSSC Geography classes, one class was selected as the sample for the study. Participants selected were further allocated randomly to either the experimental group or the control group. The sample had a total of 25 pupils. To allocate them into two groups, twenty five (25) cards were prepared, of which 12 were labelled with the letter A and the other 13 with the letter B. Letter A represented Group A (the experimental group) and letter B represented Group B (the control group).

These twenty-five cards were mixed together in a box and each of the 25 pupils making up the sample was asked to pick a card from the box. The researcher assigned all the learners who picked cards with the letter A to make up the experimental group (Group A) and those who picked cards with the letter B were assigned to the control group (Group B). Twelve (12) pupils picked cards labelled 'A', thus making up the experimental group, and thirteen (13) pupils picked cards labelled 'B', thus making up the control group.

3.5   Research instrument

A pre-test (see Appendix F) was given to all pupils from both groups, followed by an experimental treatment as an intervention on the experimental group and the same post-test (see Appendix G) for both groups.

3.6   Data collection procedure

Firstly, the researcher got the approval for the research proposal of this study by both the Departmental Review Committee and the Faculty Review Committee of the University of Namibia. The researcher then applied for the ethical clearance certificate from the University of Namibia's Research Ethics Committee. The ethical

clearance certificate (see Appendix E) was obtained together with the permission letter from the Centre for Postgraduate Studies of the University of Namibia for conducting this study titled "The use of videos and animations to improve learners' achievement in NSSC Geography in selected Secondary Schools in Ohangwena Region" (see Appendix D).

Secondly, the researcher sent out a letter, with the aims and the significance of the study, requesting permission to conduct research to the director of education in Ohangwena Region (Appendix A) and to the school principal of the chosen school (Appendix B). After the sample was obtained, the selected learners were invited to volunteer to participate and they were informed that they were under no obligation to participate in this study. The whole process took three days to be completed and there was a minimum of two days between each of the dates in which the activities were conducted. On the first day, a pre-test was given to the group that made up the sample. This was followed by the experimental treatment on the experimental group. During the second day, Group A was placed in the computer laboratory with each learner at a computer connected with microphones and internet. Each learner was provided with the YouTube link https://youtube/nPrGba_pPz8, where the multimedia lesson had been posted, and each learner was to listen individually using earphones. The lesson was designed to last for 40 minutes. During this activity, a teacher stayed in the computer laboratory who acted only as a facilitator to help learners in case of trouble accessing the multimedia lesson or any other problem.

The learners in Group B were placed in a classroom, where the teacher provided the handouts with summary notes of the same content given to Group A. The teacher presented the same lesson content that was given to Group A for forty (40) minutes. After the activities of the second day, the learners were released to go back to their

homes or hostel and were not informed of what was going to follow next. On the third day, all the twenty-five (25) learners were brought together in the classroom where they took a post-test. The post-test answers for all groups were marked and the results obtained were used to determine whether there was any statistically significant difference between the scores of the two groups by comparing the performance in the post-tests with the pre-tests of both groups.

3.7   Data analysis

The average scores of the Experimental (A) and Control (B) groups were obtained. A *t- test* was used to find out if there was any statistically significant difference in the performances of the two groups. The observed difference has been attributed to the intervention given to Group A.

The collected quantitative data were subjected to statistical analysis taking into account the two methods used for teaching. The *t*-test was used to compare the means of the two groups' outcomes using the Statistical IBM SPSS (Version 22). The two samples' means were collected and calculated. The *t*-test assumes that the sampling distribution is normally distributed (Field, 2009). The researcher compared the two values (if p-value was lower than 0.05, then H_0 was rejected and if p-value was higher than 0.05, H_0 was accepted.

3.8   Ethical considerations

Hennin, Van Rensburg, and Smit (2004) describe ethics as "a body of principles of right, proper and good conduct". Letters of permission were obtained from the Director of Ohangwena Education Directorate (see Appendix A), from the Principal of Ponhofi Secondary School where the study was conducted (see Appendix B) and from the University of Namibia (see Appendix D). All the learners in the sample

gave consent before participating (see Appendix C). Ethical clearance certificate was obtained from the University of Namibia (see Appendix E). Participants were made aware that their participation was voluntary and that they were free to withdraw from the study any time they wanted to. Participants were guaranteed that their results would be held confidential and anonymous and no name was required at any time of the study. The data used from the participants will be stored in a folder on the researcher's computer with a password for 3-5 years before deleting it.

3.8   Summary

This chapter gave a description of the research methods used for data collection and analysis of data collected to answer the research question and test the hypotheses. One school out of the nine NSSC secondary school in Ohangwena Region was selected for this experimental study. A stratified random sample was used to select the sample that the researcher used to gather data. Finally, the chapter looked at ethical considerations of the study.

CHAPTER 4: PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

4.1   Introduction

This chapter presents, analyses and discusses the findings of the study. The findings will be used to answer the main research question and to test the two hypotheses for the study as presented in Chapter 1. The analysis of the data collected was done on the Statistical IBM SPSS (Version 22).

The study was aimed at investigating whether the use of video and animations improve learners' performance in NSSC Geography in Ohangwena Region, Namibia. The study tried to answer the following research question:

Is there a statistically significant difference in the performance of Geography Grade 12 learners taught with videos and animations (audio, moving graphics and text) and that of learners taught with drawings and text only?

The following hypotheses are tested based on the findings:

H_0: There is no statistically significant difference in learners' academic performance in Grade 12 NSSC Geography between learners taught with videos and animations (audio, moving graphics and text) and those who are taught with drawings and text only.

H_1: There is a statistically significant difference in learners' academic performance in Grade 12 NSSC Geography between learners taught with videos and animations (audio, moving graphics and text) and those who are taught with drawings and text only.

The data were collected by using a quasi-experimental research design, i.e., a non-equivalent pre-test/post-test control group design. A pre-test was administered to both the control group and the experimental group, followed by the treatment (the use of an animated lesson) on the experimental group. After the treatment, a post-test was administered to both groups. Results from the tests were analysed to answer the main question for this study.

The study was conducted in one computer-furnished secondary school with a Grade 12 geography class. The school has four main fields of study: Pure Science, Integrated Natural Sciences, Social Science and Commerce. Although the school has a large number of children, the number is not evenly distributed among the fields of study. Pure Science, for instance, has the largest number of children, while Commerce and Social Sciences have the lowest numbers. Although the school has a fully furnished computer laboratory, the number of computers is very low in comparison to the total population of learners and teachers.

In general, Geography teachers in this school make use of multimedia once in a while when trying to explain something they think is too hard for learners to understand. This is normally done during the normal class lesson and lasts for less than ten minutes. The teacher is usually highly involved, by pausing the video and explaining more to make emphases on the concept being taught.

4.2   Data presentation and analysis

This section presents the findings of the study to test the hypotheses of the study presented in Chapter 1. The data analysis takes the form of tables (Tables 4.1-4.4) generated from SPSS. Tables 4.1 and 4.2 contain results of the t-test run from the results of the test before the treatment was given to the experimental group (pre-test),

while Tables 4.3 and 4.4 contain results of the *t*-test run from the results of the test taken after the treatment was given to the experimental group (post-test).

Table 4.1 provides summary statistics for the two groups – the control group with 13 participants and the experimental group with 12 participants. Table 4.2, on the other hand, contains the main test statistics for the pre-test.

Similarly, Table 4.3 provides summary statistics for the two groups – the control group with 13 participants and the experimental group with 12 participants, while Table 4.4 contains the main test statistics for the post-test. A t -test analysis was run with the purpose to see whether there is a statistically significant difference between the means of the two groups that sat for both the pre-test and the post-test.

4.2.1 Results of the pre-test

Table 4.1: Summary statistics of the pre-test results (by group)

Group Statistics					
	Group	N	Mean	Std. Deviation	Std. Error Mean
Scores	control group	13	14.15	4.652	1.290
	experimental group	12	15.58	4.055	1.171

Table 4.2: Overall statistical analysis of the pre-test results

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Scores	Equal variances assumed	.099	.755	-.816	23	.423	-1.429	1.752	-5.054	2.195

Independent Samples Test

As shown in Table 4.1 (summary statistics of the pre-test results), the control group had a mean score of 14.15, with a standard deviation of 4.652, while the experimental group had a mean of 15.58, with a standard deviation of 4.055.

From the SPSS calculations, the value of t is -.82, and the number of degrees of freedom on which this result is based is 23. Therefore, on average, the experimental group's performance (M = 15.58, SE = 1.17) was slightly higher than that of the control group (M = 14.15, SE = 1.3). This difference before the treatment was given to the experimental group was not significant: t (23) = -.82, p > .05.

4.2.2 Results of the post-test

Table 4.3: Summary statistics of the post-test results (by group)

	Group					
			N	Mean	Std. Deviation	Std. Error Mean
Scores	control group		13	18.08	3.095	.858
	experimental group		12	19.33	3.676	1.061

Table 4.4: Overall statistical analysis of the post-test results

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Scores	Equal variances assumed	.305	.586	-.927	23	.364	-1.256	1.355	-4.060	1.547

Table 4.3 (summary statistics of the post-test results) shows a higher mean score for the experimental group (19.33), with a standard deviation of 3.676, than that of the control group (18.08), with a standard deviation of 3.095.

From the SPSS, the value of t is -.93, and the number of degrees of freedom on which this result is based is 23. Thus, the experimental group's performance was higher ($M = 19.33$, $SE = 1.06$) than that of the control group ($M = 18.08$, $SE = .86$).

The difference after the treatment that was given to the experimental group was however not statistically significant $t(23) = -.93$, $p > .05$.

Therefore, based on the statistics, $p > .05$, there is no sufficient evidence to reject the null hypothesis, which stated that: There is no statistically significant difference in learners' academic performance in Grade 12 NSSC Geography between learners taught with videos and animations (audio, moving graphics and text) and those who are taught with drawings and text only. Therefore, the null hypothesis cannot be rejected at the conventional level.

4.3   Summary

This chapter presented, analysed and discussed findings collected from the experimental study conducted to investigate whether there is a statistically significant difference in the performance of Geography Grade 12 learners taught with videos and animations (audio, moving graphics and text) and that of learners taught with drawings and text only. A statistical IBM SPSS (version 22) was used to analyse results collected in order to test whether the use of videos and animations improves learners' performance in NSSC Geography in Ohangwena Region, Namibia. A quasi-experimental design, i.e., a non-equivalent pre-test/ post-test control design was used. The results of the post-test show a slightly higher score in the mean of the experimental Group, however the difference in the means is not significant. Therefore, based on statistics, $p > .05$, there is no sufficient evidence to reject the null hypothesis, which stated that there is no statistically significant difference in learners' academic performance in Grade 12 NSSC Geography between learners taught with videos and animations (audio, moving graphics and text) and those who are taught with drawings and text only.

The next chapter will conclude the study and give some recommendations for further research.

CHAPTER 5: DISCUSSION, RECOMMENDATIONS AND CONCLUSION

5.1   Introduction

This chapter gives conclusions and the recommendations based on the findings of the study, which were collected in order to answer the main research question and to test the two hypotheses for the study as presented in Chapter 1.

5.2   Discussion

The findings of this study reveal that the use of multimedia may influence Grade 12 Geography learners' performance to a certain degree. There was however no sufficient evidence of a statistically significant effect between the usage of multimedia in teaching and the academic performance of the Grade 12 Geography learners. There was a visible difference in the results of the experimental group and the control group. Surprisingly, the group taught with multimedia tools (the experimental group) performed only slightly higher (but not significantly) than the control group.

Research suggests that multimedia influences performance. Grabe and Grabe (1998) report that multimedia has a moderately positive impact on student achievement. The positive results of the experimental group in this experiment can therefore be attributed to the availability of text, sound, animation and video for presenting information which helped to increase the clarity of explanations.

Agrawal (2009) points out that multimedia make the process of teaching and learning faster and more interesting, and therefore effective. This may explain why the experimental group after being taught with the multimedia designed lesson performed better than the control group. Gura and Percy (2005) further claim that

some concepts and phenomena are just better understood when they are seen, which makes multimedia a powerful tool to reckon with.

Quite surprisingly, the learners from the control group also performed quite well although the teaching methods used for them was limited to a more traditional way of teaching. This highlights how erroneous it is to assume that multimedia tools are much more beneficial for teaching than the traditional method.

Multimedia tools may be beneficial for learners' performance because video formats provide experiences that are both more complex and more similar to situations outside the classroom, thereby exposing learners to realistic experiences which they may not have encountered directly (Grabe & Grabe, 1998). Another reason is that they are powerful tools for problem solving, conceptual development and critical thinking (Ringstaff & Kelley, 2009). Jones and Scaife (2000) are also of the idea that the use of videos and animations can be expected to enhance learning, especially when illustrating dynamic processes as motion is depicted more visually explicitly. Thus, because many important aspects of comprehension are perceptually available in the diagrams presented in multimedia formats, such diagrams facilitate understanding as information is more explicit and therefore requires less inference (Jones & Scaife, 2000).

Although this study's results are contrary to some studies, there is much evidence that multimedia impacts the cognitive functioning of learners, which leads to better performance (Mayer, 2001). Perhaps if the study could be carried over a long period of time and with many participants at a different time as opposed to being done after school hours, results might be different.

The score from the experimental group of this study is slightly encouraging (although not statistically significant). Learners from the experimental group scored slightly higher than those from the control group. According to Riding and Grimdey (1999), although the development of multimedia computer presentations represents both technological and educational development, it should be noted that technology itself does not automatically ensure learning, therefore teachers need to explore the best ways to make use of them to ensure that learning takes place. In the light of what Riding and Grimdey (1999) point out, further work is needed to investigate if both teachers and learners may benefit maximally from the use of videos and animations in education and to investigate the effects of other features of multimedia such as the addition of cueing.

5.3   Recommendations

Since the experiment conducted was focused on the influence of multimedia alone on the academic performance of Grade 12 NSSC Geography learners, results may not portray the complete picture of the extent to which academic results may be improved, e.g., it does not look at the combined influence of both multimedia and a teacher whereby the teacher adds own explanations to the multimedia by pausing the video during the lesson to give more emphasis and clarity on the content being taught. However, given that there was an improvement in the performance of the NSSC Grade 12 Geography learners taught with multimedia, although not significant, the Ministry of Education through its advisory services should provide support to teachers at the school level by providing video and animated lesson materials so that teachers can make use of such materials at their own convenient time to help learners to learn, since multimedia mediate learning (Hegarty, 2004). In addition, advisory teachers should gather animated lesson materials that they deem

relevant for several topics in Geography and come up with a clear work plan to guide teachers on when to use such materials, e.g., end of sub topic or topic.

Geography teachers, on the other hand, should form collaborative teams where they can share several video and animated Geography lessons, also to use these collaborative teams to share ideas on how to best use such animated lessons and to help those in the group who may have difficulties with accessing technological tools in their respective schools.

School principals also should support Geography teachers in their respective schools by ensuring that the school possesses at least a personal computer and a data projector that the Geography teachers can access any time they may wish to use them. However, school principals should ensure that the use of multimedia should not be an excuse for lazy teachers not to do their work, thus, teachers should clearly indicate in their daily lesson plans whether they will make use of the multimedia tools and should indicate for how long. This is to ensure that multimedia is used to the advantage of learners.

5.4   Conclusion

This study was aimed at investigating whether there a statistically significant difference in the performance of Geography Grade 12 learners taught with videos and animations (audio, moving graphics and text) and that of learners taught with drawings and text only. A purposive sampling technique was used to select a school for this study in Ohangwena Region. For the aim of this experiment, it was required that the participating school should have a computer laboratory with access to internet. Out of the five (5) NSSC Geography classes, one class was chosen by using

a stratified random sampling technique. Participants from the chosen class were further allocated randomly to the experimental and control group.

A t test was run to help in finding answers to the main underlying question. After the experiment was carried out, the results show that the experimental group performed slightly higher than the control group (Experimental group: M=19.33, SE=1.06; Control group: M=18.08, SE=.86). This shows a $p > .05$, thus no sufficient evidence to reject the null hypothesis, which stated that there is no statistically significant difference in learners' academic performance in Grade 12 NSSC Geography between learners taught with videos and animations (audio, moving graphics and text) and those who are taught with drawings and text only.

Overall, this study suggests that the use of video and animations in teaching Geography improves learners' performance, although not significantly. Therefore, awareness of the power of using multimedia tools in education, specifically its influence on the academic performance of Grade 12 Geography learners, could provide a useful tool in increasing the likelihood that teachers and all the stakeholders in education can incorporate it in everyday planning of what happens in classrooms to help improve Grade 12 Geography results. The results (Experimental group: M=19.33, SE=1.06; Control group, M=18.08, SE=.86) show a $p > .05$, which shows a positive correlation between the usage of multimedia and the academic performance of the learners although this result is not significant, which sets it contrary to what several authors who wrote strongly on the influence of multimedia on the academic performance of learners. It should however be borne in mind that this study was conducted on a small group of learners and was done over a short period of time. The study also did not look at the combined influence of both teacher and multimedia tools but only at multimedia independently. Therefore, further

research is needed to determine the long term effects of multimedia tools on a larger group of learners before a generalised conclusion can be drawn.

Many variables could possibly influence the results. It is also possible that the nature in which the videos and animations were put together in terms of its instruction design could have influenced the results negatively. Further studies are required to look into the actual compilation of the content and the instructional design of the message, the perception of the learners and access to the technology for teaching and learning.

The results of this study point to the fact that educators may not use multimedia as the only tool for teaching, but rather use it as an aiding or support and mediating tool only to complement the work of the teacher. Thus, the combined influence of both multimedia and the Geography teachers may bring about significant improvements in the performance of learners.

References

Agrawal, R. (2009). *Educational Technology Management and Evaluation*. Delhi: Shipra Publications.

Ainsworth, S., & Van Labeke, N. (2004). Multiple Forms of Dynamic Representation. *Learning and Instruction*, *14*(3), 241-255.

Andrienko, G. N., Andrienko, P., Jankowski, D., Keims, M. J., Krook, A., MacEachren, & Wrobel, S. (2007). Geovisual Analytics for Spatial Decision Support: Setting the Research Agenda. *International Journal for Geographical Information Science, 21*(8), 839-857.

Anglin, G. J., Vaez, H., & Cunningham, K. (2004). Visual representations and learning: The role of static and animated graphics. *Handbook of Research on Educational Communications and Technology, 2*, 865-916.

Ayres, P., & Paas, F. (2007). Making Instructional Animations More Effective: A Cognitive Load Approach. *Applied Cognitive Psychology, 21*(6), 695-700.

Bodermer, D., Ploetzner, R., Feuerlein, I., & Spada, H. (2004). The Active Integration of Information During Learning with Dynamic and Interactive Visualizations. *Learning and Instruction*. doi:10.1016/j.learninstruc.

Christopher, C. N., & David, H. R. (2005). *Computer-Assisted Language*. ESSEX: Pearson Educational Limited.

Crooks, S. M., Verdi, M. P., & White, D. R. (2004-2005). Effects of Contiguity and Feature Animation in Computer-based Geography Instructions. *Journal of Educational Technology Systems, 33*(3), 259-281.

De-Konning, B. B., Tabbers, H. K., Rikers, R. M., & Paas, F. (2007). Attention Cueing as Means to Enhance Learning from an Animation. *Applied Cognitive Psychology, 21*, 731-746.

DNEA. (2014,2015,2016). *National distribution of symbols per centre*. Windhoek: DNEA. Dransch, D. (2000). The Use of Different Media in Visualising Spatial Data. *Computer & Geosciences, 26*(1), 5-9.

Edsall, R., & Wentz, E. (2007). Comparing Strategies for Presenting Concepts Introductory Undergraduate Geography: Physical Models Vs. Computer Visualization. *Journal of Geography in Higher Education, 31*(3), 427-444.

Engstrom, M. E., & Jewett, D. (2005). Collaborative Learning the Wiki Way. *TechTrends, 49*(6), 12-15.

Evans, S. (2009, September). The Medium of Instruction In Hong Kong Revisited: Policy and Practice in the Reformed Chinese & English Streams. *Research Papers in Education, 24*(3), 287-309.

Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). London: Sage Publications Ltd. Gagne, R. M., & Driscoll, M. (1988). *Essentials of learning for instruction.* Englewood Cliffs: NJ Prentice-Hall.

Grabe, M., & Grabe, C. (1998). *Integrating technology for meaningful learning* (2nd ed.). Boston: Houghton Mifflin.

Gura, M., & Percy, B. (2005). *Recapturing technology for education: Keeping tomorrow in today's classroom*. New York: Rowman & Littlefield Education.

Hai-Peng, H., & Li-jing, D. (2007, August). Vocabulary Acquisition in Multimedia Environment. *US-China Foreign Language, 5*(8), 1-5.

Hasselbring, T. S., & Glaser, C. H. (2000). Use of Computer Technology to Help Students with Special Needs. *The Future of Children*, 102-122.

Hegarty, M. (2004). Dynamic Visualizations and Learning: Getting to the difficult Lessons. *Learning and Instructions, 14*, 343-351.

Henniger, M. L. (2003). *The teaching experience: An introduction to reflective practice*. Upper Saddle River: NJ: Prentice Hall.

Hennin, E., Van Rensburg, W., & Smit, B. (2004). *Finding your way in qualitative research.* Pretoria: Van Schaik.

Hopkins, W. G. (2008). Quantitative Research Design. *Journal of Sport Science, 4 (*1), 12-21.

Jacobson, M., & Archodidou, A. (2000). The design of hypermedia tools for learning: Fostering conceptual change and transfer of complex scientific knowledge. *Journal of Learning Science, 9*(2), 145-199.

Jain, C., & Getis, A. (2003). The Effectiveness of Internet-based Instructions: An Experiment in Physical Geography. *Journal of Geography, 27*(2), 153-167.

Johnson, B., & Christensen, L. (2012). *Educational research: Quantitative, qualitative, and mixed approaches* (4th ed.). California: SAGE Publications.

Johnson, N. (2002). Editorial II, Animating Geography: Multimedia and Communication. *Journal of Geography in Higher Education, 26*(1), 13-18.

Jolly, E. J., & Horn, C. A. (2003). Technology: The Greater Equalizer? *Web-Based Learning: What Do We Know?*, 45-56.

Jonassen, D. (2000). *Computers as mind tools for schools engaging critical thinking*. Upper Saddle River: NJ: Prentice-Hall.

Jones, S., & Scaife, M. (2000). Animated diagrams: An investigation into the cognitive effects of using animation to illustrate dynamic processes. Berlin.

Kim, D., & Gilman, D. A. (2008). Effects of Text, Audio, Graphic Aids in Multimedia Instruction for Vocabulary Learning. *Educational Technology and Society, 11*(3), 114-126.

Kramsch, C., & Andersen, R. W. (1999, January). Teaching Text and Context Through Multimedia. *Language Learning and Teaching, 2*(2), 31-42.

Lambert, J., & Cuper, P. (2016). Multimedia Technologies and Familiar Spaces: 21st-Century, Teaching for 21st Century Learners. *CITE Journal*, 1-24.

Large, A. (1996). Computer Animation in an Instructional Environment. *Library and Science Research, 18*(3), 23.

Mayer, R. E. (1997). Multimedia Learning: Are We Asking the Right Questions? *Educational Psychologist, 32*, 1-19.

Mayer, R. E. (2001). *Multimedia learning.* Cambridge: Cambridge University Press.

Mayer, R. E. (2003). Multimedia Learning. *Psychology of Learning, 41*, 85-139.

Mayer, R. E. (2005). Cognitive Theory of Multimedia Learning. In R. E. Mayer. *The Cambridge handbook of multimedia learning,* pp. 43-71. Santa Barbra, California: Cambridge University Press.

Mayer, R. E. (2005). Introduction to Multimedia Learning. In R. E. Mayer, *The Cambridge handbook of multimedia learning* (pp. 1-18). Cambridge: Cambridge University Press.

Mayer, R. E., & Moreno, R. (2000). Aids to Computer-Based Multimedia Learning. *Learning and Instruction, 12*, 107-119.

Mayer, R. E., & Moreno, R. (2002). Animation as an Aid to Multimedia Learning. *Educational Psychology Review, 14*(1).

Mayer, R. E., & Moreno, R. (2003). Nine Ways to Reduce Cognitive Overload in Multimedia Learning. *Educational Psychologist, 38*(1), 43-52.

Mayer, R. E., Fennell, S., Farmer, L., & Campbell, J. (2004). Personalization Effect in Multimedia Learning: Student Learn Better When Words are in Conversational Style Rather Than Formal Style. *Journal of Education Psychology, 96*(2), 389-395.

Mayer, R. E., Mathias, A., & Wetzell, K. (2002). Fostering Understanding of Multimedia Messages Through Pre-training: Evidence for a Two-stage Theory of Mental Model Construction. *Journal of Experimental Psychology: Applied, 8*(3), 147.

McMillan, J. H., & Schumacher, S. (2006). *Research in education: A conceptual introduction.* New York: Little Brown.

Ministry of Basic Education, & Ministry of Higher Education, (2005). *ICT policy for education.* Windhoek: Polytechnic Press.

Moreno, R., & Mayer, R. E. (2000a). A Learner Centered Approach to Multimedia Explanations: Deriving Instructional Design Principles from Cognitive Theory. *Interactive Multimedia Electronic Journal of Computer-Enhanced Learning, 2*(2), 12-20.

Moreno, R., & Mayer, R. E. (2000b). Engaging Students in Active Learning: The Case Study for Personalized Multimedia Messages. *Journal of Educational Psychology, 92*, 724-733.

Moreno, R., & Mayer, R. E. (2002). Animation as an Aid to Multimedia Learning. *Educational Psychology Review, 14*(1).

Nan, C. (2005). Analysis of How to Promote Big Class Vocabulary Teaching with Multimedia and Its Application. *Social Sciences, 22*(4), 94-96.

Narayanan, N. H., & Hegarty, M. (2003). Multimedia Design for Communication of Dynamic Information. *International Journal of Human-Computer Studies, 57*, 279-315.

North Central Regional Educational Laboratory (US) & Metiri Group. (2003). *EnGauge 21st century skills: Literacy in the digital age.* Naperville: IL: author.

Novak, J. D. (1998). *Learning, creating and using knowledge: Concept maps as facilitative tools in schools and corporations*. Mahwah: NJ: Lawrence Erlbaum.

Paivio, A. (1986). *Mental representations: A dual coding approach.* New York: Oxford University Press.

Park, O. (1998). Visual Displays and Contextual Presentations in Computer Based Instruction. *Educational Technology Research and Development, 46*(3), 37-50.

Park, O., & Gittelman, S. S. (1992). Selective Use of Animation and Feedback in Computer-Based Instructions. *Educational Technology Research & Development, 40*(4), 27-38.

Prensky, M. (2001). Digital Natives, Digital Immigrants, Part 2: Do They Really Think Differently? *On the Horizon, 9*(6), 1-6.

Price, S. J. (2002). *Diagram representation: The cognitive basis for understanding animations in education*. Brighton: University of Sussex.

Rebetez, C. (2006). *Control and Collaboration in Multimedia learning: Is there a split in interaction*? Geneva: University of Geneva.

Rebetez, C., Betrancourt, M., Sangin, M., & Dillenbourg, P. (2008). *Running ahead: animation and collaboration - learning from animation enabled by collaboration.* Geneva: University of Geneva.

Riding, R., & Grimdey, M. (1999). Cognitive Style, Gender and Learning from Multimedia Materials in 11 Year Old Children. *British Journal of Educational Technology, 30*(1), 43-56.

Rieber, L. P. (1990). Animation in Computer-Based Instructions. *Educational Technology Research and Development, 38*(1), 77-76.

Rieber, L. P. (1991). Animation Incidental Learning and Continuous Motivation. *Journal of Educational Psychology, 83*(1), 318-328.

Ringstaff, C., & Kelley, L. (2009). *The learning return on our educational technology investment: A review of findings from research*. San Francisco: WestEd RTEC.

Schar, S., & Krueger, H. (2000). Using New Learning Technologies with Multimedia. *IEEE Multimedia, 7*(3), 40-51.

Schnotz, W., & Bannert, M. (2003). Construction and Interference Learning from Multiple Representation. *Learning and Instruction, 13*, 141-156.

Schnotz, W., & Rasch, T. (2005). Enabling, Facilitating and Inhibiting Effects of Animations in Multimedia Learning: Why Reduction of Cognitive Load Can Have Negative Results on Learning. *Educational Technology Research and Development*, *53*(3), 47-58.

Schnotz, W., & Rasch, T. (2008). Functions of Animations in Comprehension and Learning. In R. K. Lowe, & W. Schnotz, *Learning with animation: Research implications for design* (pp. 93-113). New York: Cambridge University Press.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental & quasi-experimental designs for generalized causal inference.* Boston: MA: Houghton Mifflin.

Singleton, R. A., & Straits, C. B. (2005). *Approaches to social research.* New York: Oxford University Press.

Wentz, E., Vender, C. J., & Brewer, A. C. (1999). An Evaluation of Teaching Introductory Geomorphology Using Computer-Based Tools. *Journal of Geography in Higher Education, 23*(2), 167-180.

Appendix A: Letter to Director of Education, Ohangwena Region

22nd February 2017

To: Mr. I. Hamatwi

Director of Education

Ohangwena Regional Directorate

Eenhana

Request for Permission to conduct research in Ohangwena Region

Dear Sir,

I am Simon Kaukungwa Shilongo, a Master student with the University of Namibia. The research I wish to conduct for my Master's thesis is to investigate whether multimedia instructions improve grade 12 learners' achievements in Geography. This research is under the supervision of Dr. P. Boer as my main supervisor and Dr C. Shaimemanya as my co-supervisor.

I am therefore hereby seeking your consent to conduct this study for the week starting Monday February 2017 at Ponhofi SS, in Ohangwena circuit.

The study is planned to take place after normal school hours to ensure that it does not interfere with the teaching and learning process for the affected teacher (s) and learners.

Participating learners' details will be handled with a high degree of confidentiality and their participation will be voluntarily.

I have provided you with a copy of the permission letter and the ethical clearance certificate which I received from the University of Namibia Research Ethic Committee.

For more information, I can be reached on shilongosk@gmail.com

Thank you for considering this matter,

Yours sincerely

SK

Simon K. Shilongo

Student

Appendix B: Letter to School Principal, Ponhofi Secondary School

22nd February 2017

To: Mr. J.N Shinedima

School Principal

Ponhofi SS

Ohangwena

Request for Permission to conduct research in Ponhofi SS

Dear Sir,

I am Simon Kaukungwa Shilongo, a Master student with the University of Namibia. The research I wish to conduct for my Master's thesis is to investigate whether multimedia instructions improve grade 12 learners' achievements in Geography. This research is under the supervision of Dr. P. Boer as my main supervisor and Dr C. Shaimemanya as my co-supervisor.

I am therefore hereby seeking your consent to conduct this study for the week starting Monday 27 February 2017 in Ponhofi SS.

The study is planned to take place after normal school hours to ensure that it does not interfere with the teaching and learning process for the affected teacher (s) and learners.

Participating learners' details will be handled with a high degree of confidentiality and their participation will be voluntarily.

I have provided you with a copy of the permission letter and the ethical clearance certificate which I received from the University of Namibia Research Ethic Committee.

For more information, I can be reached on shilongosk@gmail.com

Thank you for considering this matter,

Yours sincerely

SK

Simon K. Shilongo

Student

Appendix C: Letter of consent (Participants)

19 February 2017

Letter of consent

I Simon K Shilongo, Student Number 200538411, hereby confirming that the undersigned learners has given consent to be part of the animated lesson designed for my experimental study. The decision to include the learners is to make the lesson as interesting as the lesson taught by a teacher and also to capture the audience attention.

Learners Names and Signatures

Benjamin Shilumbu   …………………..

Elizabeth Povanhu   …………………..

Eslon David   …………………..

Fransina Otto   …………………...

Josephine Mateus   …………………..

Kennedy Namholo   …………………...

Meameno Shaamena   ……………………

Appendix D: Approval letter from University of Namibia

CENTRE FOR POSTGRADUATE STUDIES

University of Namibia, Private Bag 13301, Windhoek, Namibia
340 Mandume Ndemufayo Avenue, Pioneers Park
☎ +264 61 206 3275/4662; Fax +264 61 206 3290; URL: http//www.unam.edu.na

UNAM
UNIVERSITY OF NAMIBIA

06 February 2017

RESEARCH PERMISSION LETTER

Student Name: **Simon Shilongo**
Student number: **200538411**
Programme: **Master of Education**

Approved research title: The use of videos and animations to improve the learners' achievement in Namibian Senior Secondary Certificate Geography in selected secondary schools in Ohangwena Region.

TO WHOM IT MAY CONCERN

I hereby confirm that the above mentioned student is registered at the University of Namibia for the programme indicated. The proposed study met all the requirements as stipulated in the University guidelines and has been approved by the relevant committees.

The proposal adheres to ethical principles as per attached Ethical Clearance Certificate. Permission is hereby granted to carry out the research as described in the approved proposal.

Best Regards,

DR. SETH J. EISEB
ACTING DIRECTOR: CENTRE FOR POSTGRADUATE STUDIES
Tel: +264 61 2063414
E-mail: seiseb@unam.na

Centre for Postgraduate Studies
Office of the Director
2017 -02- 0 6
University of Namibia
UNAM

Appendix E: Ethical clearance certificate (University of Namibia)

UNAM

UNIVERSITY OF NAMIBIA

ETHICAL CLEARANCE CERTIFICATE

Ethical Clearance Reference Number: FOE/156/2016　　　**Date: 9 December, 2016**

This Ethical Clearance Certificate is issued by the University of Namibia Research Ethics Committee (UREC) in accordance with the University of Namibia's Research Ethics Policy and Guidelines. Ethical approval is given in respect of undertakings contained in the Research Project outlined below. This Certificate is issued on the recommendations of the ethical evaluation done by the Faculty/Centre/Campus Research & Publications Committee sitting with the Postgraduate Studies Committee.

Title of Project: The Use of Videos and Animations To Improve Learners' Achievement in Namibian Senior Secondary Certificate Geography in Selected Secondary Schools in Ohangwena Region

Nature/Level of Project: Masters

Researcher: S.K. Shilongo

Student Number: 200538411

Faculty: Faculty of Education

Supervisors: Dr. P. Boer (Main) Dr. C. Shaimemanya (Co)

Take note of the following:
(a) Any significant changes in the conditions or undertakings outlined in the approved Proposal must be communicated to the UREC. An application to make amendments may be necessary.
(b) Any breaches of ethical undertakings or practices that have an impact on ethical conduct of the research must be reported to the UREC.
(c) The Principal Researcher must report issues of ethical compliance to the UREC (through the Chairperson of the Faculty/Centre/Campus Research & Publications Committee) at the end of the Project or as may be requested by UREC.
(d) The UREC retains the right to:
(i) Withdraw or amend this Ethical Clearance if any unethical practices (as outlined in the Research Ethics Policy) have been detected or suspected,
(ii) Request for an ethical compliance report at any point during the course of the research.

UREC wishes you the best in your research.

Prof. P. Odonkor: UREC Chairperson　　　　Ms. R. Claassen: UREC Secretary

GEOGRAPHY PRETEST

Grade 11   Marks: 25

Learner Number ……………………….   **Duration: 1 hour**

Instruction to candidates

- **Write in blue or black ink**

- **Answer all the questions**

- **The number of marks per question are indicated in brackets [ ]**

- **This question paper consist of 5 printed pages including the cover page**

(1) (a) Table 1 below, compares the Loma Prieta earthquake with other major earthquakes.

Table 1

Richter scale value (strength)	Date	Place	Number of deaths
9.1	2004	Sumatra	283 106
8.0	1556	Shenshi, China	830 000
7.6	2005	Pakistan	86 000
7.5	1976	Tangshan, China	255 000
7.1	1989	Loma Prieta, California	63
6.9	1995	Kobe, Japan	5470
6.7	1994	Northridge, California	57

(i)   Using evidence from Table 1, suggest **two** reasons why there were so many deaths in the Shenshi earthquake.

1..

....

2..

.... [2]

(ii)   State what measures can be taken in an event of earthquake to minimize the impact of earthquake

....

....

....

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....

....

....[5]

2   Study figure 1.1 showing plate margins and zones where earthquakes and volcanoes occur.
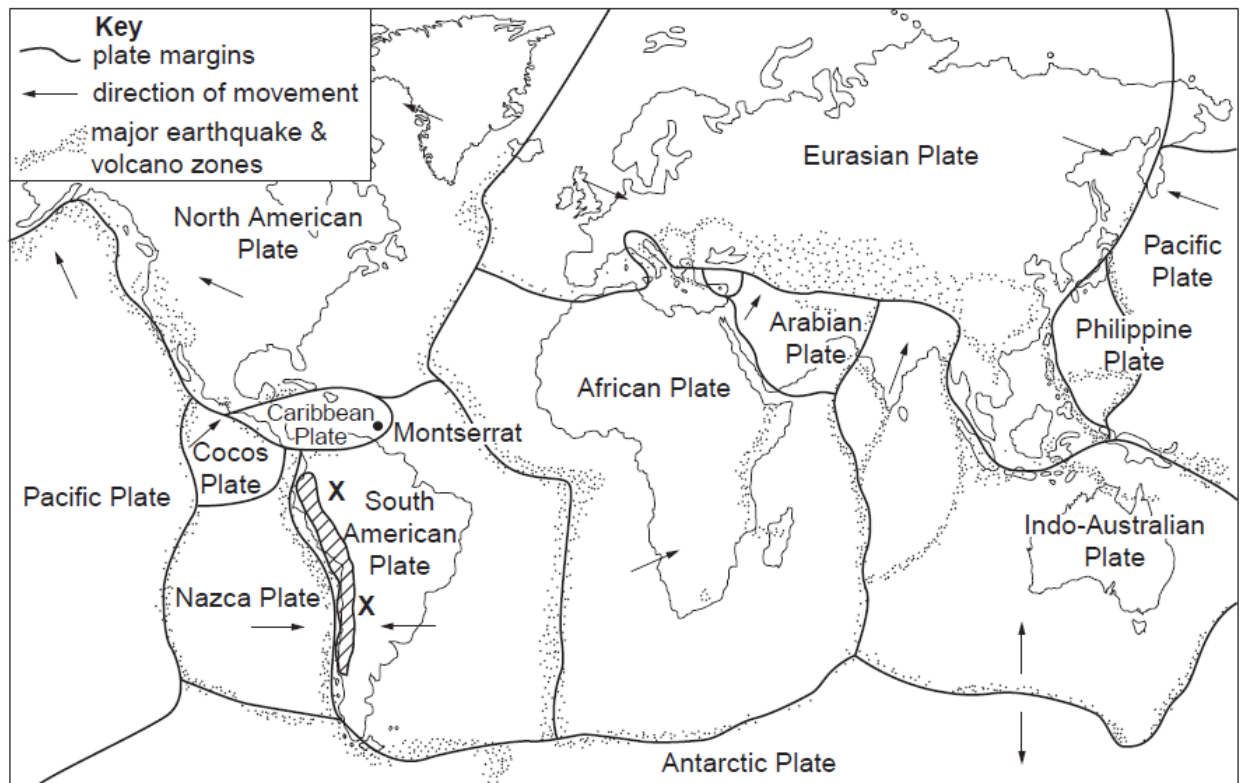
Figure 1.1, plate boundaries and major earthquake and volcano zones

(i)   What term is used to refer to the point underground where an earthquake originates?

………………………………………………………………………………………………[1]

(ii)   By using Figure 1.1, describe the distribution of the major earthquake and volcano zones

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

………………………………………………………………………………………………[3]

(iii) Explain the processes which result in the earthquake on the area shaded and labeled **X** on Figure 1.1. You may use labeled diagrams in your answer.

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....

....

....

....[5]

(iii) Name the type of plate boundary between the following plates:

A Eurasian plate and Pacific plate;

....

B Antarctic plate and Indo-Australian plate;

....

C North American plate and Pacific plate.

....   [3]

(iv) Use letter **Z** to label the plate boundary on Figure 1.1, where new land is being formed, and describe how it is being formed

Label Plate boundary on figure 1.1.   [1]

How land is being formed

....

....

....

....[3]

(b) Which **two** of the following statements about earthquake are correct? Tick only **two** statements.

Statement	Tick
They are mostly found in the centres of plates	
They are mostly found at plate margins	
They are found at every plate margin	
They may be found in the centres of plates	
They are only found at plate margins	

GEOGRAPHY POSTTEST

Grade 11   Marks: 25

Learner Number …………………………   Duration: 1hour

Instruction to candidates

- **Write in blue or black ink**

- **Answer all the questions**

- **The number of marks per question are indicated in brackets [ ]**

- **This question paper consist of 6 printed pages including the cover page**

**1 (a)** Study Figure 1.1, showing plate margins and zones where earthquakes and volcanoes occur.
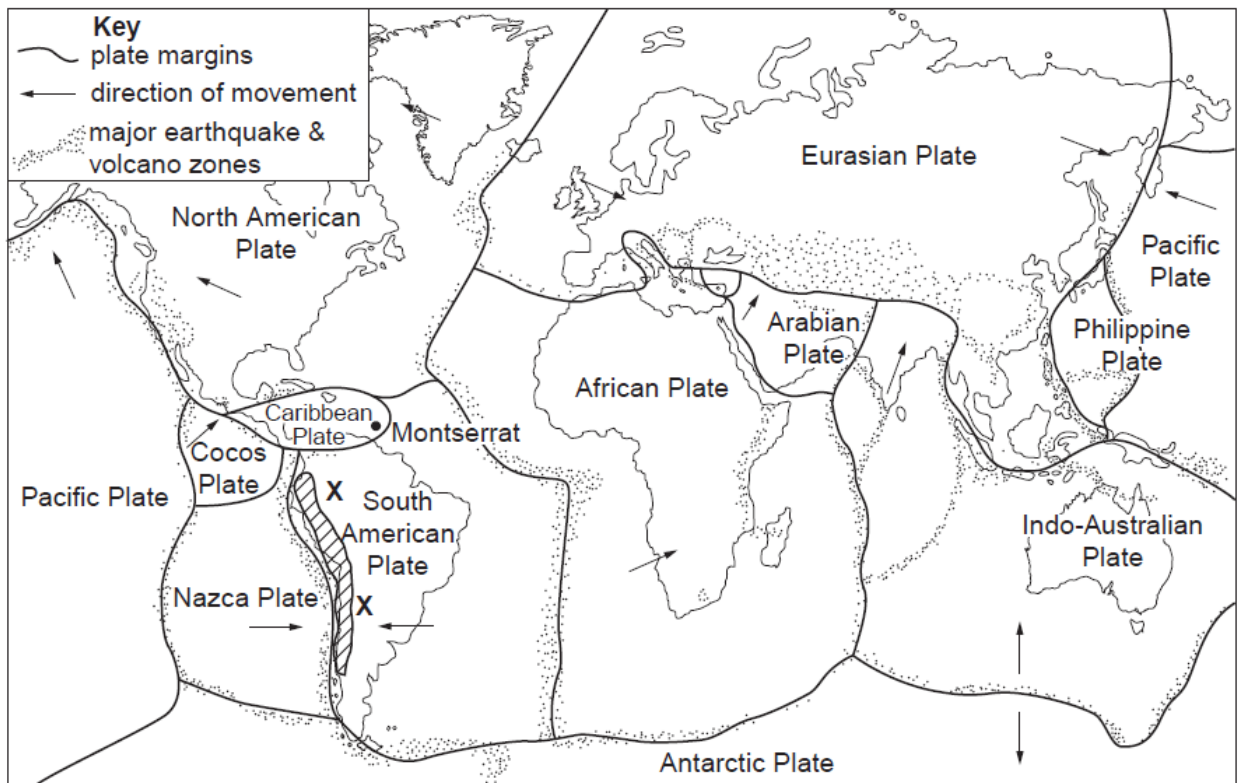
Figure 1.1, plate boundaries and major earthquake and volcano zones

(v)   State the term used to refer to the point underground where an earthquake originates

……………………………………………………………………………………………….[1]

(vi)   Describe the distribution of the major earthquake and volcano zones which are shown on Figure 1.1.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

……………………………………………………………………………………………………

………………………………………………………………………………………… [3]

(vii) Explain the processes which result in the earthquake on the area shaded and labeled **X** on Figure 1.1. You may use labeled diagrams in your answer.

………

………

………

………

………

……[5]

(iii) Name the type of plate boundary between the following plates:

A Eurasian plate and Pacific plate;

……………………………………………………………

B Antarctic plate and Indo-Australian plate;

……………………………………………………

C North American plate and Pacific plate.

……………………………………………………   [3]

(viii) State at which plate boundary (A,B or C) where new land is being formed, and describe how it is being formed

Plate

boundary……………………………………………………………………………[1]

How land is being formed

……

……

……

………………………………………………………………………………………………[3]

(b) Which **two** of the following statements about earthquake are correct? Tick only **two** statements.

Statement	Tick
They are mostly found in the centres of plates	
They are mostly found at plate margins	
They are found at every plate margin	
They may be found in the centres of plates	
They are only found at plate margins	

[2]

(c) Table 2 compares the Loma Prieta earthquake with other major earthquakes.

Table 2

Richter scale value (strength)	Date	Place	Number of deaths
9.1	2004	Sumatra	283 106
8.0	1556	Shenshi, China	830 000
7.6	2005	Pakistan	86 000
7.5	1976	Tangshan, China	255 000
7.1	1989	Loma Prieta, California	63
6.9	1995	Kobe, Japan	5470
6.7	1994	Northridge, California	57

(iii)   Using evidence from Table 2, suggest **two** reasons why so many people died in the Shenshi earthquake.

1..

....

2..

....[2]

(iv) State what measures can be taken in an event of earthquake to minimize the impact of earthquake

....

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....[5]