EFFECTIVENESS OF USING WEBSITES IN THE TEACHING OF TRANSPORT SYSTEM IN HUMANS: A CASE STUDY OF A RURAL HIGH SCHOOL IN OMUSATI REGION, NAMIBIA

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ABSTRACT

Several countries recognised the importance of websites usage in education for teaching and learning. In Namibia, the use of websites in teaching remains limited. The purpose of this study was to explore the effectiveness of usage of websites to teach the topic of transport system in humans in Biology as a school subject at a selected rural high school in Omusati Region in Namibia. The study adopted a qualitative approach using single case study. A sample size of three Biology teachers was used for the study. A purposive sampling technique was adopted to compose the sample. Three research questions were answered. Data was collected over a one-week period using open-ended questionnaire, observation schedule and photographs and analysed using thematic analysis. Major findings were that the usage of websites in teaching transport system in humans in the selected rural high school has a great effectiveness for both teachers and leaners. Findings also indicate that Biology teachers used websites in several ways to teach the topic transport system in humans. Moreover, findings also indicate that Biology teachers in the selected rural high school faced a lot of challenges regarding the usage of websites at the initial stage of the study, which were addressed and resolved. Some of the challenges identified were inadequate technical and financial support towards the usage of websites at school and poor websites skills in both teacher and learners. Based on the above, it is recommended that each rural high school invest in Wi-Fi with stronger signals, teachers should post past examinations on websites and there is a need for a study to determine the extent to which rural high schools customise and implement websites usage in Biology for purposes of achieving effective website usage in teaching.

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DECLARATIONS

I, Julia Ndatitangi Amunyela hereby declare that this study: Effectiveness of using websites' in the teaching of transport system in humans: a case study of rural a high school in Omusati region, Namibia is a true reflection of my own research and that this work or part thereof has not been submitted for a degree at any other institution of higher education. Wherever contributions of others are involved their contributions is acknowledged with due reference.

Julia Ndatitangi Amunyela	Signature	Date
Name of student		26/11/19

DEDICATION

This thesis is dedicated to my loving father, mother and my son, George Megameno Kayone. A day did not pass without you complaining about how busy I was. I will always be grateful of your understanding and patience. You believed in me and your prayers have been eventually answered.

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First and foremost, I thank my God, my good Father, for letting me through all the difficulties. I have experienced your guidance day by day. You are the one who let me finish my degree. I will keep on trusting you for my future. Thank you, Lord.

Secondly, I would like to express my special appreciation and thanks to my supervisor and my co-supervisor, Dr H. U. Kandjeo-Marenga and Dr H. Miranda respectively, who have been tremendous mentors for me. I would like to thank you for encouraging my research and for allowing me to grow as a research scientist. Your advice on both research as well as on my career have been invaluable.

Thirdly, I would also like to thank the principal, teachers and learners of the selected school in Omusati Education Region in Namibia. A special thanks to my family. Words cannot express how grateful I am for all of the sacrifices that made on my behalf. Your prayers for me was is what sustained me thus far. To my beloved son George Megameno Kayone, I would like to express my thanks for being such a good boy who always was cheering me up when I felt the stress and overwhelming results of this study.

LIST OF ACRONYMS

AB	Actual Behavior
ASU	Actual System Use
ATB	Attitude toward the Behavior
ATU	Attitude toward Using
BI	Behavioral Intention
BIU	Behavioral Intention to Use
CLO	Common Lisp object system
DVDs	Digital Video Discs
ICT	Information and Communication Technology
LMS	Learning Management System
MOE	Ministry of Education
NSSC	Namibia Senior Secondary Certificate
PEU	Perceived Ease of Use
PU-	Perceived Usefulness
SAAS	Software as a Service
SN	Subjective Norm
TAM	Technological Acceptance Model
TRA -	Theory of Reasoned Action
UNESCO -	United Nations Educational, Scientific and Cultural Organization.

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CHAPTER 1: INTRODUCTION

1.1 Background of the study

This chapter discusses the background to the study, the statement of the problem, the significance of the study, research questions, definition of terms, and limitations of the study. In 2005, Namibia launched its official ICT in Education Policy. For Namibia, the goal of ICT in education and teacher professional development is nothing short of transformative— vaulting this desert nation into a desert tiger by helping teachers and learners attain the "21st century skills" of creativity and problem solving (InfoDev, 2006). ICT skills training is covered within the Namibian curriculum as seen in the following standards: Basic Information Science for Grades 4-7,Computer Literacy for Grades 4-7,Computer Practice for Grades 8-10 ` and Computer Studies for Grades 11-12 (InfoDev (2006).

Information Communication Technology can be described as any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital form. These comprises, but is not limited to computers, digital television, e-mail, modems and internet and it mostly deals with how these various products can be joined together and work hand in hand.(MOE Report, 2010). In this study, ICT in education refers to the usage of websites as a tool for teaching the topic of transport in humans in Biology as a school subject.

In Namibia, Biology is one of the crucial subjects in science education. Learners in high schools who study Biology sit for three examination papers at either Ordinary or Higher Level, depending on the individual learner's choice. Several examiners' reports indicated that, transport in humans

is one of the topics that is not well understood by learners until to date (NSSCO examiners' reports 2010, 2011 &2015). Apart from ICT, all the other subjects are taught in normal classrooms using the traditional ways of teaching such as chalk and chalkboard, textbooks reading and recitation. This therefore means that for learners to perform well in school they should be exposed to interesting and new methods of teaching. These methods include integration of ICT and usage of websites. Knowledge in websites usage is a pre-requisite in this modern society, where every sphere of life is controlled by technology. Bingimlas (2009), believes that the use of ICT resources, computers, the internet and other related technologies in the classroom better prepares the learners for the work place. Several scholars argue that using ICT in teaching gives the learners a chance to learn how to function better in this digital world (Alayyar, Fisser &Voogt (2012) and Ifenthaler, Isaias, Kinshuk, Spector, Angeli & Valani, (2012).

Yelland (2001) argues that the utilisation of traditional methods of teaching does not prepare learners for the job market, especially where the knowledge of technology is a pre-requisite. ICT is important for several reasons in the education system. Firstly, ICT is a potential enhancer to learners' achievement (Bransford et al., 2000). Secondly, a number of theorists and scholars like Beacham and McIntosh (2013) and Fu (2013 concur that using ICT in the teaching process improves learners' knowledge, minimises face to face instruction and provide a learning environment where teachers can easily offer assistance to learners with special needs. Moreover, the use of ICT serves as a motivation for the learners and help them develop a positive attitude towards learning (Wakhu, 2013).

One areas of concern is the use of teaching strategies that will provide learners maximum opportunity to use their senses to help them understand transport system in humans. The researcher as a professional teacher noted that majority of learners do not understand the topic of transport in humans, in particular, the weakness lies in their understanding of how the human heart function. Specifically, learners have problems understanding how the human heart works, more so, they do not know how to identify various parts of the human heart. The researcher has often observed learners' explanation on how the human heart functions, and some have problems of using the correct terminology as used in science. For example, they may have some knowledge of the basic words in constructing sentences but they might have no idea of the deeper meaning of such concepts. The researcher is intrigued by the phenomena of how learners who are repeatedly exposed to this topic, yet still do not understand it. Moreover, several Biology examiner's reports have indicated that learners misunderstood questions and often poorly answered questions about transport in humans. A good example is found in the examiner's report of the academic year 2014. The report indicated that terms like one complete journey, pulmonic and systemic system are not yet fully understood. In addition to that, the report has indicated that some candidates didn't understand the phenomena that blood passes through the heart twice is not the same as blood passes in or around the heart twice, the researcher believes that, learning of transport system in humans can be made easier and more comfortable by integrating websites usage in instructional strategies for teaching transport system in humans. Previous researches also proved that use of ICT in teaching will enhance the learning process and maximises the students' abilities in active learning (Finger & Trinidad, 2002; Jorge, Gutiérrez& Garcia, 2003; Young, 2003; Jamieson-Procter, Albion, Finger, Cavanagh, Fitzgerald, Bond, & Grimbeek; 2013). The learners can make use of websites for easy understanding because of usage of websites might change traditional classrooms into smart classroom and improve learning processes in Biology, particularly the topic of transport in humans.

1.2 Statement of the problem

The regular use and development of ICT has had an enormous influence on people's ways of living including how instructiomn is delivered. The purpose of this study is to explore the effectiveness of the usage of websites in the teaching of the topic transport system in humans in the selected rural high school. (UNESCO, 2003, p. 57) describes the usage of websites as a:

> *Mind tool that involves students in learning, not through computer-mediated communications, but with the help of the latter, which implies an intellectual partnership between the person and the computer to get an access to information and its interpretation, as well as organisation of the process of learning on one's own.*

ICT is the best way to convey the information to learners in science subjects, particularly in the teaching of transport system in humans in Biology because of the easy understanding and attractive experience to the learners compared to the traditional ways of teaching which seem not to be effective (Wakhu,2013). So, ICT integrated instruction might prove to be the best way to improve the quality of learning as it provides an opportunity for learners to use maximum senses to get the information (Senthilkumar, 2012). It was reported that learners experience difficulties in answering questions about transport system in humans (NSSC examiners' reports 2010, 2011, 2014 &2015).

In Namibia, little is known about how teachers use websites to teach the topic of transport system in humans, in Biology. In this regard, Biology teachers are expected to enhance teaching in order to prepare learners for their examinations. Given this background, the study aimed at exploring how some Namibian rural high school Biology teachers use websites in their teaching in order to

effectively develop learners' knowledge about transport system in humans in a rural high school in Omusati Region.

1.3 Research questions

The main research question was: How effective is usage of websites in developing learners' knowledge about transport system in humans in a rural high school in Omusati Region? And the sub-research questions were:

1. How do Biology teachers use websites in teaching of transport system in humans in the selected rural high school in Omusati Region?
2. What challenges are faced by Biology teachers when using websites to teach the topic transport system in humans in the selected rural high school in Omusati Region?
3. How does usage of websites help in developing learners' knowledge in the topic transport system in humans in the selected rural high school in Omusati Region?

1.4 Significance of the study

Biology is often said to be a very demanding subject with a lot of content. As a result there is good reason that creating teaching strategies for conceptual change and observing their effects on learners' performance might prove to be useful to the teachers with similar learning situations (Bekele, 2014). Moving on, this study is significant since no known similar study has been previously done on this topic in Namibia. Although several researchers and theorists have not completely ignored the usage of websites in Biology, to date, little research has focused on the effectiveness of usage of websites to teach transport system in humans in a rural high school. This might study stimulate more research efforts in this domain and hopefully, better inform practice.

Moreover, transport system in humans is not like topics from other units. There is a greater need for learners to understand transport system in humans. Learners may not have the skills necessary to deal

with such a demanding topic, so this research might be useful to teachers whose learners are struggling with transport system in humans or more specifically the human heart. This study will also be useful for all researchers interested in the integration of ICT via the usage of websites in classrooms, teachers who are in the process of developing ICT use in schools, and strategists and policy makers within the Ministry of Education.

In addition, for as much as the findings of this study has proven that the usage of websites is effective in teaching transport system in humans, the Ministry of Education, Art and Culture might develop projects. Teachers will be trained with usage of websites in their school computers. They will also be trained how to pedagogically integrate websites usage in the teaching across the curriculum and also to expand teachers' confidence and competence in integrating websites usage pedagogically. This will be beneficial since ICTs have the potential to speed up, enhance, and deepen skills, to motivate and engage learners, to help relate school experience to work practices.

1.5 Limitations of the study

The behaviour of sample group members might have changed with negative implications on the level of research validity since they were informed about the presence of the observer, the issue was addressed, and the researcher became a participant in the study. In carrying out the study, time was a major constraint. As a school teacher the time to conduct the research was limited due to the classes which equally needed to be attended to at her school, this was solved by collecting data in the evening. Therefore, it was very difficult to come up with a proper plan to conduct the appropriate research as expected. Finding literature (Namibia context), that discuss usage of websites as a tool to facilitate learning was also a challenge, however, the internet and newspapers were used to gather information

about the importance of usage of websites. Most of the sources likely found were generalised to subjects and not specifically for transport system in humans.

The study, in some cases, was difficult as some findings were subject to bias from unreliable information as the people who gave the information may have different perceptions about the study on usage of websites. The researcher had no control over the data the participants preferred to accord or withhold thereby presenting a limitation in adequacy of information obtained. Unforeseen problems sometimes interfered with the observation rendering what has to be observed not coming out clearly, however an observation schedule was used to confirm. Finally, data was not collected effectively because some participants were not open to direct observation and lack of ICT skills in teachers and learners.

1.6 Delimitation of the study

Delimitation of the study is defined as the boundary limitation (Best and Kahn 2005). This study focused only on usage of websites in teaching transport in humans in Biology but did not focus on ICT utilisation in other subjects and other topics in Biology. Although the rural high school in which the research was conducted is in Omusati region, it is typically a rural high school; hence, the findings of this research may not be generalised to other schools since some conditions in the school may be unique and different from other areas especially those in urban set-ups.

1.7 Definition of terms

*Integration***:** For the purpose of this study, refers to the use of ICT to introduce and reinforce skills through usage of Websites as an ICT tool.

Information and Communication Technology: Is a range of technological tools and resources used to communicate, create, disseminate, store and manage information.

Computer laboratory: A room specifically designed and equipped with ICT tools for teaching and learning all subjects.

Participants: For the purpose of this study, participants refers to the grade 11 teachers and learners who were involved in the study.

Knowledge: Acquaintance with or understanding of human transport system gained through Integration of ICT in the teaching or the traditional way of teaching.

Rural High school: A High School that is found in a geographic area that is located outside towns and cities.

*Websites usage***:** Is the utilization of the system of connected documents on the internet which often contain colour pictures, videos, and sound, and which can be used for information about transport in humans.

1.8 Summary

This chapter discussed the background of the study. In addition, it has also discussed the statement of the problem of the study, research questions, and the significance of the study, the limitation and delimitation of this study. The definitions of terms that are used in this study have also been addressed. According to the literature, several studies conducted concentrated on the use of ICT in teaching and learning in general and most of them are founded on the Technological Acceptance Model (TAM), developed by Davis (1989). Literature has also indicated that the integration of ICT in teaching faces a lot of challenges. There are no studies conducted in Namibia that investigated the

usage of websites in the teaching the topic of transport in humans in Biology regarding Namibia Senior Secondary Certificate (NSSC). The study might prove beneficial to the teachers, curriculum developers, and professional development institutions to add value to the current integration of ICT and make learning more effective in both rural high schools and urban high schools. The researcher encountered a number of limitations; amongst those limitations were finances, time, lack of literature (Namibia context) and lack of ICT skills in teachers and learners. Moreover, this study was limited to the grade 11 NSSC Biology learners and teachers in the selected rural high school in the Omusati education region, hence the findings cannot be generalised to other teachers, learners and other educational regions. The following chapter will discuss theoretical framework and literature.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter provides a theoretical framework on which this study is based. In addition, it also provides the literature review regarding the integration of ICT in the teaching of Biology. Technologies, specifically the communication tools, provides teachers and learners with so many interesting tools that can be used to advance the teaching and learning process. These tools claim to help the instructors to have more advantage of using technology in teaching and supports the learners to learn better and faster.

2.2 Theoretical framework

The research was based on the theory of Technology Acceptance Model (TAM) by Davis (2003).

2.2.1 Technology Acceptance Model

The Technological Acceptance Model (TAM) in Figure 1, developed by Davis (1989), has Actual System Use (ASU) as the main variable. Davis defines ASU as an individual's observable usage of a particular system (e.g. technology). Figure 1 advocates that ASU is a direct function of Behavioural Intention to Use (BIU) a technology, which Davis defined as the extent to which a person has drawn up conscious plans to perform or to not perform some determined future behaviour. BIU is in turn, a function of attitude towards using (ATU) and perceived usefulness (PU). ATU is an individual's positive or negative feeling about performing the behaviour according to (Davis, Bagozzi & Warshaw, 1989), while PU is the extent to which a person is convinced that using a particular system would intensify his or her job performance (Davis, 1989). According to Figure 1:1 PU is influenced by perceived ease of use (PEU), which Davis defined as the extent to which a person believes that

using a particular technology would be free from effort. Figure 1 further suggests that ATU is determined jointly by PU and PEU. According to Figure 1, TAM hypothesises that in turn, each of PU and PEU is influenced by external variables (e.g. system characteristics, development process, and training). However, other explanatory variables notwithstanding, the proponents of TAM (e.g. Davis, 1989) posit that PU and PEU are the two fundamental determinants of ASU. They object that if users find a technology useful (i.e. having PU) and easy to use (i.e. having PEU), then they develop a positive attitude toward using this technology (ATU). All these will eventually lead to the behavioural intention to use (BIU) the technology and finally the actual use of the technology (ASU).

The researcher therefore adopted Technology Acceptance Model as a framework to demonstrate the mechanisms that link websites usage and effective teaching. Taking TAM theory as a theoretical framework would provide insights into the effectiveness of websites use by Biology teachers in the selected rural high school in Omusati region, hence understanding how they use websites in the teaching of transport system in humans. Moreover, applying TAM theory to the educational practice can promote websites usage amongst teachers.

In this instance, the summarised components of TAM theory below are relevant to the study.

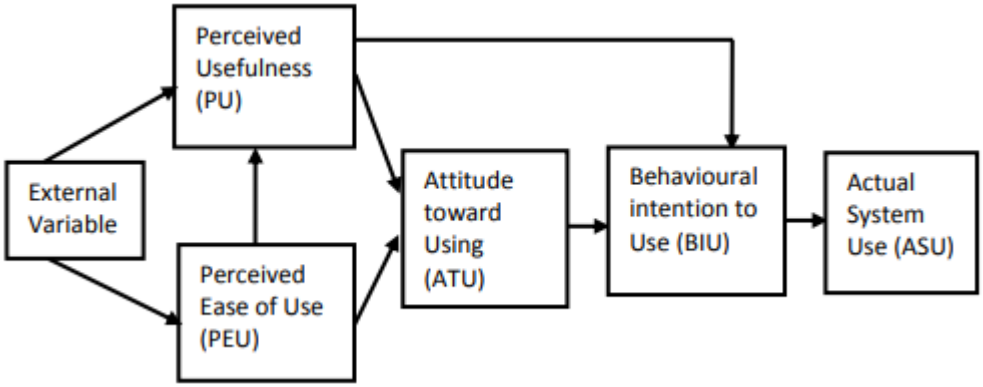

Figure 1: The Technology Acceptance Model (TAM)

The diagram illustrates that during teaching, the usefulness of websites is influenced by how easy the usage of websites is in teaching. Biology teachers' attitude to use websites is influenced by how useful they find websites usage and the easiness of using websites in the classroom. This theory also hypothesise that the usefulness and easiness of websites usage are influenced by external variables such as teachers training and websites development process. If teachers find websites usage in their teaching useful and easy to use, then they develop the desire to use websites. This will lead to behavioural intention to use websites and finally the actual use of websites in their teaching which promotes effectiveness of websites usage in the teaching of transport system in humans.

2.3 Integration of ICT in Education

ICT has been described as a potentially powerful enabling tool for educational change and reform and productivity gains in developed world economies. Information and Communication Technology, is generally referred to as "a range of technological tools and resources used to communicate, create, disseminate, store and manage information" (Tinio, 2002, p .12). Technologies do not refer to only the computers, but also broadly to the internet (websites),

broadcasting technologies (such as radio and television), telephones (including mobile phones), Compact Discs (CDs) and Digital Video Discs (DVDs). ICT is integrated when it is used to support and enhance the attainment of curriculum objectives and to engage learners in meaningful learning (MOE Report, 2010).

According to MOE Report, (2010) ICT integration in education means that ICT is to be added as an additional subject in the curricula and that we do not limit ourselves to the teaching and learning through websites and some software packages. Sadik (2008) defines integration of technology into learning as curricula utilising authentic tasks that intentionally and actively help learners to construct their own meanings from thinking about experiences and allows for more inter-disciplinary project-based instruction. Integration is defined not by the amount or type of technology used, but by how and why it is used (Sadik, 2008). Meaningful integration of technology in Biology Education is achieved when learners are able to select technology tools to help them obtain information in a timely manner, analyse and synthesise the information and present it professionally (Sadik, 2008).

Teachers integrate technology into teaching and learning of Biology for a variety of reasons such as; promoting students engagement, teaching 21st century skills, best teaching practices, to stay current, for hands-on interactive learning, to vary instructional methods, to perform labs and demonstrations, and for research and communication (Hechter, Phyfe & Vermette, 2012). Yet, administrative, technological, organisational, and philosophical factors exist, which seriously hinder the effective implementation of technology into classroom teaching and learning (Hechter

et al.2012) .There is a need to identify organisational and philosophical factors that hinder the effective implementation of technology and websites usage in the classrooms.

2.4 Challenges and Opportunities Influencing Integration of ICT in Teaching and Learning of Biology

Seffrin, Panzan and Ruth (2008) define a barrier as an event or condition that hinders the adoption of decision(s). Hudson and Porter (2010) observe that Biology teachers are also faced with inhibiting challenges or barriers to computer use and websites-teaching. Bennison and Goos (2010) and Amuko, Miheso and Ndethiu (2015), describe two types of barriers currently hampering the integrated use of websites-technology by teachers: - external (first order) barriers and internal (second order) barriers.

Amuko et al (2015), observe that policy makers continue to introduce strategies for ICT, with the intention of increasing its use in high schools. These strategies are likely to have an effect on the school level factors. The teacher level obstacles are more difficult for policy makers to tackle as it is the teachers themselves who need to bring about the required changes in their own attitude and approach to ICT-websites teaching. Amuko et al (2015), in their research findings stated that, the main factor in front of Biology integration process is the gap between the curriculum's expectations and teachers' beliefs. However, they suggested that, the integration of ICT-websites teaching into the Biology classroom depends on individual teachers as well as the schools' contextual factors.

2.4.1 Teacher Related Challenges in Teaching and Learning Biology

Teacher related challenges impact on fundamental change and are typically rooted in teachers' core beliefs and are therefore the most significant and resistant to change (Amuko et al. 2015)). Teacher related factors refer to teacher comfortability, teacher confidence and teacher competence. Research indicates that lack of teacher confidence prevents teachers from using ICT in their teaching (Amuko et al. 2015). They also indicated that limitation in teachers ICT knowledge makes them feel anxious about using ICT in the classroom and thus not confident to use it in their teaching (Amuko et al. 2015).

Junior teachers had higher confidence levels and were more positive towards ICT in education than senior teachers. The less experienced and the veteran teachers were positive about ICT-websites teaching in education compared with the highly experienced teachers who were mainly more negative (Afshari, Bakar, Luan, Samah & Fooi, 2009). In addition, they further indicated that female student users, compared with male counterparts, are inclined to hold negative reactions to computers and such differences may have resulted in the different ways of using computers. As discussed by Davis, Klawe, Nyhus, and Sullivan (2008), computer use and expertise have been associated with masculinity, and therefore, gender socialisation serves to act negatively on female ICT interactions. They further indicated that boys aged 13-16 had already acquired a gender stereotyped view of computer users. Boys in general receive more support from teachers, stakeholders and parents, and are more likely to be the main ICT user at home than girls are.

Teachers' computer competence is a major predictor of integrating ICT in teaching. Evidence suggests that majority of teachers who reported negative or neutral attitude towards the integration of ICT into teaching and learning Biology processes lacked knowledge and skills that would allow them to make an "informed decision" (Amuko et al. 2015). A study conducted by Agyei and Voogt (2012) in Ghana among student teachers and practicing Biology teachers, reported low levels of technology integration levels as a result of low competencies and access levels of technology. Successful integration of ICT-websites in teaching is related to teachers' competence and attitudes towards the use of modern technology in their teaching and learning Biology (Amuko et al. 2015).

Positive attitudes towards ICTs use by school teachers are important to ensure the integration of the technology is effectively carried out in the school curriculum and also during teaching and learning. Teachers' attitudes are influenced by their perception of the usefulness of ICT equipment, their behaviour, intentions and pedagogical aspects. Teachers' attitudes towards using ICT in teaching and learning are also influenced by several factors (Amuko et al. 2015). Factors that can influence the teacher attitude towards ICT include ICT related knowledge and skills, and motivation to use ICT. Teacher age and teaching experience cannot be influenced or changed (Afshari, et al., 2009). In addition Jimoyiannis, Tsiotakis, Roussinos and Siorenta, (2013) found that across a number of subject specialties including Biology, teachers' post-training beliefs about the role of ICT-websites in education were influenced by their gender, age, and teaching experience. In general, male facilitators held a more positive attitude towards integrating ICT-websites teaching in education while female facilitators held a more neutral or negative attitude. Teachers' attitudes and beliefs influence successful integration of ICT into teaching Biology (Keengwe, Onchwari & Wachira, 2008).

Amuko et al (2015), stated that, in teaching and learning of Biology, teachers' belief about Biology learning with or without using technology is considered to be important because it could influence teaching and learning, and Biology curriculum reform. At the classroom level, teachers' beliefs can accelerate or slow down curriculum reforms as teachers' beliefs are resistant to change and play a role in teaching practices. Findings from a study done in Kenya by (Amuko et al.2015) has shown that teachers who begin using ICT in their teaching, initially believe that technologies create more work for them. In addition, they also found that, Biology teachers have negative beliefs about using computers in Biology teaching because of negative experiences. However, they expressed that these beliefs can be changed with in service and out-of-service courses focusing on long-term constructivist approach. They further stated that, when teachers have the environments providing social support and enough technological sub-structures, their beliefs can change in the course of time and they can design a more constructivist learning environment.

Teachers adopting constructivist educational beliefs are more willing to adopt student-centred approaches and other innovative instructional approaches, while teachers adopting traditional beliefs are more likely to adopt teacher-centred instructional practices. The way teachers integrate computers into their classroom instruction seems to be strongly mediated by their belief systems (Sang, Valcke, van Braak, Tondeur & Zhu, 2011). Moreover, the process of integrating ICT-websites into Biology teaching is directly affected by teachers' beliefs about using computers and internet as a tool for teaching and learning Biology. Cultural perceptions such as school cultures and social cultural factors need to be considered as an important element in the implementation of

ICT-websites teaching, and culture may play an important role influencing how teachers relate their beliefs to ICT use (Sang et al., 2011).

2.4.2 School Related Challenges in Teaching and Learning Biology

School related challenges refer to inadequate provision of resources such as infrastructure, support, trainings and time. Teachers rated lack of time as one of the most problematic factor to technology utilisation in schools. They further said that mastering technology requires time (Amuko et al 2015). Breakdown of a computer causes interruptions and if there is lack of technical assistance, then it is likely that the regular repairs of the computer will not be carried out resulting in teachers not using computers in teaching. The effect is that facilitators will be discouraged from using computers because of fear of equipment failure since no one would give them technical support in case there is a technical problem (Amuko et al 2015).

Yilmaz (2011) assessed technology integration processes in the Turkish education system and reported that it is important to provide schools with hardware and internet connections. In addition, it is also crucial to provide schools with technical support with regard to repair and maintenance for the continued use of ICTs in the schools. Peeraer and Van Petegem, (2011) and Kukali (2013) claimed that issues surrounding computer hardware were the most serious factors affecting implementation. Teachers reported that computers were not reliable enough. They further found that, lack of Biology educational software had a negative effect on their using ICT in their classrooms.

A study by researchers like Hamzah (2007) and Khambari, Moses and Luan (2009), found that Biology teachers in Sarawak, Malaysia, indicates that insufficient time, limited knowledge on how to use ICT-websites teaching in class and lack of technical support have prevented them from using it. For instance, Lim and Pannen, (2012) mentioned that lack of funding and staff support in case a study from Indonesia; and lack of instructional software and funds, are major factors to ICT utilization in Jordanian school settings. Similarly, in a study conducted in Jordan by Al-Senaidi, Lin and Poirot (2009), lack of institutional support and lack of time were the major hurdles to ICT utilisation in secondary education. Dionys (2012) from Cambodia addresses the lack of digital resources and infrastructure (for example, the unstable electricity support) for technology integration in teacher training centres. Buabeng-Andoh (2012) asserts that while Jordanian schools were fully equipped with ICT infrastructure; there will be always some teachers who resist the change or disbelieve in ICT benefits.

Professional development is necessary for teachers to enable them to effectively use technology to improve student learning. Staff development should be collaboratively created, based on faculty input and school needs. It must prepare teachers to use ICT effectively. This training should not consist merely of short workshops or training, which is not enough to build proper knowledge and skills (Khan, Hossain, Hasan & Clement, 2012). There are not enough training opportunities for teachers in the use of ICT in classroom environments. Current training programmes do not include enough time for them to become comfortable with the software, nor does it include support to help them troubleshoot during the early implementation stages and the training experience is not tailored to their needs. Teacher training and continued, ongoing relevant professional development is

essential if benefits from investments in ICTs are to be maximised. Teachers remain central to the learning process (Bingimlas, 2009 & Kukali, 2013).

Lack of training and insufficient technology facilities are significant factors that influence effectiveness of technology. Having the latest technology, knowledge, enough training, proper time management and support from the community, are among factors that prevent teachers from using ICT in class (Ayub, Bakar & Ismail, 2012). A study, in New Zealand and Australia conducted by Hudson & Porter (2010) and Amuko et al (2015), in Kenya found that one of the barriers that Biology teachers identified in failing to adopt the use of ICT-websites teaching in the classroom, is the lack of computer use due to lack of experience, lack of adequate professional training and lack of professional support in the use of computers in Biology instruction. Successful use of technology for the benefit of children depends on the knowledge of teachers and their confidence and competence in using technology (Amuko et al.2015). The above scholar's position is that teachers need to learn how to use technology; they also need to learn how to apply the technology to teaching and learning Biology.

2.5 ICT Websites and Distance Education

West (2011) did a research on the effects of distance education of the teachers and learners performance. There are several issues affecting the learners' inspirations in distance education which one of it is the self-directed (independent) learning. Learners can distinguish and organise the aim of their learning, lesson plan and put effort when they self-manage. When learners self-monitoring their thought, they identify and govern their internal perceptive strategies.

According to research by Locatis et al (2011), presence of sensation can completely alter the learning effects and the learner's gratification. Their research evaluated these results and the teaching and technology use in distance education. The technology used was video conference websites-cast. The authors indicated that the sensation of presence is the utmost when learners are together physically and it is more advanced with video-conferencing websites-cast since the communication is more symphonic, similar to when communicating face-to-face. They also proposed that the outcomes of learning, assessments of education and technology will be preferable with greater degrees of presence. Nevertheless, in distance education, the student's performance is better when communication between the teachers and the learners is two-fold, either through the use of cellular phone or video-conferencing websites-cast than when classes are broadcasted in one-way, either on radio or television.

Angela Owusu-Ansah et.al (2011), emphasised in their study that several institutes are still doubting about the employment of distance education due to some excessive issues such as capital, availability, department concerns, state orders, and academic organisational actions. Among several schools, costs delay the development the most. The more distance learning delivery systems become complex and costly, the more the learning becomes inaccessible to the low income class of society.

However, ICT-Websites has made work easier in education; ICTs empower instructors and learners, making very important contributions to learning and achievement in institutions. Learners can now

study in their own convenient time and at a convenient place. Distance learning has created a lot of flexibility in institutions today, learners can now accomplish their school work at any location provided there is a computer and internet service connection for websites browsing. Furthermore, it enables learners to work from anywhere where they are convenient without having to sit in a scheduled classroom. Although it still has some limitations affecting the student's motivation, such as the self-directed education which make the student totally independent and permanently separate from the instructor. Also in Distance education, the learning outcomes and the performance of learners are higher when the learners communicate in tow-away with the teachers through the use of ICT tools such as videoconferencing, telephones.

Distance education particularly in Namibia is something that institutions should not avoid especially for learners who are very far from the school. Although some certain requirements need to be accomplished for distance education to stand properly such as the instructional design plans, communications and abilities that best fit the certain features of some subjects and most important the ICT tools such as internet, subjects websites usage, radio.

2.6 Levels of Integration of ICT in Teaching and Learning of Biology

The role of -usage of websites in teaching and learning is very versatile. Classification and analysis of the roles is necessary to integrate technology meaningfully. The importance in this field is the relationship between the use of technology and the teaching aims which will be achieved as well as the influence of technology on the teacher’s beliefs in their work (Barzel & Drijvers, 2009).

In Namibia, ICT is increasingly being applied in teaching and learning in almost all the subjects being offered in secondary education (Gikonyo, 2012). Biological knowledge and Biological practices are inextricably linked, and this connection can be strengthened by the use of technologies in teaching and learning Biology. (Olive, Makar, Hoyos, Kor, Koshelera & Strä/sser, 2010). Learning with useful integration tools can lead to a functional understanding of Biological concepts, as well as develop a broader understanding of the nature of Biology (Varughese, 2012). Usage of websites seem to enhance efficiency of Biological thought and enables learners to make conjectures and immediately test them in a Biology learning environment. It also offers multiple Biological representations that enhance generality of Biological concepts and provide opportunity for counter example, unlike in a paper and pencil environment (Ogwel, 2008).

Biology educators are primarily concerned with usage of websites technology to aid in instruction (for example, computers and software) and to facilitate student learning. Technology educators, on the other hand, are focused on how to use Biology to understand, use, and design different technologies (Merrill, Reece & Daugherty, 2010). Biology educators appear to see websites-technology as a tool in service to solving Biological problems.

The use of ICT in the Biology classroom has long been a topic for consideration by Biology educators. As discussed by UNESCO, (2007), for successful integration of ICT into the Biology curriculum, it is essential to have knowledge of the existing software that is used by Biology

teachers. They highlighted that one of the major problems is that the educational software is often isolated and not integrated with the textbooks that many facilitators use. Moreover, many ICT-websites applications are poorly attuned at the curriculum.

As proposed by Varghese (2011), ICT could help teachers to visually present abstract concepts. The ability to think with external representations of processes by means of ICT-websites can scaffold the development of Biological understanding. ICT-websites could change negative perceptions of learners about Biology. Teachers can use ICT-websites to present information in multiple formats (For example, text, pictures, sound, animations, and video clips). Facilitators also could present activities in a layered order and with varying scaffolding levels. ICT-websites teaching itself is not likely to improve ineffective teaching practices (Alayyar, Fisser & Voogt 2012). On the contrary, Ifenthaler, Isaias, Kinshuk, Spector, Angeli & Valani, (2012) stated that ICT-websites does not have an educational value in itself, but it becomes precious when teachers use it in the learning and teaching process. ICT can provide many possibilities for disabled learners to improve their Biological abilities**.** There is need for Biology educators and curriculum developers to integrate educational software and textbooks (Bektaş et al., 2012).

2.7 Learning system and ICT-Websites

Basically, a library is a place where books, newspaper and records are kept for reading or borrowing. But talking about learning system in software application that is used to design, implement, and assess a specific learning process. The use of learning management system has grown considerably world education. Basically a learning management system make available for instructors with a way to

create and deliver content, monitor student participation, and evaluate student performances. A Learning Management System also offers learners with the ability to use interactive features such as eased discussions, discussion forums to communicate with teachers and even with their fellow learners and conferencing.

Stantchev, Colomo-Palacios, Soto-Acosta and Misra (2014) said Learning Management Systems are virtual learning environments which provide high level of functionality as regards of learning activities and structures for course management and tracking. Using LMS with websites in education provides the instructors and the learners with a set of tools for developing the learning processes and managing it. LMS can also be used as a tool to maintain classes, used to upload information and also provides a way to communicate between the instructor and the learners.

Machado and Tao (2007) also mentioned that Learning Management Systems is one of the technology that have been adopted for both cooperate lessons and in schools. LMS is a websites-system designed with some special features to help the instructors to meet their pedagogical aims of delivering instructional contents to the learners. This type of LMS is considered websites-based and is accessible through the websites browser and the internet connection.

McGill and Klobas (2009) mentioned that Learning Management System can store, process instructional materials and help in the administration and communication related with teaching and learning which can also be seen as virtual learning environment. Teasley (2009) states that Learning Management Systems can also be seen as websites-based systems that enables the instructor and

learners to share contents or course materials, enables communication between instructors and learners and also learners can submit their assignments online. The main aim of LMS is to make electronic learning faster and better and also make it less expensive and more user friendly using the modern technology. There are so many Learning Management Systems today, inter alia, WebsitesCT, Google Classroom, Blackboard, Moodle, Dokeos, eFront, eCollege, WebsitesWorK, SAAS/CLO.

One of the main strengths of LMS is that they can decrease a lot of the administrative work involved in assessment. Some types of collective assessment can be completely computerised with self-marking quizzes, tests and exams so that learners can get their results immediately and teachers only have to analyses the results.

2.8 Social Networks

Lockyer and Patterson (2008) in "Social Learning Platforms and the Flipped Classroom", defined a social network as a websites-based software where users share information through their personal profiles, connect with other users of the social network site (friends and contacts), upload and share multimedia contents, share links of contents that are accessible via the websites, and also creates an environment where users can create and join groups. All these can be seen as communication whereby the users are using technology to communicate with each other through the websites. Therefore, it is perceived for the social network to impact the educational system.

Wallace (2013) in “Social Learning Platforms and the Flipped Classroom”, said though the social learning platforms are seen as instrument for improving remote area learning, they are often used within the school environment and are termed websites education in modern system. One of the great features of social networking environment that support communication activities is that when it is incorporated into the classrooms or schools effectively, they can help to simplify a sustained ecological variation in classrooms. It also motivate the learners by enabling a feasible, high quality learning that is not just intended at indorsing high principles in classrooms. Moreover, it helps to improve the levels of attending and participating in school activities too.

Griffith and Liyanage (2008) in another study “An introduction to the potential of social networking sites in education”, states that the psychosocial benefit of social networking are the help of personality exploration. Websites-education also provides social understanding skills like perception thinking, and help to achieve the need for communal support. Social networking creates an environment where users can be allowed a more personalised experience for learning through the websites to complement what is being taught in traditional classrooms. The examples of these are the discussion boards, instant messaging, wikis.

There are so many social networking sites available today which some of them can also be used for educational purposes such as Facebook, flicker, blog, wiki, etc. The Facebook websites social network technology is a popular networking site which has the potential to be used for teaching and learning because of its distinctive functions that provides instructional, social and technological affordances.

Wang et al., (2012) said Facebook websites have become one of the most outstanding social networking system, it also provides some potentials of teaching and learning. One of its features that enables teaching and learning is the Facebook group page which is used as learning management system such that the instructors can put up announcements, organising weekly tutorial sessions, sharing subject resources, conducting online discussions, and some other administrative matters.

Furthermore, in their research, they found out that when the Facebook websites are used for teaching and learning, learners are motivated to share views. Facebook websites provide a safe and friendly environment where learners feel convenient communicating and interacting with one another, the learners get to know their peers better and also some of the learners became friends with each other during the course program. ICT-website tools are very important in the educational system. Websites usage is very important as it helps learners to communicate in a more convenient way especially for the learners who are shy to communicate face-to-face with their fellow learners. It helps to break these kinds of barriers and also help learners or the users to have access to information online. Example of this is when the teachers post on the group page of Facebook and share downloadable documents on the page wall.

2.9 Information and Communication Technology and websites-teaching

The role of ICT in education is becoming very important as the world is growing rapidly into a digitalised media and information society. ICT has become the connection of communication among communities and countries; a tool used for opening opportunities, and creates channels for educational, personal and country development.

Latchem (2014) stated that there is really a great need for the research in websites-education to provide evidence how and in what ways educational outcomes can be improved by employing the new tools. The idea of educational technology of addressing the technical, administrative and institutional complexities of educational change entirely began to blend in the 1960s - 1970s. The progression of the planned learning methods and audio-visual teaching devices which all seemed to be proficient of revolutionising education had proved to have their disadvantages. Many observers have proposed that the use of new ICT-websites have important potential in providing right to use, and refining the excellence in education.

According to Rodríguez, Ussbaum, López and Sepúlveda (2010) more than 20 years after information and communication technology was introduced in schools, it still lack a solid evidence of the actual role it plays in education and the reasons are that there is absence of information concerning the precise types of ICTs used. The infrequent attention given to the observing and the evaluation of ICT-websites in education programs and the incompatibility between the techniques used to measure the effects and the type of learning indorsed. It was confirmed that there were statistically very important positive transformations in learners whose instructors presented higher adoption levels when related to both lesser adoption cases and other defined control groups. For this, monitoring and evaluating is something very important by providing real-time information for decision making through the request of valuation instruments according to the monitoring plan for it helps in understanding what really happens when an Information and Communication Technology program is applied in a classroom setting.

Bocconi, Kampylis and Punie (2013), said in order to use ICT-websites effectively in education, it is very important to raise up the understanding teachers as based on technology use in education, clearly outlining the specific features and consequences of innovation for learning using ICT-websites. Learners and instructors should have access to experiences in which they can become familiar with the unique contributions that ICT-websites play to their creative practices of which other media tools do not offer. In order to bring about this transformative deviation to education, the part of ICT-websites should be upsetting, changing both the instructor's and the learner's impart in formal settings.

Beacham and McIntosh (2013) mentioned that using ICT-websites particularly in science subjects in schools helps in the student's cognitive increase and education can help to establish more digitally inclusive society if instructors work together through and with others to improve the inclusion of learners. It is then now important for learners and instructors to know that the use of ICT-websites in education is a way for school to construct a digitally comprehensive society because as the digital technology is becoming progressively universal in education, the respect of the effect ICT-websites have on inclusive education and practice will become more vital. Digital inclusion does not necessary mean that all folks make use of ICTs all through their daily lives, but it can be seen as warranting that all persons are able to make use of ICT smartly.

Fu (2013) states that through Information and Communication Technology and Websites usage, learners can learn at any time and in any location, material courses online can be easily accessible for 24 hours a day and seven days a week which means that using ICT-websites, learning and teaching no longer depend on just classrooms and the usage of printed materials. ICT-websites in education help the users to build new knowledge through accessing, selecting, organising, and interpreting information and data. However, ICT-websites provide both the learners and the teachers with more educational affordances and possibilities where by learners are able to use information and data from various sources. Through the collaborative learning with ICT-websites tools, learners have more opportunities to build the new understanding into their background knowledge and also become more confident to challenge themselves and learn their mistakes.

Tenekeci (2011) added that, he does not think ICT systems are the same everywhere. Verily, countries are unique in the way Information and Communication Technology is used and the way they are being taught or their knowledge towards it. Not all places or schools are able to benefit from the improvement of ICT-websites. This is due to the limitations in ICT infrastructure amenities, lack of support and training, higher cost of development and lack of higher bandwidth of internet connectivity. In other words, Fu (2013) states that there is no problem with ICTs in putting it in schools but the problems they are facing is a lack of support in terms of facilitating conditions and mainly there is no training of the proper use of ICT-websites. Schools are different in the ICT tools they implement.

Cubukcuoglu (2013) said to build an environment where technology is used regularly and efficiently, it is very important to maintain the needs of teachers in using ICT-websites in teaching and learning by attempting to eliminate the possible obstacles that obstruct frequent technology use and to identify the enablers that encourage it. In addition, it is very necessary to fetch for the limitations that can hinder the technology use and remove or fix it. By doing this, it will help the teachers to be motivated and make them eager to implement ICT-websites in their teaching. The use of websites also helps the teachers to reach many goals of education and support learning in both inside and outside the classrooms. Although applying new technology is dependent on the instructors' and learners' positive attitudes and beliefs towards its effectiveness, in this case, the personal factors of the instructors should be considered more than the other factors but for instructors to have a positive attitude, he or she would need to have some skills of ICT use and also be very confident in using ICT-websites.

2.10 Summary

This chapter presented the theoretical framework that this study is based on. In today's world, technology has really changed the educational systems. The role of ICT-websites in education is becoming very important as the world is growing rapidly into a digitalised media and information society. ICT tools has made the communication easy in education. Opportunities are now open for learners to learn comfortably without stress. They also create new opportunities for integrating pedagogical innovations in an environment where learners are expected to function actively, self-governing, self-reflected and also collaborate in their works. The effective use of Information and Communication Technology (ICT) – websites have momentous values in improving the quality and enabling access to education. Although for ICT-websites to be used effectively in education, it is very important to increase the understanding based on technology use in the institution, clearly drawing

the specific features and consequences of innovation for learning using ICT tools. The next chapter will discuss the methodology used to carry out this study.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

In this chapter the research design, research area, target population, sampling procedure, sample size, research instruments, data collection procedure, logistical and ethical consideration and data analyses are described.

3.2 Research Design

A research design is defined as the framework of research methods and techniques chosen by the researcher. Qualitative research involve focusing on the participants' experiences, meaning and perspectives (Hammarberg, Kirkman, & de Lacey, 2016). Gail & Sargeant (2011) state that, in education, qualitative research aspires to understand how learning occurs through close study of small numbers of learners and a focus on the individual. This study adopted a qualitative approach using a single case study. The qualitative design using an open- ended questionnaire, observation schedule and photographs were utilised for data collection. The author sought in-depth understanding of the effectiveness of usage of websites in the teaching of transport system in humans in Biology as a school subject.

3.3 Sample and sampling procedure

According to Polit and Hungler (1999), population is defined as an aggregate or totality of all the objects, subjects or members that match to a set of specifications. Sampling can be defined as the statistical technique of selecting a sub-group of a population of interest for purposes of making

observations (Mugoh, 2002; Borg & Gall, 1989). A sample size is the group of participants obtained from the accessible population, for purposes of conducting the study.

In this study, the sample was three Biology teachers in the selected rural high school in the Omusati Educational Region. The researcher wished to collect data from several Biology teachers, but only three were employed in the selected rural high school. The data collected from the three Biology teachers was nonetheless adequate enough to have meaningful results.

A purposive sampling technique was used to deliberately choose participants with certain qualities to acquire information (Etikan, Musa & Alkassim, 2015). According to Mugenda & Mugenda (2003), purposive sampling allows a researcher to utilise cases that have the required data with respect to the objectives of his or her study. The participants were considered to be suitable and relevant in providing answers to the research questions.

3.4 Research instruments

3.4.1 Observation schedule

This study used an observation schedule found in Appendix 8 A. The researcher became involved with the participants, therefore taking a participating role. The observation schedule focused on description regarding agreed upon items for observation based on the research questions. Comments were used by the observer to explain their observation and to provide reflection and additional insight. The observation schedule began with the items about the effectiveness of usage of Websites in the

teaching of transport system in humans. More items followed, with the intent to gather data with more depth on how Biology teachers use websites in teaching of transport system in humans and ways in which the usage of websites help in developing learners' knowledge in the topic transport systems in humans in the selected rural high school. The observation schedule was concluded with challenges faced by Biology teachers when using websites to teach the topic transport system in humans in the selected rural high school in Omusati Region.

The observation schedule enabled the researcher to collect data that was not captured in the questionnaire. It allowed the researcher to comprehend, how teachers integrate websites usage, and effectiveness of the usage of websites in the teaching of transport systems in humans and also to affirm the responses given by the participants in the questionnaire concerning challenges teachers face in the integration of usage of websites. Moreover, observation was an efficient way of gathering of data on effectiveness of usage of Websites from the sample of the rural high school Grade 11 Biology teachers as it provided knowledge of the context in which events occurred, and enabled the researcher to see things that participants themselves were not aware of, Cooper, Lewis and Urquhart (2004) . The researcher made seven specific observations for each participant, totalling 21 lessons involving the usage of websites in the teaching of transport system in humans. Observation was carried out at 14 o'clock in the afternoon, in the computer laboratory in order to avoid interrupting the selected rural high school teaching and learning process. The validity of this observation might be threatened by the following two factors: personal and procedural. Personal factors involved participants not behaving in the way they normally behave and it occurs when participants behave differently because of the personal characteristics or behaviour of the observer. Procedural reactivity occurs when participants behave otherwise because they know they are being studied or observed.

They change their behaviour in response to the procedures involved in the process of observation itself. To ensure validity the researcher became an active participant, this led to the researcher being accepted as one of the group. This leads to situations and behavior which are more "natural" and helps to minimize reactivity.

3.4.2 Open -ended Questionnaire for the Biology teachers

According to Zull (2016), an open ended questionnaire is a type of research tool which requires participants to construct a response in their own words and to express it verbally or in writing. An open-ended questionnaire was used and had two sections, A and B. Section A collected biographic data of the Grade 11 Biology teachers such as gender, age, phase specialisation and period in the teaching profession while section B comprised of one question: What challenges are faced by Biology teachers when using websites to teach the topic transport system in humans in the selected rural high school in Omusati Region? In this study, each respondent was requested to reply to the questions in the questionnaire. The researcher opted for a questionnaire because it was going to best reflect what the respondents wanted to say, give more data that the researcher might have missed to collect with the observation schedule regarding the research questions about challenges faced by Biology teachers when using websites to teach the topic transport system in humans in the selected rural high school in Omusati Region. More importantly, questionnaires enabled the researcher to combine it with observation to collect "relatively objective first-hand information" (Johnson & Turner, 2003, p. 314). To this end, Merriam (1998, p. 96) believes that observation is a kind of data triangulation in order to "substantiate the findings. In addition, the questionnaire reactivity and investigator effects on the teachers. The researcher opted for an open-ended questionnaire as it is used for information-gathering purposes in the following cases as indicated by Porst (2011):

- Unknown range of possible answers

  Avoidance of excessively long lists of response options used to motivate respondents by giving them an opportunity to express their opinions freely in their own words.

The total number of participants who took this questionnaire was three. See Appendix 7 for a copy of the questionnaire distributed to respondents

3.4.3 Photographs

Photography is closely associated with qualitative research and the researcher can use them in many different ways. The researcher captured photographs used in this qualitative research. According to (Bogdan & Biklen, 1992), photographs are mainly used in social science in conjunction with participant observation, and they are often used to help the researcher recall and study details that could be ignored if the photographs were not available for reflection.

Photographs were captured in the selected rural high school computer laboratory during the study in order to answer all the research questions of this study. The photographs captured included ways in which Biology teachers were using websites in the teaching of transport system in humans, challenges faced by the Biology teachers when using websites and ways in which usage of websites helped in developing learners' knowledge in the topic of transport system in humans. Photographs allowed for triangulation between different information sources, encouraged reflection and brought different insights to the research. In addition, photographs were used because they allowed participants to express their views in a non-verbal way allowing the observer to capture more details and different kind of data than observation schedule and open ended questionnaire would.

The researcher used a participant observation schedule, photographs and open ended questionnaire. Using an observation schedule as the research instrument, Lacono, Brown and Holtham (2009, p. 2) believe that, a participant observation allows the researcher to observe and record behaviour, while interacting or participating in the life or the settings of the event. To establish trustworthiness of the findings, Firstly, the researcher triangulated the data obtained from laboratory observations and open-ended questionnaire filled by Biology teachers. Golafshani (2003, p. 604) argued that, "engaging multiple methods such as observation, interviews and recordings will lead to more valid, reliable, and diverse construction of realities".

3.5 Data collection procedures

The researcher set aside one week to visit the selected school for this research. Permission was obtained from the University of Namibia, the Ministry of Education and Omusati Director of Education. Further, the researcher got permission from the participants through the office of the principal of the selected school. Appointments for data gathering were then made between the participants and the researcher. When the researcher arrived at the school, the researcher visited the school's IT room to see which ICT resources were available.

Participants were allowed to read the letters of consent. Since all the participants showed interest in participating in the study they all read the letter of consent and filled it. The researcher and participants agreed on the day and time of observation. Two Grade 11 Biology classes in the selected high school were taught transport system in humans using websites and observed.

The study was conducted during after-school hours because observation takes time and also to ensure that it does not affect the academic activities of the selected school. Since the selected school had a hostel, the study was conducted immediately after lunch. The data was collected from the selected school on the same days to ensure that the collected data is valid. The researcher taught, Biology teachers completed the research open-ended questionnaires after school hours and were collected on day three of data collection. The researcher self-administered the observation schedule and captured photographs. In the selected school, the researcher requested the permission from the Biology teachers before she took the photographs and gave assurance that the faces of neither the teacher nor the learners would not be displayed in such a manner that they could be recognised by anyone reading a written report of the study. Data collected using all the three tools was qualitative only.

3.6 Data analysis

Springer (2010) defines data analysis as the method of constructing meaning order and structure to the gathered information. According to Sharp (2008), the main objective of analysing data is to provide evidence made from the study. Analysing data involves the assessment of the information collected and drawing meaning from it relating the data to the research question.

Thematic analysis was used to analyse the findings. Thematic analysis involved identifying themes that emerge from the data (Harding, 2013). Thematic analysis was "a method of identifying, analysing and reporting themes within the data" (Braun & Clarke, 2006, p. 77). Thematic analysis involves searching through a data set to find repeated patterns of meaning (Braun & Clarke, 2006). Coding played an important part in the thematic analysis as coding needed to be performed initially in order

to break up the data and find connections. This gave an accurate picture of the effectiveness of using websites in the teaching of transport system in humans.

Firstly, the researcher organised the photographs into tables. Followed by coding the data manually by giving the photographs names. Each photograph was then placed into a theme. The researcher then counted how many themes emerged across all of the photographs. The researchers indicated the number of themes that arose and also interpreted the processes that lead to these groupings. In the observation schedule about the effectiveness of using websites in the teaching of transport systems in humans, categories were also created and counting conducted to identify the themes. Common theme started to emerge and were recorded.

Detailed analysis of the open-ended questionnaire on the challenges biology teachers face when using websites in the teaching of transport system was also conducted. Important categories and quotes were recorded, and detailed information about what they meant was recorded and clarified. This allowed for common themes to emerge, with accurate quotes to reflect or confirm emerging themes.

Thematic analysis continued by finding important themes and binding them into major themes. The refinement of themes was conducted and the themes were located into order from the first research question to last research question. Common themes emerged and were recorded in details. Findings were then written into a readable, interesting, and coherent piece of academic work.

3.7 Ethical considerations

Johnson (2008, p. 101) implies that ethics are principles and guidelines that help us uphold the things we value". The value of research depends as much on its ethical authenticity as on the innovation of its discoveries (Walliman, 2011). Before administration of the research instruments to the participants, permission was obtained from the Permanent Secretary of the Ministry of Education, Arts and Culture and was also obtained from the principal of the targeted school. Ethical clearance was obtained from UNAM Research Ethic Committee (UREC). Informed Consent was obtained from the participants.

The participants were informed about the purpose and value of the study. All information collected was kept confidential and used only for the purpose of this study and no real names were used. To address the issue of anonymity of the research respondents during the data collection process, the researcher allocated codes to individual participants. The data collected with questionnaires and observation schedule are kept in a locked room, soft data are kept in the researcher's laptop and will only be destroyed after a period of five years. The research participants were also informed about their rights to withdraw from the research, should they feel uncomfortable to continue with the study. Any participant who wishes to obtain a research report could contact the researcher who would supply such a report. The researcher acknowledged all the sources of information in order to avoid plagiarism. The researcher made an appointment with the principal to get an appropriate time to conduct observation without obstructing the schools' learning programmes. The researcher followed the instructions in compliance with Ethical clearance at the Ethics Committee at University of Namibia.

Due to ethical issues, the researcher did not capture photographs of the teachers or learners which displayed faces which may have allowed them to be recognised. In this study, the camera was used as an instrument of capturing the school and classroom context in which the websites is utilised, for reflection to help in the process of data analysis. The teacher was comfortable with the camera as an instrument.

3.8 Summary

This chapter focused on the methodology used to collect data from the Grade 11 Biology teachers in the selected rural high school in the Omusati Education Region. Under the methodology, the research design, population of the study, samples and sampling procedures, research instruments, data collection and analysis, and ethical considerations are discussed. The study adopted a qualitative approach using single case study. An observation schedule, and questionnaire were used to collect information from the participants. In this study, a purposive sampling method was used to select participants who took part in the study. Thematic analysis was employed to analyse the collected data. Ethical clearance issues were described. The next chapter will focus on the results and discussions of the study.

CHAPTER 4: RESULTS AND DISCUSSION

4.1 Introduction

In this chapter the researcher presents and discusses the results of the study. The results presentation is done according to research questions. Results presented and analysed are mainly from observation and questionnaire.

4.2 Research Question One

How do Biology teachers use websites in teaching of transport systems in humans in a rural high school in Omusati region?

This research question sought to find out how Biology teachers use websites in the teaching of transport system in humans using observation schedule.

4.2.1 Observation

From the Biology teachers' lessons observation, the researcher noted that Biology teachers incorporate websites into all aspects of their teaching, subject preparations and management, in order to improve their own learning as well as that of their learners.

4.2.2 Discussion

This study found that the three Biology teachers from the selected rural high school use websites in the teaching of transport system in several ways.

Teacher 1 was a female, Biology/Life Science teacher from the selected rural high school, with 6 years of teaching experience. From observations, the teacher used websites to share videos of how the human heart work. The videos explained double the circulatory system during the lesson. In support of practical work the researcher observed that, in the laboratory teacher 1 uploaded videos that explained how the pulse rate is determined and those about dissection of a mammal heart. In

addition, teacher 1 used websites to upload and assess the leaners' quizzes, homework, and classwork, to allocate grades to the learners, and give feedback. Teacher 1 was also observed sharing lesson plans online with teachers in England and organising her quizzes and classwork by adding the due dates and times as well as creating rubrics. The researcher has observed that the teacher was using websites in the classroom for several reasons and daily. Teacher 1 strongly emphasised this by saying that:

> *With the use of websites in the teaching of transport system in humans, she could upload videos, notes, quizzes, homework, class work, grade learners and provide effective feedback for learners online. With the use of Websites in the teaching, the Biology teachers can provide the learners to different kinds of information resources and thereby possibly choose the one they are comfortable with and that which they can manage in terms of clarity. In addition, learners are exposed to a variety of assessments including self-assessment modes such as quizzes that will give results instantly. This can help the learners identify the weak areas that they must improve regarding transport system in humans.*

Teacher 2 was a male, Biology teacher from the selected rural high school, with 11 years of teaching experience. The researcher observed that teacher A was able to use websites to teach transport system in humans but at a minimal level. From observations, the teacher used the websites to upload notes about transport system in humans. He was observed creating quizzes and assignments on the websites but he could not manage to complete them. It was observed that teacher 2 was also be able to post links with information about transport in humans. In several lessons he posted links for the

learners to follow and watch the videos such as the one showing different types of blood vessels and their features as well as the link that explained fully how the human heart function.

Teacher 3 was also a male, Biology teacher from the selected rural high school, with 5 years of teaching experience. This teacher was observed giving individualised instruction based on their abilities. Teacher 3 was also able to upload notes on PowerPoint on the website where learners could access the notes about the internal and external structure of the human heart, blood vessels, different types of blood cells and their functions. Teacher 3 was observed creating and posting quizzes and assignments for the learners as well as grading them. Furthermore, Teacher 3 was observed using websites to give remedial activities to the learners who scored low marks in every assessment he posted. Last but not least, this teacher was also observed posting links with videos about how the human heart function and some that explained the terminologies used in transport system in humans. Teacher 3 emphasised that:

> *The use of Websites in the teaching of transport system is a necessity as it provides learners with a variety of learning styles, from aural, visual, physical and verbal, motivate the learners, to save hours of repetitive teaching, augments memory retention and promote independent learning, to keep learners engaged and to facilitate peer collaboration. Learners were more likely to watch videos compared to using textbooks. It allows me to take a document, video or link and push it out to my learners.*

Basically, an LMS make it easier for instructors with a way to create and deliver content, monitor student participation, and evaluate student performances. Stantchev, Colomo-Palacios, Soto-Acosta

and Misra (2014) supports the study findings that learning management systems are virtual learning environment which provides high level of functionality as regards of learning activities and structures for course management and tracking. Using LMS with websites in education provides the teachers and the learners with a set of tools for developing the learning processes and managing it. LMS can also be used as a tool to maintain classes, used to upload information and also provides a way to communicate between the instructor and the learners.

Machado and Tao (2007) also support the study finding that LMS is one of the technology that have been adopted for both cooperate lessons and in schools. LMS is a websites-site designed with some special features to help the instructors to meet their pedagogical aims of delivering instructional contents to the learners. This type of LMS is considered websites-based and are accessible through the websites browser and the internet connection.

4.3 Research question two

What challenges are faced by Biology teachers when using websites to teach the topic transport system in humans in a rural high school in Omusati Region?

The second research question aimed at identifying the challenges faced by Biology teachers in the selected rural high school when using websites in the teaching of transport system in humans. Biology teachers revealed that when they started using websites in the beginning, they experienced several challenges. These challenges were classified in four categories namely: personal, social, technical

and environmental factors. However, these challenges were experienced at the beginning of the study in the selected rural high school but the situation was resolved over time.

4.3.1 Questionnaire

The following challenges were identified in the field: insufficient time for integration of websites usage activities, insufficiency of ICT skills in both Biology teachers and the learners, inadequate technical and financial support towards the usage of websites at schools, and inadequate infrastructure and slow internet**.**

4.3.2 Observation

In the observation schedule the following was observed:

- Physical ICT infrastructure
- Availability of internet and upload speed
- Insufficiency of ICT skills in both teachers and the learners,
- Negative staff attitudes towards ICT-websites usage,

4.3.3 Discussion

a. Insufficient time for websites usage activities

Teacher 2 indicated that the use of websites in teaching transport system in humans was really time consuming. Transport system in humans is a long topic and it took him a lot of time to cover the learning outcomes although learners were actively engaged. He further made it clear that at the beginning of the study, his free time was too short for them to deliver their lesson using websites as they have other commitments and in most cases they had technical problems during lesson, which took time to resolve. Teacher 2 also made it clear that he had a problem with using websites at the beginning of the study. Using website tools in Biology lessons particularly in transport system in humans wasted a lot of time, because one period was just 40 minutes and that time was really not

enough for the learners to arrive in the computer laboratory, set up all those ICT websites as tools and make the lesson a success. However, later during the study they were able to set up their websites tools easily and could use their time effectively.

b. Poor ICT skills of one teacher and some learners

Observation indicated that one teacher and some learners had poor websites usage skills at the beginning of the study. The findings reveal that the teacher 2' capabilities to use websites was limited. Teacher 2 emphasized this by writing that "we were trained only about basic components" which was an additional evidence of the poor ICT skills of the teacher. Teacher 2 also claimed that, the fact that he did not get good training on websites tools; therefore, he was not proficient in using the websites. The teachers did not receive any websites usage training at the teachers' training universities where they were trained and as a result, they did not get opportunities to comprehend the importance of the websites tools integration in teaching. However, the teacher 2 took an initiative to learn and improve his websites competence during the course of this study with the help of other research participants. The findings reveal that learners were not ready to use websites instruction like chalkboard and textbooks to receive learning materials. They felt that teachers could deliver effectively and help them understand better by employing traditional chalk and talk method, however the teachers collaborated and allowed learners to explore websites usage during this study.

c. Negative teacher attitudes towards ICT integration

The findings of the study also reveal that not all the three Biology teachers in the selected rural high school appreciate technology. Teacher 2 indicated that at the beginning of the study he had a fear of

using websites to teach transport system in humans. Although he had the necessary websites skills. He emphasised that websites skills must go together with the right perception and attitude. It was observed that teacher 2 was contented with the wrong perception towards the use of websites in teaching and that hindered the use of websites usage in his teaching at the beginning of the study; he perceived usage of websites as a waste of time. Teacher 3 indicated that to learn anything new is a mammoth task, especially the usage of websites which is technical.

Teacher 2 was reluctant to change because of his teaching experience with chalk and chalkboard and that the usage of websites in teaching is for junior teachers, those without teaching experience yet and teachers who are in urban settings. He further expressed his fear of being substituted by technology and therefore his views towards it was negative and he will not embrace it. Teacher 2 however developed a positive attitude during the course of the study and eventually embraced a wonderful experience that he got from the constant use of websites. All three Biology teachers revealed that they were reluctant to use websites to teach transport in humans because they were worried that they might get embarrassed that the learners knew more about the technology than they did. So, this study revealed that Biology teachers held negative attitudes towards the usage of websites in the teaching of transport in humans however they still embraced it during the course of this study

d. Inadequate Technical and financial support

The findings of the study revealed that financial constraints and lack of technical support on the part of the rural high school as some of the major challenges to the full integration of usage of websites in the teaching of transport system in humans. One respondent indicated that their school

was still young, and the country was experiencing an economic crisis, hence their school was no exception. Finances cannot allow the school to meet all its demands and computers in the laboratory are not all functioning, quiet discouraging according to all the Biology teachers but nevertheless that did not stop them from using websites to teach transport system in humans by making use of the available computers. In the selected school, several computers in the computer laboratory were not functioning either due to software or hardware failure.

Due to this, most of the learners did not understand the place of ICT in their education. The researcher understands that there is a need to raise funds for fixing computers which were not functioning well. On the matter of the technical aspect, Teacher 2 indicated he had poor ICT skills to incorporate websites tools in their teaching and he really need more guidance and help from the ICT experts, this was resolved by the observer by demonstrating to teacher 2 how he could use websites to teach transport in humans due to the fact that the IT support personnel were not around during teaching in case the Biology teachers experience a technical failure while conducting their lessons.

Technical problems were a major challenge at the beginning of the study and a source of frustration for learners and Biology teachers and caused disruptions in the teaching and learning process. When technical issues arouse and there was lack of technical assistance, Biology teachers and learners were not able to use the computers for a certain period of time, the consequence was that Teacher 2 was discouraged from using computers because of fear of equipment malfunction. The technical challenges faced by the Biology teachers are not strange as these were similar to those found by (Amuko et al), The findings indicated that breakdown of a computer causes interruptions and if there is lack of technical assistance, then it is likely that the regular repairs of the computer will not

be carried out resulting in teachers not using computers in teaching. The effect is that facilitators will be discouraged from using computers because of fear of equipment failure since no one would give them technical support in case there are technical problems (Amuko et al).

In the selected school, computers were very sandy, this indicated that the school did not buy covers for their computers and if they were available they were not seen by the researcher. The dust on malfunctioning computers indicated that the computers might have been abandoned for too long. But nevertheless, whether used or not, sand on and in computers leads to electromagnetic interference on the mother board causing hardware breakdown.

e. Inadequate infrastructure and slow internet

On infrastructure and internet, the researcher noted that the school had limited ICT facilities and a slow internet speed connection. This was evident where the computer laboratory had 28 computers and only 12 computers were functioning well, and 18 of the computers were not functioning at all. Those that were functioning well, had low internet speed but nevertheless the situation was resolved by connecting to a different Wi-Fi and teachers were given modems for faster internet speed. It was also observed that the learners accessed the computer laboratory in different shifts not for convenience but to share the few computers. This however was resolved by dividing learners in groups of 12 so that they can access computer laboratory in different shifts to ensure that each learner had a computer. It was established, the availability of ICT infrastructure can itself act as a promoter to teachers and learners acquiring ICT skills and using them in teaching. Its lack can discourage teachers and learners from acquiring usage of websites skills, or discourage those who have the skills in the usage of websites in teaching and learning. This means that presence

of the right infrastructure, in right quantity and time is obligatory for the integration of websites usage in teaching and learning.

Moreover, the school visited had their computers networked. However, the researcher observed that the available Wi-Fi signals did not cover the whole school. That means at times internet failure was experienced in the school. The researcher has observed that teacher 1 in particular felt very irritated by the recurrent interruptions to the internet which affected her lesson planning but it was only when the researcher saw the expression on her face with yet another internet failure that the researcher began to appreciate the disappointment she felt. The teacher tried so hard to upload some of the videos about how the human heart work and could not conceal her displeasure caused by the interruption.

The researcher observed that there was a printer in the selected school lab. The Biology teachers in the selected school had their computers networked and can interact with computers in the school laboratory. This means that in case the computer laboratory was in use or not accessible, the Biology teachers in this particular school could still go ahead and integrate usage of websites in their lessons preparation.

There were few chairs in the computer laboratory. The researcher observed that only 12 learners used the computer laboratory at one time so they didn't have to share computers. Each group was allocated a period on the timetable in which they visited the computer laboratory. From the above discussion, integration of usage of websites in the teaching of transport in system humans in selected rural high school faced challenges that touch on perceptions and ICT skills of teachers and learners; attitude of school teachers on websites usage integration; and infrastructure, financial and

technical support. This finding is supported by the work of authors like Bennison and Goos (2010) and Amuko et al (2015), they describe two types of challenges, currently hampering the integrated use of websites-usage by teachers: - external (first order) challenges and internal (second order) challenges.

Teacher related factors refer to teacher comfortability, teacher confidence and teacher competence. Research indicated that lack of teacher confidence prevents teachers from using ICT in their teaching (Amuko, Miheso & Ndethiu, 2015). It also indicated that limitation in teachers' ICT knowledge makes them feel anxious about using ICT in the classroom and thus not confident to use it in their teaching.

School related challenges refer to inadequate provision of resources such as infrastructure, support, trainings and time. Teachers rated lack of time as one of the most problematic factor to technology utilisation in schools. They further indicated that mastering technology requires time (Amuko et al. 2015).

4.4 Research question three

How does usage of websites help in developing learners' knowledge in the topic of transport system in humans in a rural high school in Omusati region?

4.4.1 Observation

On the teaching of knowledge, the researcher sought to know how websites help in developing learners' knowledge about transport system in humans. The researcher observed that websites integrated text, pictures, audio, graphics, animations, simulations, full-motion video, and links to other software or websites greatly enhance the teaching experience. While teaching science certainly has changed, education has always been a constantly evolving enterprise. Undoubtedly, some of that change has revolved around the type of media that were available to teachers at the time. In many respects, web-based tutorials, practice quizzes, simulations, animations, interactive exercises, and games are merely another type of media. As recent literature has indicated, any type of media used in a classroom must be incorporated within the scope of effective teaching strategies in order to be successful (Clark, 2003; Cooner, 2005). Therefore, the use of web-based materials must be melded into those sound teaching practices that are already research supported. The results collected through case study indicated that the following four major themes emerged:

- Interaction,
- makes learning flexible,
- Infusion and
- Enabling collaboration.

a. Interaction

Some websites promote interactive experiences. For example, the “pbslearningmedia” directs learners to the map of the human heart and describe the different pumping jobs of the two sides of the heart. Ask learners to make a labelled drawing of the heart and show the pathway of blood from when it enters the right side of the heart until it delivers oxygen to the rest of the body.

Traditional methods used for instruction are passive in nature. By passive, it means the teaching of instruction that requires no action on the part of learners beyond listening, watching, and perhaps taking notes. The traditional ways of teaching involves one -way channel of instructional teaching. Websites usage offered the learners and teachers the ability to regulate, manoeuvre, and add to the data environment. On the lowest and least valuable level, this may basically mean the learners control the pace of their learning regarding transport in humans. Using websites, learners may not only make preferences about the pace, but may decide on the content; take notes about transport system in humans; answer questions; run simulated experiments such as dissecting a mammalian heart; create and manipulate images; make their own multimedia presentations, communicate with others by commenting on the posts, and more. The whole teaching system of Biology can be altered and instruction is altered from teacher-centred to learner-centred. Teachers became constructors other than instructors. The learners were changed from being a passive reproducer of knowledge to an active producer of knowledge and collaborator with the usage of Websites.

b. Makes learning flexible

Websites usage required learners to be aggregated in a regulated environment which was the computer laboratory in the selected rural high school at a specific time. Websites usage was rigidly tied to schedules developed by people far removed from the day-to-day functioning of the classroom.

Websites applications can be applied whenever and wherever. The consideration of the flexibility probable in usage of websites to support teaching and learning. One outcome of this flexibility has been the establishment of cybernetic educational experiences.

Cybernetic experience refers to educational circumstances in which distance and time separate the teacher and learners, who use ICT too interactively to share resources, communicate, and learn. Learners were in the computer laboratory and the Biology teachers were in classes. Cybernetic education gave learners an opportunity to study at their own pace. In other words, a cybernetic education means having educational transactions accessible from the home or anywhere that the student chooses to be. However, it was unfortunate that the learners in the selected school were not allowed to bring along ICT tools such as computers, tablets or cell phones from home.

Flexible learning is a rich and multi-layered concept encompassing distance learning, interactivity, collaboration, and engagement via quizzes and worksheets. It embodies creating and delivering resources such as videos and notes of how blood travel in the heart and the three types of blood vessels that increase engagement and enjoyment and that enliven and enrich the process of learning. Websites features prominently, but it is not all about the use of websites. It is about learning. It is just that use of websites has increased the opportunities and tools that may be taken and used in the pursuit of effective, flexible learning.

It can be said that flexible learning and flexible delivery does make a difference. It makes a difference to learners, to the teachers, management of the learning environment and to teaching and learning

processes. The particular attributes of an online learning environment provides teachers with powerful new ways to represent knowledge that are not available in a print environment such as dissection of a mammalian heart. However, these different ways of representing knowledge place different information processing demands on learners. In designing and delivering courses using websites, the information processing demands on the learner need to be considered carefully (Bridgland & Blanchard 2001).

c. Infusion

Infusion created a positive environment among the selected rural high school learners in learning transport system in humans. It was also found that fusion of websites with instruction was positively correlated to learners' ability to provide relevant and clear responses. The infusing approach is linked with schools that now have a range of computer-based technologies in laboratories, classrooms, and administrative areas. Biology teachers explored new ways in which use of websites changes their personal productivity and professional practice. The curriculum merged transport system in humans to reflect real-world applications. For instance, transport system in humans' content was provided from multiple websites. Learners' access to websites enabled them to choose from videos, worksheets, quizzes that stimulate learning and demonstrate their knowledge in transport system in humans. Learners have more options with regard to learning styles and pathways. They take more responsibility for their own learning and assessment (Essay in Education, 2018).

Furthermore, fusion involves Biology teachers' usage of websites into all aspects of their teaching, topic preparations and management with regard to transport system in humans, as it enhanced their

own learning as well as that of their learners. At this stage, usage of websites enabled Biology teachers to become active and creative, able to stimulate and manage their learners' learning styles, because they integrated a range of suitable learning styles, and the results of suitable learning style was that learners developed knowledge about transport system in humans.

This helped with developing learners' knowledge as it motivated learners to explore personally relevant issues that revisit their scientific ideas concerning transport system in humans regularly, support science ideas so that learners participate in the process of making enquiries; model the scientific process of considering alternative explanations and help them to detect errors; gave learners an opportunity to explain their ideas about transport system in humans; provide multiple visual representations from varied media; motivates learners to listen and learn from peers; design transport system in humans activities to promote productive and respectful interactions.

d. Enabling Collaboration

The idea of collaborative learning is not unusual. It involves learners expressing their thoughts and opinions, solving problems and performing inquiry together, observing their peers' thoughts and learn, and teaching each other reciprocally. "It requires learners to develop the abilities to co-construct understanding, to commit to a line of inquiry, to engage in knowledge building discourse, to assess soundness of ideas based on appropriate evidence or supporting theories, and to resolve conflicting views" (Bereiter, 2002; Scardamalia, 2002).

Collaborative learning offers numerous opportunities for learners to acquire important knowledge and skills. Given the context of joint problem solving, learners naturally are required to engage in explaining one's thought, seeking clarification, helping each other and performing mutual regularisation. "These activities activate a list of cognitive functions such as knowledge activation, externalisation, regulation and internalisation" (Hron & Friedrich, 2003). When teachers are willing and able to guide, engage and encourage learners to learn collaboratively, they open up ways for learners to gain access to many useful ways of thinking and using correct terminology (Mercer, 2004).

Findings from the study revealed that, not every resource is inanimate. Usage of websites in the teaching of transport system in humans allows educational collaborations between the Biology teachers and learners, as well as between learners. These collaborations took place between Biology teachers and learners widely separated in the school. Learners may collaborate with peers in other schools although this was not attempted during the study, teachers may collaborate with other teachers to share expertise that they can possibly share with their learners.

There were several ways in which the usage of websites can help to develop learners' knowledge in the topic of transport system in humans. The results of this study relates to those of (Gikonyo, 2012), where it was found that the role of usage of websites in teaching and learning was very versatile. Classification and analysis of the roles was necessary to integrate technology meaningfully. In addition, (Barzel & Drijvers, 2009) The importance in this field is the relationship between the use of technology and the teaching aims which will be achieved as well as the influence of technology on the teacher's beliefs in their work. In Namibia ICT is increasingly being applied in teaching and learning in almost all the subjects being offered in secondary education (Gikonyo, 2012). In the same

manner, Olive, Makar, Hoyos, Kor, Koshelera and Strä/sser (2010), found that Biological knowledge and Biological practices are inextricably linked, and this connection can be strengthened by the use of technologies in teaching and learning Biology.

Varughese (2012) further emphasised that learning with useful integration tools can lead to a functional understanding of Biological concepts, as well as develop a broader understanding of the nature of Biology. The findings of this study further concurred with Ogwel (2008), websites usage was found to enhance efficiency of Biological thought and enables learners to make conjectures and immediately test them in a Biology learning environment. It also offers multiple Biological representations that enhance generality of biological concepts and provide opportunity for counter example, unlike in a paper and pencil environment. Teachers working together in collaborative communities can affect changes in their classrooms by giving each other support and encouragement.

4.5 Summary

The researcher noted the following from the results presented above that there are several ways in which a teacher can integrate websites usage in the teaching of transport system in humans and make learning effective. Among those ways that the study has revealed were creation and sharing of videos, uploading of notes, create quizzes and worksheets and supporting practical work.

Furthermore, the study has also revealed that there are several challenges that teachers face with the usage of websites in their teaching and some teachers however were able to overcome them in their lessons. The challenges ranged from personal, technical, financial and social. Whereby personal challenges involved matters such as teachers' negative attitude towards the use of websites usage and

poor websites skills in both teachers and learners. Technical challenges revealed by the study included technical failure of the computers or Wi-Fi and no ICT technician was around to offer the necessary help.

All in all, it has been established that integration usage of websites usage makes learning fun, increase attention span and eventually make learning effective. Furthermore, the benefits of using websites are endless. It has been noted that using websites enabled learners to learn more, learn faster, and learn more enjoyably; yield better results for both high and low performing learners; learners were more motivated and have more self-confidence; and support is provided for many scholastic approaches, such as teaching of knowledge, independent studying, and cooperative learning.

Furthermore, usage of websites was suitable for offering the Biology topic "transport system in humans" in several ways, for instance visually, with audio, and interactively which allowed learners to absorb more effectively. Usage of Websites can support weaker learners to make progress as the learning material can be directed at the level suitable for each learner; and if usage of websites is integrated, learners are more motivated to learn. The next chapter focuses on the summary, conclusion and recommendations of the study.

CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

In this chapter, the summary from the results is concluded and recommendations are provided according to the research questions.

5.2 Summary and Conclusions

The objectives of this study was to determine the effectiveness of usage of websites in teaching knowledge about transport system in humans. In order to find answers to the research questions as indicated below a qualitative design was employed due to the nature of the research problem and the information it required. A purposive sampling method was employed to select the participants from the selected rural high school in the Omusati Education Region. In this study, an open-ended questionnaire and observation schedule were used to collect data from the participants. A content analysis was employed to analyse the data obtained from the observation and a teacher participant questionnaire. The findings of this study is only applicable to the Grade 11 learners and teachers in the selected rural high school in the Omusati Education Region but not to other schools or education regions in Namibia

The findings of the study revealed the following results:

5.2.1 Research Question One

How do teachers use Websites in teaching of transport system in humans in a rural high school in Omusati Region?

The study findings indicate that teachers integrate usage of websites in the teaching of transport system in humans in the following ways: Creation and sharing of videos, uploading of notes, create quizzes and worksheets, to support practical work and grading learners.

5.2.2 Research Question Two

What challenges are faced by teachers when using websites to teach the topic of transport system in humans in a rural high school in Omusati Region?

There are several challenges that Biology teachers face with the usage of websites in their teaching and one Biology teacher was discouraged from using websites usage in their lessons at the beginning of the study. Most of the challenges teachers face were personal, technical and related to infrastructures.

The research findings also revealed that the school is experiencing financial constraints and is not able to fully support the use of websites in teaching and learning by getting the malfunctioning computers fixed. Lack of latest updated computer windows was an indication of the financial hardship the school was going through.

Findings from the study, indicated that poor websites skills in one Biology teacher and learners was the main constraint of usage of websites in the selected rural high school at the beginning of the study. One Biology teacher and learners needed to enhance their websites skills in order to be able to use websites in the teaching and/or learning of transport system in humans respectively.

On infrastructure, the research findings indicated that the school has a shortage of computers to enable effective usage of websites in the teaching and learning of transport system in humans. The number of computers which were functioning properly was outnumbered by the number of learners in the selected classes. Wi-Fi connectivity was a major challenge; however, it was resolved. The computers could detect a certain Wi-Fi but were not able to connect because the internet signal was not strong enough. As a result, the Biology teachers and learners were not able to communicate with others; and acquisition of learning materials was not possible at the beginning of the study. Security of hardware was tight in the selected school rural high school in Omusati Educational Region, however all computers were not protected from dust and this will probably decrease the lifespan of most computers.

5.2.3 Research Question Three

How does usage of Websites help in developing learners' knowledge in the transport system in humans in a rural high school in Omusati Region?

Usage of websites in the teaching of transport system in humans play a significant role in helping to teaching knowledge to meet the demands of practical work and the improvement of conceptual understanding in a conceptually difficult topic such as transport system in humans.

Usage of websites may integrate text, pictures, audio, graphics, animations, simulations, full-motion video, and links to other software or websites greatly enhancing the learning and teaching experience. The above mentioned tools promote active learning in learners, fun, motivating keep the learners engaged, and allow collaborations and interactivity.

5.3. Recommendations

Based on the findings of the research, the researcher made the following recommendations as per the research questions:

5.3.1 Research Question One

How do teachers use websites in teaching of transport system in humans in a rural high school in Omusati Region?

Established on the findings of this study, the researcher recommends the following:

- Biology teachers must be encouraged to post their lesson plans on websites to allow learners to better understand the important concepts they are teaching.

- Biology teachers must be encouraged to convert old examination questions into a websites documents to allow learners to practice exams, this enables learners to prepare for the appropriate level of examination questions.

5.3.2 Research Question Two

What challenges are faced by teachers when using websites sites to teach the topic "transport system in humans" in a rural high school in Omusati Region?

- There is a need to maintain internet connection during usage of websites and connect more computers to the internet. Rural high schools should then invest in Wi-Fi with stronger signals for accessibility of internet with easiness.
- The rural high schools should take time and try to achieve a 1:1 ratio of Learner- Computer access by getting the malfunctioning computers fixed.
- The researcher suggested that teachers' perceptions towards ICT – usage of websites can be motivated positively by engaging them with continuous professional development programmes that can equip them with new websites skills.
- This study also drew attention to the fact that for a school to use websites in the teaching and learning processes, there is a need to involve parents to ensure sustainability of the websites tools and get the learners the necessary gadgets that will help them to acquire the necessary skills and for the integration of usage of websites to become a huge success.
- Since the study has indicated that there are poor websites skills some teachers and learners in the selected rural high school in Omusati Education Region, there is a need to conduct a study on a large scale to investigate whether computer skills and literacy among all learners and teachers is a necessary condition before infusion of websites usage in

teaching and learning. The recommended study should be a mixed design in order provide in-depth data.

- The curriculum developers need to conduct a full needs analysis in each rural high school concerning the implementation of usage of websites in the schools. In other words, each school is evaluated for its enthusiasm to accept technology. If the findings indicate that certain schools are not ready to embrace usage of websites some preparatory work may be considered before usage of Websites is implemented.
- Since usage of websites is a relatively new tool in the teaching and learning process in rural high schools, a lot of research need to be conducted. The researcher thus recommends "Starting Teachers' Integration of websites usage into Their Teaching Practices in the high schools "also as a possible research area.

5.3.3 Research Question Three

How does usage of websites help in developing learners' knowledge in the topic transport system in humans in a rural high school in Omusati Region?

- Biology teachers should reflect on what motivates their learners to use websites in their learning process.
- Biology teachers should be encouraged to assign projects involving not only researching transport system in humans in Biology but also converting such information into a web page and adding links to other related sites and graphics.
- Research is needed in other rural high schools to complete the effectiveness of use of websites in teaching of transport system in humans.

- There is a need for a study to determine the extent to which rural high schools customise and implement websites usage in Biology. Do Biology teachers in rural high schools use websites in the teaching of Biology and how effective are the websites tools for the realization of use of websites in the teaching of Biology?

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Appendix 1: Permission letter from the University of Namibia Research Ethics Committee

UNAM
UNIVERSITY OF NAMIBIA

ETHICAL CLEARANCE CERTIFICATE

Ethical Clearance Reference Number: FOE /539/2019 **Date: 22 November, 2019**

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 Usage Of Information Communication & Technology (Ict)-Web In Teaching Circulatory System In Humans In Rural High Schools, Omusati Region

Researcher: JULIA NDATITANGI AMUNYELA

Student Number: 200839322

Supervisor(s): *Dr H. U. Kandjeo-Marenga (Main) Dr H. Miranda (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.

pp Dr. E. de Villiers: HREC Chairperson

Ms. P. Claassen: HREC Secretary

Appendix 2: Letter requesting permission from the researcher

PO Box 60478
Katutura
07 July 2019

The Executive Director
Ministry of Education, Arts and Culture
Private Bag 13186
Windhoek

Dear Ms. Steenkamp

REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN OMUSATI REGION

My name is Amunyela Julia Ndatitangi, and I am a Masters' degree student at the University of Namibia. The research I wish to conduct for my partial thesis requires me to observe some key informants within the ministry. These people include Teachers and learners. This research will be conducted under the supervision of Dr. H. Kandjeo-Marenga.

This letter serves to seek formal consent to approach the key people mentioned above. Further, I would be grateful if I may access appropriate documents at the informants' discretion. For this reason, I request your permission to visit these informants within your ministry between September 2019 and October 2019 to conduct my research as outlined in my research proposal.

I attached a copy of my research proposal summary which includes copy of the consent form to be used in the research process. I have attached a provisional data collection letter from the University of Namibia whilst awaiting ethical clearance from the University of Namibia, which I will provide to your office as soon as it is available as part of this, I undertake to ensure that the names of the participants will be replaced with Pseudonyms although their positions may not warrant much anonymity. The materials I collect as part of the research will be accessible only to me and my supervisor.

Upon completion of the study, I undertake to provide you and the participants with access to the research findings. If you require any further information, please do not hesitate to contact me on +264 813806475 or on my email: ndatitangij@gmail.com.

Thank you for your time and consideration in this matter.

Yours Sincerely

Julia Ndatitangi Amunyela
Student number: 200839322
University of Namibia

Appendix 3: Permission letter from the Permanent Secretary

REPUBLIC OF NAMIBIA

MINISTRY OF EDUCATION, ARTS AND CULTURE

Tel: +264 61 -2933202
Fax: +264 61- 2933922
Enquiries: G. Munene
Email: Gibson.Munene@moe.gov.na

Luther Street, Govt. Office Park
Private Bag 13186
Windhoek
Namibia

File no: 26/1/26

Ms Julia N. Amunyela
P O Box 60478
Katutura
E-mail: ndatitangij@gmail.com

Dear Ms Amunyela,

SUBJECT: PERMISSION TO CONDUCT RESEARCH IN OMUSATI REGION

Kindly be informed that permission to conduct an academic research for your Master's Degree in Education in *"Curriculum Studies & Assessment' The usage of Information Communication and Technology (ICT) – web teaching circulatory system humans in rural high schools, Omusati region,"* is hereby granted. You are requested to present this letter of approval to the Regional Director to ensure that research ethics are adhered to and disruption of curriculum delivery is avoided. In addition, you should obtained written consent from the parents for the learners you wish to interview.

Furthermore, we humbly request you to share your research findings with the Ministry. You may contact Mr G. Munene at the Directorate: Programmes and Quality Assurance (PQA) for submission of a summary of your research findings.

I wish you the best in conducting your research and I look forward to hearing from you upon completion of your study.

Sincerely yours

Ministry of Education, Arts and Culture
Office of the
Executive Director
2019 -09- 17
Tel: 061-2933523/4
Fax: 061-253671
Private Bag 13186, Windhoek, Namibia

Sanet E. Steenkamp
EXECUTIVE DIRECTOR

All official correspondences must be addressed to the Executive Director.

Appendix 4: Letter requesting permission to the Educational Director of Omusati Region

PO Box 60478
Katutura
20 September 2019

The Director: Omusati Regional Council
Directorate of Education, Arts and Culture
Private Bag 529
Outapi

Dear Mr. L. Shapange

REQUEST FOR PERMISSION TO CONDUCT AN EDUCATIONAL RESEARCH IN OMUSATI REGION

My name is Amunyela Julia Ndatitangi, and I am a Masters' degree student at the University of Namibia and my title is: **Effectiveness of integrating Information Communication and Technology (ICT) - Web usage in the teaching of transport system in humans in rural High schools in Omusati region.**

The research I wish to conduct for my partial thesis requires me to observe some key informants within the ministry. These people include Teachers and learners. This research will be conducted under the supervision of Dr. H. Kandjeo-Marenga.

This letter serves to seek formal consent to approach the key people mentioned above. Further, I would be grateful if I may access appropriate documents at the informants' discretion. For this reason, I request your permission to visit these informants within your ministry between September 2019 and October 2019 to conduct my research as outlined in my research proposal.

I have attached a copy of my permission letter from the PS and a provisional data collection letter from the University of Namibia whilst awaiting ethical clearance from the University of Namibia, which I will provide to your office as soon as it is available as part of this, I undertake to ensure that the names of the participants will be replaced with Pseudonyms although their positions may not warrant much anonymity. The materials I collect as part of the research will be accessible only to me and my supervisor.

Upon completion of the study, I undertake to provide you and the participants with access to the research findings. If you require any further information, please do not hesitate to contact me on +264 813806475 or on my email: ndatitangij@gmail.com.

Thank you for your time and consideration in this matter.

Yours Sincerely

JNamyela

Julia Ndatitangi Amunyela
Student number: 200839322
University of Namibia

Appendix 5: Permission letter from the Director of Education of Omusati Region

REPUBLIC OF NAMIBIA

OMUSATI REGIONAL COUNCIL

DIRECTORATE OF EDUCATION, ARTS AND CULTURE

Team Work and Dedication for Quality Education

Tel: +264 65 251700
Fax: +264 65 251722

Private Bag 529
OUTAPI

Enq: Apollonia Hango
Ref: 13/2/9/1

27 September 2019

To: Ms. Julia Ndatitangi Amunyela
P.O. Box 60478
Katutura
Windhoek

Re: Permission to Conduct Research in Omusati Region

1. This letter serves to acknowledge receipt of your letter dated 20 September 2019.
2. Kindly take note that permission has been granted to conduct an educational research in Omusati Region, concerning the **"Effectiveness of Integrating Information Communication and Technology (ICT) –Web usage in the teaching of transport system in humans in rural High schools in Omusati Region"**.
3. Please be informed that the research to be conducted at schools should by no means, whatsoever disrupt teaching and learning. Furthermore, the information to be collected should be for the sole purpose of completing the research study only.
4. We hope and trust this exercise will enhance quality education in the Region.

Thank you for your understanding.

Yours faithfully

OMUSATI REGIONAL COUNCIL
DIRECTORATE OF EDUCATION, ARTS AND CULTURE
2019 -09- 30
OFFICE OF THE DIRECTOR
PRIVATE BAG 529, OUTAPI
REPUBLIC OF NAMIBIA

Teamwork and dedication for quality education

Laban Shapange
Director of Education, Arts and Culture

Cc: Inspectors of Education- Omusati Education Directorate

All official correspondence must be addressed to the Chief Regional Officer.

Appendix 6: Consent letter for the participants

P.O.Box 60478, Katutura

Mobile: +26413806475

Email: ndatitangij@gmail.com

20 September 2019

Dear participants

I am Julia.N Amunyela, a Master of Education (Curriculum Education) student at the University of Namibia doing research on "***.Effectiveness of using websites in the teaching of transport system in humans: A case study of a rural high school in Omusati region.***

You are humbly invited to participate in this research study. There are no risks involved in participating in this research. This study consists of a questionnaire, observation and tests based on the NSSCO transport system in Biology. Your sincere responses will help in improving the effective teaching of transport system in our schools. You are assured that the information you will give in this research study will be treated with maximum confidentiality since your name and that of your school will not be used on the instruments. Your participation in this research is entirely voluntary. If you are willing to participate in this research, please fill in your full name and sign in the space provided. Signing the consent form means you declare that you will participate willingly in this research and you have the right to withdraw from the study at any time.

Thank you very much.

Yours truly,

_____

Ms J.N Amunyela

Consent

I_____ ***Effectiveness of using websites/ in the teaching of transport system in humans: A case study of a rural high school in Omusati region.***

Signature_____ Date_____

Appendix 7: An open-ended questionnaire for the teachers

Biology teacher Questionnaire

Thank you very much for participating in this study. It is important for us in the education sector to understand the various challenges we face in teaching, especially when it involves use of Websites in the teaching of transport system in humans. This questionnaire was prepared to collect data concerning Biology teachers' challenges in Websites use and integration during teaching of transport in humans. All the information provided on this questionnaire will only be used for the purpose of this study and all the information collected will be treated with strict confidentiality. Please answer this question to the best of your knowledge. Your responses will be greatly appreciated. Please do not write your name anywhere on this questionnaire.

DEMOGRAPHIC INFORMATION

A. Personal information

Please use a cross (×) in the appropriate boxes

1. Gender
   Female Male

2. Age range 20-30 30-40 40-50 50-60

3. Phase specialization Senior secondary junior secondary

4. What challenges do you face when they integrate Websites in teaching transport system in humans?

   Technical and Financial challenges:

   _____
   _____
   _____
   _____

Personal challenges:

Thank you very much for your participation!

Appendix 8: A Observation Schedule

Background Information

Observer _____ Date of observation _____

Duration of Observation: 40 minutes

Total Number of
Attendees _____

Name of Presenter(s)

_____

1. Does the use of Websites prove to be a better method of teaching learners as compared to the traditional methods of teaching transport system in humans?

Yes/No

Explanation:

2. Does the teacher teach better as a result of using Websites in teaching transport system in humans?

   Yes/No

Explanation:

3. What changes have been noticed as a result of using Websites when teaching transport system in humans?
4. How do teachers integrate Websites usage when teaching transport system?
5. Do you regard using Websites as having any benefits?

Yes/ No

Explanation:

6. What changes are needed for maximal use of Websites in teaching transport system in humans?

7. Is teaching of transport system in humans improving as a result of using Websites?

Yes/No

Explanation:

8. What factors inhibit Websites usage at school?