PROMOTING SUSTAINABLE DEVELOPMENT GOAL 4 THROUGH ICT INTEGRATION INTO GEOGRAPHY ADVANCED SUBSIDIARY CURRICULUM IN SELECTED SECONDARY SCHOOLS, OHANGWENA REGION.

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ABSTRACT

This study aims to explore how Information Communication Technology (ICT) promotes Sustainable Development Goal (SDG) 4 in the teaching of the Geography Advanced Subsidiary (AS) curriculum at selected schools in the Ohangwena region. The study employed a qualitative approach, using a multiple-case study design. A purposive sampling was used to select four secondary schools offering the AS level. Two Geography teachers, four Heads of Departments (HoD), and four school principals participated in this study. Semi-structured interviews and document analysis were used to collect data. Data were thematically analysed. Findings revealed that different ICT tools were used in teaching Geography to promote Goal 4, which calls for quality and inclusive education. These ICT tools included computers, projectors, laptops, and multimedia projectors. All schools selected have dedicated computer laboratories. However, some school laboratories were not operational and accessible to AS learners. Some schools allowed their learners to bring their own devices, such as laptops and tablets, for internet access, while others did not permit learners to bring any devices to school. Most participants had a positive perspective toward ICT usage in their teaching for quality education. However, some participants needed to be more comfortable integrating ICT tools into their teaching due to the time-consuming nature of setting up devices like projectors. This might hinder the attainment of Goal 4 of Sustainable Development in terms of quality and inclusive education. The study recommends introducing compulsory and examinable Information and Communication subjects in the primary school phase. The study recommends training teachers on using ICT for quality teaching, providing ICT tools in schools and improving internet accessibility and connectivity.

Keywords: Sustainable Development Goal 4, ICT integration, Advanced Subsidiary curriculum, ICT policy for education, Quality Education

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LIST OF ABBREVIATIONS AND ACRONYMS

AS- Advanced Subsidiary

ESD -Education for Sustainable Development

FIR- Fourth Industrial Revolution

GIS- Geographical Information System

HoD- Head of Department

ICT- Information and Communication and Technology

IT- Information Technology

MEAC- Ministry of Education, Arts and Culture

MoE- Ministry of Education

NDP- National Development Plan

NIED-National Institute for Educational Development

NSSCAS- Namibian Senior Secondary Certificate Advanced Subsidiary

SDGs – Sustainable Development Goals

SP- Strategic Plan

ToC- Theory of Change

TPCK-Technological Pedagogical Content Knowledge

UN- United Nations

UNESCO- United Nations Educational, Scientific and Cultural Organisation

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DEDICATION

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DECLARATION

I, Julia Forlesta Nuumbosho, declare that this study is my work and is a true reflection of my research and has not been submitted for a degree at any other institution. No part of this thesis may be reproduced, stored in any retrieval system, or transmitted in any form without the prior permission of the author or the University of Namibia on that behalf

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Name of student	Signature	Date

CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1 Introduction

This chapter presents the study on promoting Sustainable Development Goal (SDG) 4 through ICT integration into the Geography Advanced Subsidiary Curriculum in selected schools in the Ohangwena region. It outlines the study's background, problem statement, research questions, significance, limitations, delimitations, and definitions of terms.

1.2 Background of the study

The United Nations (UN) developed the SDGs in 2015. This was an appeal for all governments worldwide to commit to ending poverty, protecting the environment, and ensuring everyone is free and lives peacefully by 2030 (De Villiers, 2021). The 17 SDGs require everyone to be innovative, technical, and knowledgeable about financial challenges. Education for Sustainable Development (ESD) plays a pivotal role in facilitating the attainment of the 17 SDGs. By instilling an understanding of these goals within educational environments, ESD serves to heighten awareness of the SDGs themselves. Moreover, it fosters a critical and contextualized comprehension of the SDGs, enabling individuals to grasp their significance within broader societal and environmental contexts. Importantly, ESD mobilizes action towards the realization of the SDGs, driving collective efforts aimed at achieving sustainable development on a global scale (United Nations, 2015).

As outlined by the United Nations in 2015, Goal 4 recognizes the significance of education across social, economic, and political domains for everyone, aiming to guarantee fair and comprehensive high-quality education while fostering continuous

learning opportunities throughout individuals' lives. SDG 4 has seven targets and three implementation strategies. The targets are: one, quality primary and secondary education for all; two, early childhood and pre-primary education; three, equal access to technical, vocational and higher education and higher education; four, skills for decent work; five, gender equality and equal access for all; six, youth and adult literacy; seven; sustainable development; and global citizenship. The three means of implementation are: build and upgrade inclusive and safe schools; expand higher education scholarships for developing countries; and lastly, increase the supply of qualified teachers in developing countries.

Namibia's universal primary and secondary education implementation aligns with the SDGs, particularly SDG 4 (Iipinge & Julius, 2016). The Namibian government has introduced reforms in the school system thrice since independence in 1990, most recently in 2012. These revisions encompass alterations to the foundational framework of primary education, an evaluation of the fundamental educational curricula, the incorporation of technical subjects, assessments of language protocols and advancement strategies across all educational stages, along with the implementation of the Namibian Senior Secondary Certificate Advanced Subsidiary Curriculum (NSSCAS) (Bohn, 2020).

In the new NSSCAS qualification, the use and integration of ICT are envisaged as contributing to the attainment of Goal 4 of the SDGs. Tjoa and Tjoa (2016) agree that ICT can be essential in achieving SDG 4 to ensure inclusive and equitable education and promote lifelong learning opportunities. Likewise, the United Nations recognises that technological innovation plays a critical role in supporting the successful implementation of SDG 4 (United Nations, 2015). Hence, achieving the SDGs

requires integrating the power of ICT in ways comparable with the innovation, scale, and reach of the private sector (United Nations, 2015). This paper explores how ICT integration promotes SDG 4 in teaching the Geography AS curriculum.

1.3 Statement of the problem

According to Bohn (2020), in response to the recent curriculum changes, the Ministry of Education, Arts, and Culture has introduced the NSSCAS qualification, modeled after the British Cambridge International's AS level. The AS curriculum aims to cultivate critical thinking skills in students, aligning with Namibia's Vision 2030. This updated curriculum strives to provide comprehensive subject matter to learners, introducing advanced fundamental principles. Furthermore, the AS curriculum emphasizes proficient utilization of ICT to augment self-directed learning and foster advanced cognitive abilities (Bohn, 2020).

It is widely recognised that ICT integration in schools can help achieve Goal 4 of the SDGs (Camiller & Camiller, 2020), but what needs to be established is how this can be achieved in Namibia. Currently, the Ministry of Education, Arts and Culture is making efforts to ensure that schools offering AS are well equipped in ICT facilities for quality education and outcomes. Yet, there remains a need for substantiated evidence in Namibia regarding the impact of ICT integration on teaching the Geography AS Curriculum in supporting SDG 4. Consequently, this research endeavors to investigate how the integration of ICT contributes to advancing SDG 4 within the Geography AS curriculum.

1.4 Research questions

This study aims to explore how Geography teachers integrate ICT in Namibian secondary schools to promote SDG 4 in the new AS curriculum. The specific questions are:

1. How is ICT integrated into the Geography AS curriculum to promote achieving Goal 4 of the SDGs?
2. What are the challenges of implementing and integrating ICT in Geography at the AS level that prevent the promotion of Goal 4 of the SDGs?
3. What should be done to ensure effective ICT integration in Geography at AS level to achieve Goal 4 of the SDGs?

1.5 Significance of the study

This research aims to present suggestions aimed at enhancing the incorporation of SDG 4 within the Geography AS curriculum. Furthermore, it seeks to delineate the significance of various academic subjects in advancing the objectives of SDG 4. The study intends to enlighten both the Ministry of Education, Arts, and Culture, as well as curriculum developers, regarding the criticality of integrating Information and Communication Technology (ICT) into the AS curriculum. Additionally, it aims to shed light on the obstacles encountered by educators when integrating ICT into the new AS curriculum. Furthermore, this will benefit and guide Geography teachers regarding ICT integration into the subject. Recommendations and suggestions could also lead to the effective implementation of the new AS curriculum. The outcome of this study hopes to reveal the need for the government, specifically, the Ministry of Education, Arts and Culture, to provide adequate and necessary ICT facilities and tools to not only the study area but also the entire education sector for teachers to enhance

the teaching and learning process in all disciplines. Furthermore, the study discusses the practical implications of technological innovation in promoting SDG 4 in Namibia's teaching and learning processes.

1.6 Limitations of the study

This study was only conducted at four schools in the Ohangwena region. Therefore, the findings of this study cannot be generalised to other schools in the region or other regions. One of the obstacles to achieving the study's goal was the need for significant knowledge about SDG 4 among teachers and principals, as some were unfamiliar with SDG 4. However, the researcher explained the concept to them. The other limitation of this study was that most HoDs were the ones teaching Geography; hence, this reduced the number of participants in the study. The researcher increased the number of participants by increasing the number of schools participating in the study from three to four. Nonetheless, the findings of this study revealed valuable lessons on how ICT integration into Geography as a subject can be used to promote SDG 4.

1.7 Delimitation of the study

The study was conducted in the Ohangwena region only, and the target groups were Geography Grade 12 teachers, Social Science HODs, and school principals of the four selected schools in the region. This research examined how ICT is integrated into the Geography AS curriculum to promote SDG 4 in the Grade 12 AS curriculum.

1.8 Definition of terms

In this study, the following terms are defined as follows:

ICT refers to electronic technologies for information storage and retrieval (Shan, 2013). In this study the term refers to laptops, overhead projector, multimedia projectors.

ICT infrastructure refers to hardware, software, and network connectivity (Shan, 2013). This study used the same meaning of the concept.

A mobile digital device refers to a hand-held electronic device that can receive, store, process and send digital information (Makrakis, 2012).

Multimedia mixes various mass media, such as print, audio, and video. It is also characterised by the presence of text, pictures, sound, animation and video (Makrakis, 2012). The study uses the same meaning of the concept.

Multimedia Technology uses a computer connected to a multimedia projector that allows large or small images to be projected onto a standard whiteboard (Makrakis, 2012).

1.9 Thesis outline

The thesis comprises of five main chapters. Chapter one serves as an introduction to the study, while chapter two presents a comprehensive literature review. In chapter three, the research methodology is outlined, followed by chapter four, which focuses on the presentation of data. Chapter five is dedicated to the discussion of findings, and the final chapter provides a summary, conclusion, and recommendations.

1.10 Summary

This chapter presented the introduction to the study. It includes the background of the study, the statement of the problem, the research questions, the study's significance, the study's limitations, the delimitation of the study, and the definition of terms. The next chapter discusses the literature review.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter presents the theoretical framework on which the study is based. It further discusses ICT as a concept, an overview of the ICT policy in education in Namibia, ICT integration in education to promote SDG 4, integration of ICT into Geography, challenges of ICT in the teaching and learning process, and lastly, strategies used to integrate ICT in the teaching and learning process effectively.

2.2 Theoretical framework

The study adopted the Theory of Change (ToC) introduced by Carol Weiss in 1990. The theory of change is built on four main guiding principles: focus on the process, prioritise learning, be locally led, and think compass, not map (Valters, 2015). Flynn and Clare (2017) have identified common elements in any change process, which include articulating how change happens in a particular context, clarifying an organisation's role in contributing to change and defining and testing critical assumptions. Hensely (2017), on the other hand, argues that TOC theory helps in planning and assessing education reform initiatives of change associated with programme and project evaluation and informed social action. This theory guided this study in understanding how ICT policy is integrated into the Geography AS level curriculum in promoting SDG 4. According to Hensley (2017) this helped promote quality and inclusive education, which is the main central theme of SDG 4.

2.3 ICT as a concept

ICT stands for Information and Communication Technology. According to Manghirmalani (2019), ICT refers to technologies that provide access to information

through telecommunication. It is similar to Information Technology (IT), but ICT focuses primarily on communication technologies. Shan (2013) similarly defined the concept of ICT but somewhat extended the definition by stating that ICT is an extended term for IT, which "stresses the role of unified communications and the integration of telecommunications (wired and wireless signals), computers, as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information" (Shan, 2013, p.3).

According to Ogbomo (2011), in alignment with Haddad and Drexler's educational technology framework comprising presentation, demonstration, drill, practice, interaction, and collaboration, five categories of ICTs, namely Print, Audio/Video, Radio and TV, Computers, and the Internet, contribute substantively to the enhancement of teaching and learning experiences. Additionally, these ICTs streamline administrative tasks and operations within educational institutions such as schools, colleges, or universities.

Ratheeswari (2018) emphasised that ICTs mix ancient and new technologies. Radio, television, and the telephone are examples of old instruments. Examples of new tools include computers, satellites, the Internet, and wireless technology. On the other hand, Ogbomo's study (2011) identified conceptual and methodological weaknesses in the literature and the need to clarify many forms of educational technology under the ICT umbrella. Ogbomo (2011) highlights the broad scope of ICT, encompassing technologies frequently employed by educators within classrooms, peer-to-peer technological tools, professionally generated and user-originated content. This spectrum involves school-specific devices like interactive whiteboards, tools extending across formal and informal educational realms (such as educational games), and a combination of standalone and internet-connected technologies. Consequently,

discerning the most beneficial digital learning elements within specific contexts presents a challenging task.

The researcher acknowledges that ICT has limitations, just like any other technology. While most educational experts sympathise with ignoring minor difficulties, a few continue to argue the opposite and discuss the disadvantages of employing technology in education (Rangel-Pérez, 2021). Hence, this controversial sentiment has motivated the researcher to seek an understanding of how ICT integration in AS can promote SDG 4.

2.4 Overview of ICT policy of education in Namibia

Namibia Vision 2030 intends to build an informed society in which all Namibian individuals are knowledgeable about computers; hence, it is without doubt that Namibia is one of the developing nations working to integrate ICT into the educational space. In 2005, the Ministry of Education implemented an ICT policy for education, chiefly aimed at realizing the objectives of Vision 2030 (MoE, 2005). This decision emerged subsequent to global studies on ICT integration, which underscored the necessity for national educational policies concerning ICT. Such policies were recognized as pivotal in facilitating effective integration and education in ICT (Hesselmark & Miller, 2003).

According to the Ministry of Education (MoE) on the ICT policy of education in Namibia, the government issued the first ICT Policy for Basic Education through the National Institute for Educational Development (NIED) in 1995. Subsequently, Namibia gained a profound understanding of the significance of ICT. The country underwent a review of its ICT policy in 2002, establishing a Steering Committee for Education composed of representatives from diverse sectors. The

primary objective of this committee was to craft a new ICT policy, finalized in 2004, and subsequently endorsed by the cabinet in March 2005. The official launch of this policy occurred in June 2005, as documented by the Ministry of Education (MoE, 2007).

The introduction of the 2005 ICT education policy was shaped by preexisting national policies acknowledging the potential of ICT in fostering sustainable development and aligning with Vision 2030. These encompassed national frameworks such as the National ICT Policy, National Development Plan 5 (NDP), and the Ministry of Education's Strategic Plan (SP) spanning 2001 to 2006 (MoE, 2007). ICT is considered a valuable instrument for improving educational quality and enhancing the teaching-learning process, provided it is used successfully and efficiently. Namibia's ICT education strategy aims to educate all Namibian learners, students, instructors, and communities for the future world economy by producing ICT-literate citizens (Das, 2019).

The ICT policy explains the necessity, accountability, and value of integrating ICT into education to address twenty-first-century problems (MoE, 2007). This strategy aims to equip all Namibian learners, students, educators, and communities for the global economy of the future. The policy has five distinct development areas for the use of ICT:

1. “Investigation and Development of Appropriate ICT Solutions;
2. Deployment of ICT;
3. Maintenance and Support of ICT;
4. ICT Literacy; and
5. ICT Integration.

The priority areas for the policy are:

1. Colleges of Education and related in-service programmes
2. Schools with secondary grades
3. Teacher education programmes at tertiary institutions
4. Vocational training
5. Primary Schools, Libraries and Community Centers, Adult Education Centers, and Special Needs Education" (MoE, 2007, p15).

This study focuses on the fifth ICT developmental area, ICT integration, as the study seeks to explore how ICT is integrated into the Geography AS curriculum and how ICT contributes to the attainment of SDG 4. The ICT policy in education has been under review since 2017. However, schools continue to use the policy of 2005.

2.5 ICT integration in education to promote SDG 4

There is broad agreement that excellent education should be available to all learners from all backgrounds (Tickly, 2010). As a result, Ofeimanu and Didham (2018) argue that SDG 4 includes all learners, regardless of social or economic position through its seven targets. Three targets being promoted through ICT and Geography in this study are: Target 4: Skills for decent work; Target 6: Youth and adult literacy; and Target 7: Sustainable Development and Global Citizenship. These targets can be implemented by means of building and upgrading inclusive and safe schools, expanding higher education scholarships, and increasing the supply of qualified teachers, based on UN recommendations.

ICT integration in education should be inclusive and support the well-being of everyone (UNESCO, 2018). According to the United Nations (2015), technological

improvement is essential to ensuring that SDG 4 is implemented successfully. ICT is becoming a more potent tool for teaching, learning, and evaluations in the educational sector, according to Wu (2021), which helps attain sustainable education for all. Below are detailed aspects of how ICT integration in teaching and learning promotes SDG 4.

2.5.1 Promote inclusive and equitable education

Educational institutions, policymakers, and educators have embraced ICT solutions aimed at addressing educational equality across various settings, aiming to broaden avenues and opportunities, thereby fostering inclusivity and fairness in education (Liang, 2023). ICT application in education has the potential to bridge learning disparities between genders. To unlock this potential, the deployment and adaptation of ICT and its associated tools are pivotal in enhancing instructional design and attaining desired learning objectives (Tay, 2016). Dorji and Nitwat (2015) support the adoption of ICT-driven education utilizing tools that address varied learning requirements, social environments, and gender disparities, impacting students' involvement and academic achievements.

2.5.2 Promoting learner-centered education

According to Lowther (2008), the establishment of effective ICT-based teaching and learning necessitates three essential attributes: autonomy, capacity, and creativity. Learners who harness ICT tools to direct their own learning demonstrate autonomy, thereby enhancing their ability to function independently. Additionally, Shan (2013) observed that ICT has the potential to transform a classroom into an environment focused on the learner's needs and engagement.

Reid (2002) highlights that ICT facilitates students in delving deeper beyond the fundamental mechanics of course content, enabling them to develop a more profound comprehension of concepts. Furthermore, the utilization of ICT alters the connection between teaching and learning. In Reid's (2002) investigation, educators observed a shift in the dynamic between teacher and student in the context of information technology. As students become adept at assisting teachers with technological issues in the classroom, this dynamic shifts, fostering greater confidence among students. Consequently, ICT disrupts the conventional teacher-centered approach, prompting educators to exhibit more innovation in tailoring and adapting their instructional materials.

2.5.3 Promote high-order thinking skills

ICT supports students' focus on higher-level concepts rather than less critical tasks based on constructive learning (Levin, 2006). According to McMahon (2009), there are statistically significant links between ICT-assisted learning and the development of critical thinking abilities. More time spent in an ICT setting may encourage students' more vital critical thinking abilities. In light of this, it is highly recommended that schools use technology in all areas of instruction and at all academic levels. Students who engage in this can use technology to develop greater levels of cognition in particular learning environments.

2.5.4 Promote quality education

Lowther (2008) emphasizes that autonomy, capacity, and creativity represent the essential attributes necessary for cultivating effective teaching and learning with ICT. When students independently employ ICT tools, they assume responsibility for their educational pursuits. Collaborative learning through ICT offers students added

prospects to augment their existing knowledge, fostering confidence to take risks and learn from errors. As outlined by Serhan (2009), increased confidence in the learning process enables students to enhance their capacity to apply and communicate knowledge efficiently and proficiently through the use of new technology.

According to UNESCO (2018), ICT has the potential to improve education by complementing, enriching, and transforming it. Furthermore, ICT can provide various options for taking in and processing information, making sense of concepts, and expressing learning to students with varied learning styles. ICT can also assist learners in feeling the material rather than merely reading and hearing it, as over 87 per cent of students learn better through visual and tactile modalities.

2.6 The Integration of ICT into Geography

Geography is a subject that investigates the interactions between the physical environment and humans in one area. There are two categories of Geography: Physical Geography and Human Geography. The natural side investigates a wide range of topics, including Climatology, Meteorology, Geomorphology, Topography maps, rocks, soils, natural resources (such as water), and the Geography of the seas and oceans. Human geography includes population, settlement, culture, economics, and politics (Kadhim, 2020). According to Obuba (2017), technology can be utilised as a curriculum component, a means of providing educational materials, a tool for enhancing student learning, and a support for teaching. However, he further stated that integrating technology into education is difficult. Hence, it is essential to change some practices by utilising and developing technology to improve learning throughout the educational system.

ICT tools in education can take many forms, including computers, mobile devices, online courses, and whiteboards. These technological tools complement and improve instruction in all subject areas in elementary and secondary schools around the globe (Kadhim, 2020). In a study by Benjamin and Nato (2011), the most common ICT devices were cellular phones, scientific calculators, computers, and radios, with televisions being used in teaching Geography.

According to Singh and Singh (2013), ICT is used in many aspects of life. It can be used either for pleasure or for educational purposes. During free time, learners learn and look up general knowledge using tools like Facebook and video games. While in the classrooms, ICT can be used to aid pupils in learning new material. Therefore, the use of technology in learning and teaching has a good effect on education since it helps improve the learning process in schools and because it has transformed how people learn and teach (Singh & Singh, 2013).

Gamira (2019) revealed that ICT tools have no value when utilised independently; on the other hand, they have significant educational value when used as part of the learning process. Consequently, technology is neutral. It is, therefore, critical for teachers to understand how to use ICT tools. He used the concept of Technological Pedagogical Content Knowledge (TPCK) to emphasize the importance of teachers having it to integrate technology into the teaching and learning process effectively. "TPCK" refers to the types of knowledge teachers require to effectively educate while utilizing technology to improve learning settings (Gamira, 2019).

According to Singh and Singh (2013), to effectively integrate technology into teaching a subject or a particular piece of material, one must thoroughly understand the link between technology, pedagogy, and content. For instance, a Geography teacher must

be aware of this link to properly teach geography topics like Geographical Information System (GIS) applications in the classroom.

2.7 Challenges of integrating ICT into the teaching and learning of Geography

Despite the acknowledgment of the advantages of implementing ICT within classrooms and the broader educational sphere, there exist certain limitations or obstacles linked to its integration. While ICT contributes to enhancing teaching and learning in numerous aspects, several research studies have highlighted specific challenges. These challenges are categorized into four distinct groups, outlined as follows:

2.7.1 Teachers' attitudes and beliefs about ICT

A study by Khan (2012) showed that teachers' attitudes toward using ICT for instruction and learning are essential to ICT integration in teaching. Therefore, ICT can only be effectively integrated if teachers are optimistic about the use of ICT in their teaching. This is similar to Kadhim (2020), as he narrates that teachers with fewer technological skills and a positive attitude toward ICT need less encouragement and learning support to acquire the skills required for integrating ICT into their design activities in the classroom. In general, teachers who are optimistic about ICT will be positive about using it in the classroom. Furthermore, Kadhim (2020) findings indicate that individuals holding negative perceptions about ICT demonstrated lower proficiency in their use and, as a result, were less likely to agree to take and adjust to technology than those with favorable attitudes. Kadhim's study further concluded that improving people's ICT skills requires changing their unfavourable attitudes. Therefore, instructors must have a favourable attitude towards using technology if they hope to succeed in their classrooms (Kadhim, 2020).

2.7.2 Lack of knowledge and skills on ICT among teachers

Pelgrum (2001) emphasizes that teacher's abilities and knowledge have a significant role in whether or not educational innovations are successful. One of the most significant barriers to using ICT in education, in both developed and developing nations, is teacher's need for knowledge and expertise in ICT. Benjamin and Nato's (2011) study recognized that a challenge in integrating ICT within educational settings among teachers lies in their restricted familiarity and practical experience with ICT in teaching contexts. Moreover, there exists a lack of precise comprehension concerning technology and its optimal integration with current pedagogical content knowledge aimed at improving student learning outcomes.

Shan's (2013) review identified several significant challenges among teachers, including inadequate skills in managing teaching materials (Schweizer & Frederick, 2006). The integration of technology into instruction lacks specific and concrete ideas on how it enhances student learning, coupled with insufficient in-service training on ICT usage (Yildirim, 2007). Furthermore, challenges encompass low teacher expectations, ambiguous objectives for ICT implementation in schools, insufficient motivation, and a lack of technical and financial support (Liu, 2009). Uncertainty about the potential benefits of ICT usage in classrooms and technical issues within classroom settings are additional obstacles highlighted (Yildirim, 2007).

2.7.3 Teachers workload

The workload of teachers is recognized as a significant factor that impedes their incorporation of ICT into their regular teaching routines (Singh & Singh, 2013). Teachers turn to performing their teaching and administrative duties, which puts pressure on them. Consequently, teachers in these situations need more time to

create, develop, and integrate technology into the teaching and learning process. According to Singh and Singh (2013), research has shown that more time is needed to overcome ICT integration into teaching and learning situations. Teachers require time to design lessons, work with other teachers on projects, and learn how to utilize the hardware and software. Similarly, Ofeimanu and Didham (2018) stated that teachers require time to create and integrate technology into their curricula. Furthermore, some teachers cannot use technology in their classes effectively, while others are reluctant to attempt it out of fear, boredom, or lack of enthusiasm (Ofeimanu & Didham, 2018)).

2.7.4. Lack of Access to ICT

One of the challenges teachers face in integrating ICT into their teaching effectively is ICT inaccessibility or availability (Kafyulilo & Keengwe, 2014). According to Kafyulilo and Keengwe (2014), many researchers have been highly interested in this factor. In a review by Kadhim (2020), the National Center for Education Statistics in the United States of America discovered a positive relationship between the likelihood that teachers will give homework that requires students to utilize ICT and the availability of ICT in the classroom in its statistical analysis report. Gamira (2019) claims that a significant obstacle to ICT usage in schools is the need for ICT tools.

2.8 Strategies for effective ICT integration in the teaching and learning process

Shan's (2013) review outlined suggestions to facilitate the successful integration of ICT in schools. These recommendations encompass providing professional development activities focused on enhancing teachers' skills and knowledge in technology. Additionally, encouraging collaborative efforts among teachers to share effective technology practices and experiences is crucial. Furthermore, facilitating

workshops aimed at exploring successful strategies for integrating technology into instruction is essential. Lastly, ensuring consistent and effective training is vital for improving ICT skills and managing technology-rich classrooms.

According to Kafyulilo and Keengwe (2014), teachers should learn how to use technology to supplement traditional teaching, boost productivity, and integrate ICT into classroom activities from a student-centered perspective to support student learning. In order to design more exciting and rewarding activities and more practical classes, teachers must employ ICT in more inventive and effective ways (Shan, 2013). Furthermore, Shan advised teachers to maintain an open mind towards including ICT in the classroom. When using technology, teachers must adopt new teaching techniques to accommodate the new tools (Shan, 2013).

2.9 Summary

To conclude, this chapter reviewed the literature, presenting the theoretical framework underlying the study. It delved into the overview of Namibia's education ICT policy, the concept of ICT, its integration within Geography education to advance SDG 4, its broader integration in education, challenges encountered in ICT's role within the teaching and learning process, and strategies for schools to effectively integrate ICT into teaching and learning. The subsequent chapter will focus on the research methodology.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter explains the research methodology used in this study. This chapter examines the research approach, design, study population, sample and sampling method, data collection methods and instruments, data collection procedures, data analysis and ethical considerations.

3.2 Research Approach and Design

This research employed a qualitative methodology utilizing a multiple-case study framework. Qualitative inquiry entails the gathering and examination of non-quantitative data to elucidate concepts, perspectives, and personal experiences (Bhandari, 2020). According to Lopez and Johnson (2008), qualitative research endeavors to grasp and interpret social dynamics. Such an approach was considered suitable for this investigation as it aimed to delve into the viewpoints of teachers, Heads of Departments (HoDs), and principals regarding the integration of Information and Communication Technology (ICT) to advance SDG 4 within the Geography AS curriculum.

Goddard and Melville (2004) describe a case study research design as an investigative approach wherein a researcher scrutinizes a specific event or occurrence to ascertain whether it can yield demonstrable conclusions or if existing premises on the subject stem from that particular event. This suggests that employing a case study research design permits a detailed examination of a specific case to reach a comprehensive understanding. However, despite the in-depth nature of case studies, it is imperative for the researcher to ensure that the sample chosen represents a significant proportion of the study's intended population (Bayat, 2007). Using multiple case study, the study

focused on four schools in the Ohangwena region. It aimed to get in-depth information from teachers, HoDs, and principals on integrating ICT in the teaching of Geography AS to promote quality education. Case studies naturally enable researchers to thoroughly understand a procedure (Lopez & Whitehead, 2013).

3.3 Population

According to Hopkins (2002), the term "population "refers to the distinct group that serves as the primary target of the study. This study was based in the Ohangwena region and targeted schools that offer Geography at the AS level. There are a total of eight schools that offer AS in the region, and they all form part of this study population. The population study comprises eight principals, eight HoDs and eight teachers teaching AS curriculum in the region. Therefore, the population of the study was twenty-four.

3.3.1 Sample and sampling method

In qualitative research, purposeful sampling is done to choose participants or objects that will provide the most significant information on the subject being studied (Ormrod & Leedy, 2005). Purposive sampling, as defined by Patton and Cochran (2002), refers to the "selection of participants based on their potential to produce data that is valuable to the project" (p. 9). Based on this, the researcher used a purposive sampling method to get the right participants to collect the correct information. The selection was based on the following criteria: (a) the selected school must be in a radius of 100 kilometers (km) from the researcher's place of work; (b) the school must have a computer laboratory fully equipped with a minimum of 20 operational computers, (c) ICT facilities fully equipped with Internet and smart boards; and (d) the school must be offering Geography at AS level. Hence, based on the criteria, four schools met the

requirements and were purposively selected to partake in this multiple case study. The sample of this study included 2 Geography teachers, 4 HoDs for Social Sciences, and four principals of the selected schools. The sample had a total of 10 participants.

3.3.2 Data collection methods and instruments

This study used semi-structured interviews and document analysis as research methods to collect data from the participants.

Semi-structured interviews

The data was collected through semi-structured interviews with the teachers, HoDs and principals of the four chosen schools. According to Pathak and Intratat (2012), semi-structured interviews are frequently used as the primary source of data collection for qualitative studies, 12. They are scheduled in advance for a specific time and location outside of regular business hours. This study conducted semi-structured interviews with selected school principals to establish how ICT promotes quality and inclusive education for SDG 4. Open-ended questions were used during the interviews.

Newcomer (2015) explained that semi-structured interviewing involves the use of a guide comprising standardized questions and topics. However, these inquiries are open-ended, facilitating probing to ensure that the researcher adequately addresses pertinent aspects related to the research question. With this information, the researcher in this study developed a semi-structured interview schedule with open-ended questions to get in-depth and necessary information from the participants. A total of two teachers, four HoDs, and four principals were interviewed. The Interview Guide

(refer **to Appendix E and F**) enabled the researcher to gather data on how ICT is integrated into the Geography AS curriculum to promote SDG 4.

Document analysis

The study also used document analysis to obtain information about the use of ICT in teaching the Geography AS curriculum. According to Bowen (2009), the process of studying or evaluating documents, whether printed or electronic (computer-based or delivered over the Internet), is known as document analysis. Furthermore, to extract meaning, gain insight, and produce empirical knowledge, document analysis, like other analytical techniques in qualitative research, necessitates examining and interpreting data.

A variety of documents can be employed for a systematic assessment within a study, including flyers, manuals, background papers, books, brochures, diaries, journals, event programs, letters, memoranda, maps, charts, agendas, attendance registers, meeting minutes, among other types (Ward, 2013). In this particular study, the researcher employed a Geography syllabus to examine the integration of ICT into the subject, utilizing a technique of document checklist (refer to Appendix G).

3.4 Data collection procedures

The research instrument guides were designed and finalized under the supervision of the supervisors. Arrangements were made with the school principals, HoDs, and teachers for individual face-to-face, semi-structured interviews. Each participant was presented with a consent letter before the interview (refer to **Appendix D**). The consent letter outlined the study's purpose and the participant's rights. The interviews were carried out after working hours. The researcher explained the purpose of the

study before the interview commenced and the methods to collect the data, which were done through audio recording. The recording was necessary, as this aided the researcher with data analysis. The participants were again reminded of their rights, and should they feel uncomfortable during the interview, they had the right to call it off. The researcher further explained what SDG 4 and ICT education policy entail at the beginning of the interview session. The researcher also ensured the probing of questions during the discussion to seek clarity on some answers given by participants. Lastly, using a document analysis checklist, the Geography syllabus was analyzed to understand how ICT is integrated into the subject content.

3.5 Data analysis

According to Seers (2012), data analysis involves employing a range of methodologies that aid in depicting factual information, identifying patterns, formulating interpretations, and testing hypotheses. This process typically denotes the steps undertaken by a researcher following data collection, often leading to the outcomes of the study. In addition, Kawulich (2004) explains that data analysis in a qualitative study entails acquainting oneself thoroughly with the data that has been gathered, searching for patterns and themes, and looking for various and potential relationships within the data so that the researcher knows what he or she has before actually displaying the information and writing it up. This study used an inductive approach to analyse the data, as it is often associated with qualitative studies.

The inductive approach involves converting many transcripts into a highly ordered summary of the key results. This approach allows the researcher to develop a theory and identify themes from the texts and documents (Thomas, 2006). The data collected was transcribed from the recording audio into written texts to discover emerging

issues. The researcher generated codes for the emerging issues and later categorized them. The researcher constructed the issues into emerging themes and reviewed and looked for common themes, and later, the data was triangulated and finally presented. The researcher used code names for the participants; for instance, interviews with school principals were given names like Principal 1 and Principal 2, while teachers named Teacher A, Teacher B and Teacher C and HoDs 1, HoD 2 and HoD 3.

3.6 Ethical considerations

Ethical Clearance Certificate was obtained from the University of Namibia Ethics Committee (refer to **Appendix A**). Furthermore, permission was sought from the Director of Education of the Ohangwena region (refer to **Appendix B**). Upon approval from the Regional Director of Education (refer to **Appendix C**), appointments were made with the school principals to make arrangements with the participants; hence, an approval letter from the Regional Director of Education of Ohangwena region was presented to the school principals for approval and arrangements with the rest of the participants. Moreover, HoDs and teachers were informed about the purpose and value of the study with consent letters (refer to **Appendix D**). Similarly, the researcher explained to participants that the information they provided would be kept confidential, and they were informed about their rights to withdraw from the research should they feel uncomfortable proceeding with the study. The information obtained will be kept on the computer and external drive for three years, and it will be destroyed.

3.7 Summary

This chapter examined research approaches, design, study population, sample and sampling method, data collection methods, and research instruments. These included semi-structured interview and document analysis, data collection procedures, data analysis, and ethical considerations. The next chapter presents a data presentation.

CHAPTER 4: DATA PRESENTATION

4.1 Introduction

This chapter presents the findings from the present study that looks at promoting SDG 4 through ICT integration into the Geography AS level in the Ohangwena region. Firstly, the chapter provides the participants' biographical information. Secondly, the chapter presents four themes from interviews and document analysis per the study's research questions. The themes and subthemes which emerged from the data are shown in Table 1:

Table 1: Themes and sub-themes of the findings

THEMES	SUB-THEMES
4.1.ICT tools used in the teaching of Geography	4.1.1 ICT tools used in the teaching of Geography
4.2. Teachers' integration of ICT tools into the teaching of Geography at the AS level	4.2.1 How do teachers integrate ICT into teaching Geography at the AS level? 4.2.3 Why do teachers integrate ICT into the Geography AS level?
4.3. Challenges faced by teachers in integrating ICT in Geography AS level	Lack of computer skills among learners Limited internet accessibility/connectivity Insufficient ICT infrastructure Teachers' beliefs and attitudes towards the use of ICT tools in teaching Geography Teachers' insufficient ICT training Lack of time to integrate ICT into the teaching of Geography
4.4 Strategies to ensure effective ICT integration into the teaching of Geography AS level.	4.4.1 Introduction of compulsory and promotional Information and communication in the primary phase 4.4.2 Training for teachers on ICT 4.4.3 Provision of ICT tools in schools

4.2 Participants' biographical information

A total of ten participants took part in this study. Participants in this study included two Geography teachers, four HoDs for Social Sciences, and four school principals of the selected schools, who were interviewed individually using semi-structured interviews. Out of ten participants, two were female, and eight were male. Both teachers had less than ten years of teaching experience. All principals and HoDs had more than ten years of working experience in the teaching profession. Teachers were coded as Teacher A and Teacher B. HoDs were coded as HoD A, HoD B, HoD C, and HoD D, and school principals were coded as Principal A, Principal B, Principal C, and Principal D.

4.3 ICT tools used in the teaching of Geography AS level

From the interviews with the teachers, HoDs, and school principals, the following ICT tools were said to be available in schools, as presented in Table 2.

Table 2: ICT tools available and where they are kept in schools

ICT tools available in schools	Places where ICT tools are kept in schools
Computers	Computer laboratories and HoDs offices
Laptops	HoD offices, library and strong rooms
Projectors	HoD offices
Multimedia projector	Laboratories
Tablets	Library

Table 2 shows different ICT tools reported through interviews by the teachers, HoDs, and principals. These tools include computers, laptops, projectors, multimedia

projectors and tablets. The table shows that most computers were found in computer laboratories and commonly in the HoD's offices. Furthermore, laptops were reported to be found in the HoD offices, library, and strong rooms, while projectors were found only in the HoD's offices. Multimedia was reported to be located in laboratories, while tablets were found in the library.

4.4 Teachers' Integration of ICT into Geography AS level

4.4.1 How do teachers integrate ICT into teaching Geography at the AS level?

Participants were asked to indicate how they integrate ICT tools in teaching Geography at the AS level. All 6 participants (teachers and HoDs) reported using ICT in their Geography AS level teaching. The data revealed that participants used the ICT tools during the teaching-learning process as teaching aids, presented information during lessons such as case studies and videos, planned lessons, and recommended websites for learners to learn independently. HoD B indicated that,

"I use the computer for tasks like lesson plan development, information presentation like appropriate articles on case studies and videos to recommend to learners, and for basic information searches on the internet. I also make use of computers to search for further information regarding some topics because the prescribed textbook may not have much information that learners need." HoD B further extended his answer by saying that, *for example, when teaching land mass, learners turn to understand the topic better through viewing videos on the computer".* Similarly, HoD D indicated that: *"My lesson plans are done on the computer. … Also in many cases, I recommend videos and any other relevant information for learners to watch after school on their own devices or in the computer lab".* Teacher A indicated a similar approach, *"I mostly use the laptop with a projector to show my learners videos to aid with the explanation*

of certain geographical processes like plate tectonics… to show the different plate boundaries and how they occur." Teacher B also narrated that he *uses "I use laptops for searching relevant information for learners, like appropriate articles and video to recommend to learners to read and watch on their own time".* Three participants pointed out that they use Multimedia for lesson presentations and means of illustration of processes on the whiteboard in the Multimedia projector. HoD A said that, "*I mainly use the smart screen (multimedia projector) because of the convenience that comes with it…. I do not spend much time setting it up like with the smart screen. I can use it to teach lessons using PowerPoint presentations, e.g., to give a lesson on challenges that migrants may experience in their destination countries; also, I can use it to explain concepts, for example, a drainage basin system in the form of drawings on the whiteboard displayed on smart screen projector instead of using the chalkboard; it may work easier the least to say".* Similarly, HoD C reasoned that, *"using a multimedia projector it makes teaching easier example using PowerPoint presentation can be faster than writing on the chalkboard… it also makes the class interactive as learners get to engage in what they see on the screen... also, the lesson becomes interesting for the learners".*

Document analysis revealed that the syllabus recommended websites for teachers for some content, such as www.geographyas.into/rivers/river-landforms, www.alevelgeograohy.com/meanders, and www.geograpghy.about.com. Two participants have indicated using some of these websites to generate notes for learners and downloaded images for lesson presentations and to recommend these sites for learners to use during spare time (Appendix H). These websites present information for teachers and learners, particularly on Geography themes like river channel processes, landforms, and drainage basin systems. Document analysis further revealed that these

websites consisted of notes/summaries, images and videos based on the topic's outlines in the syllabus. Table 3 shows the syllabus themes and topics and recommends websites for the themes and topics in the syllabus for each topic.

Table 3: Geography syllabus themes and recommended website

THEMES	TOPICS	WEBSITES RECOMMENDED
1. Physical Geography	1.1 Plate tectonics	No recommendations
	1.2 Processes on Slopes	No recommendations
	1.3 River channel processes and landforms	http://www.alevelgeograohy.com/meanders http://www.geographyas.into/rivers/river-landfroms
	1.4 The drainage basin system	No recommendations
	1.5 Rainfall-discharge relationship within drainage basins	No recommendations
	1.6 Atmospheric processes	No recommendations
2. Economic activities and use of resources	2.1 Manufacturing industries	No recommendations
	2.2 Agriculture	No recommendations
	2.3 Energy and mining	No recommendations
3. Human Geography	3.1 Population studies	http://data.worldbank.org/indicator
	3.2 Population movements	No recommendations
	3.3 Settlement studies	No recommendations
4. Interpretation of topographic maps	4.1 Interpretation of topographic map	No recommendations

Based on the information on Table 3, only a few topics have prescribed websites for teachers to use in teaching these topics. Furthermore, the indication of the prescribed

websites shows how the AS Geography syllabus embraces the integration of ICT in the teaching of Geography.

4.4.2 Why do teachers integrate ICT into the Geography AS level?

Participants were asked to indicate why they integrate ICT tools in their teaching. It was revealed that they do so to make lessons interesting for learners. They felt that ICT gives learners a better understanding of the subject and encourages learning and teaching. Furthermore, they reported that ICT helps accommodate learners with different learning styles, helping them learn information beyond what their textbooks include and fosters independent thought as they absorb things independently. As a result, this will promote independent learning among learners. Seven participants justified the use of ICT in teaching Geography; for example, HoD B stated that:

"I use ICT because they make lessons interesting to learners, and also, they help to accommodate learners with different needs… Some learners learn through visuals when I use laptops and projectors. I can accommodate learners with different learning needs; the class becomes more interactive when I use them". Teacher A indicated that *"for me... I use ICT tools because this curriculum requires learners to get in-depth information in their subjects, like geography. Learners need to search for information from different sources like books and the internet to answer questions, so this helps learners get information beyond what the textbook has. It promotes independent thinking as they discover information on their own. Yes, by the way, this level requires learners to be at the centre of learning so learners using these tools discover more on their own".* HoD C also explained by stating *that "as for me, I mainly use ICT. Computers to be specific because it helps to stimulate learning and teaching as this provides learners with a better understanding of the subject. Learners become more*

engaged in their work, e.g., when you give a task requiring them to get information from the internet to discover it on their own."

Three school principals strongly supported the idea of ICT integration in the teaching and learning process. In their view, ICT could improve education quality and promote inclusive and learner-centred education. For example, Principal A stated that *"ICT in schools provide many advantages in delivering equitable and quality education; remember during Covid-19… with school closing. ICT became the mode of learning, and during this period, education almost came to a standstill as many schools in Namibia did not have proper ICT facilities, which had a very negative impact on education that year".* Principal A further explained that: "*With the AS level emphasizing the use of ICT in their teaching, ICT can bring many benefits to the classroom and education process …. For example, it provides teachers with various teaching aids, which creates more enthusiasm for learning among learners, I must say".* Principal B agreed that; *"ICT improves learners' academic performance, which promotes better quality education. The integration of ICT in teaching and learning will provide teachers and learners with various teaching and learning resources. It also provides an opportunity for more learner-centered education, likely creating greater enthusiasm for learning among learners. Lastly, it avails a room for greater exposure to vocational and workforce skills for learners".* Principal C supported the same sentiments, *"When ICT is integrated into lessons, learners become more engaged in their work; this is because technology provides different opportunities to make it more fun and enjoyable".* Principal D was of the similar views, *"you see, ICT has the power to improve the quality of education as learners are exposed to more information regarding their subject, it enhances better understanding of content and*

helps to include all learners with different needs that contribute to inclusive education".

4.5 Challenges faced by teachers when integrating ICT into the teaching of Geography AS level

Based on the study findings, teachers face numerous challenges when integrating ICT into teaching the Geography AS curriculum. The challenges reported include a lack of computer skills among learners, limited internet accessibility and connectivity, insufficient ICT infrastructure, teachers' attitudes towards using ICT tools, a lack of Training on ICT among teachers, and time-consuming during lesson presentations. These challenges are presented in detail below.

4.5.1 Lack of computer skills among learners

Learners' competency in computer literacy was reported as one of the challenges to effectively integrating ICT in Geography. Two of the ten participants reported that some learners needed basic computer skills to operate a computer. That made it difficult for the teachers to give learners tasks related to searching for information on computers. As a result, this hinders teaching as learners must complete their homework tasks due to poor skills in operating computers. HoD A reported, *"Some of our AS learners do not know the computer operating basics. This becomes very difficult when I want to give learners tasks that have to do with information searching on the computer; it can be discouraging to give them such tasks"*. Teacher A also observed that; *"most of my learners do not know much about computers apart from opening them…When I want to give learners a task to create a PowerPoint presentation, it becomes a challenge for them, hindering ICT integration in the class from the learners' side as they have to learn independently"*.

4.5.2 Limited internet accessibility/connectivity

Limited internet accessibility and connectivity were reported by all participants as challenges in integrating ICT into the teaching of Geography. Some classrooms were reported not to have an internet connection or a slow and unstable internet connection, and there was pressure on the internet network in those schools that allowed learners to bring their own devices to school. Teacher B stated, *"At our school, we experience the worst internet accessibility and connection, sometimes the internet is not working at all, and this can be a challenge for us teachers, and it can be prolonged you can end up wasting your whole precious time for things that will you not get … it can be frustrating".* HoD C added that, *"the school is faced with the challenge of poor and unstable internet connection; this can be discouraging for teachers and learners to make use of internet. … Imagine spending 30 minutes to search for insufficient information. That is a headache, please".* Principal A noted, *"Poor internet connection can be at times a problem in the school too, with learners allowed to bring their own electronic devices, this put pressure on the internet connection which makes the network slow".*

4.5.3 Insufficient ICT Infrastructure

Two out of ten participants reported poor ICT infrastructure as one of the challenges experienced by the teachers. Participants indicated that there needed to be more ICT equipment in schools. Some of the available tools were also reported as not functional, and mainly, the tools were shared among staff members. Teacher HoD D indicated, *"We are faced with insufficient ICT tools as a school. Many computers that we have in the school do not work. The school has one multimedia and two laptops that must be shared among all AS teachers…. this brings issues when one wants to use it. Maybe*

another teacher wants to use it too". Furthermore, Teacher B also indicated that: *"there is a scarcity of equipment like computers and photocopying machines and computers that are in the computer lab most of them are not working at all"*.

4.5.4 Teachers' beliefs and attitudes towards the use of ICT tools in teaching Geography

Two out of ten participants indicated that some teachers preferred to use the traditional way of teaching rather than using ICT due to their attitude towards ICT and resistance to change. Some participants believe that ICT allows them to cover less content than they want, so they refrain from using ICT in their teaching. Principal D stated: *"You see, sometimes teachers' beliefs and attitudes toward ICT is another factor that hinders effective integration of ICT in school; some teachers feel they can cover more content and make learners understand by using the traditional way of teaching in the classroom, especially the older teachers. Teacher A stated, "And oh yes, trust me, there are teachers that are resistant to change. I mean, one will tell you that technology is for white people"*. HoD B stated*: "I find it challenging to teach using ICT at times, as it can be time-consuming, with so much content to be covered yearly you cannot make use of ICT tools every day because you will end teaching on few minutes and not finish what you intended to teach for the day, because you will need to set it up and that can take time"*. HoD C indicated that: *"technology…. You can test your patients. You want to teach your while 40 minutes using ICT that….to your surprise, you will end up spending 20 minutes just because of some weird problems of computers or projector; … it can be inconvenient"*.

4.5.5 Teachers' insufficient ICT training

Three out of ten participants reported a need for ICT training among teachers as one of the challenges experienced. They reported that some teachers need to gain the skills to use ITC tools effectively in their teaching as they still need to receive Training on integrating ICT into their teaching effectively. Furthermore, it was reported that some teachers needed more confidence due to insufficient Training in ICT. Teacher A indicated, *"Sometimes it can be challenging to use the multimedia projector as I did not receive training on how to use the multimedia. It can be complicated sometimes when one wants to use it, but I try my best to operate it"*. HoD B stated that, *"Teachers lack confidence with the use of technology because they do not have the skills to operate the computers you see. Most of my colleagues in the department are elderly, so they always complain of not having skills in operating computers*". Principal B stated that *"the school is also faced with the challenge of lack of skills among teachers on how to use ICT tools, some teachers are not comfortable to use the multimedia due to lack of skills on how to operate, but of course, the school has done some arrangement to hold an in-service training to all teachers in the school to operate it".*

4.5.6 Lack of time to integrate ICT into the teaching of Geography

Another challenge reported was the need for more time to effectively integrate ICT into teaching Geography. Participants reported the challenge of setting up ICT tools during lessons as time-consuming, leading to teachers covering their learning objectives fully. HoD B stated, *"I find it challenging to teach using ICT at the time, as it can be time-consuming, with so much content to be covered in a year, you cannot make use ICT tools every day because you will end teaching on few minutes and not finish what you intended to teach for the day, because you will need to set it up and*

that can take time. HoD C indicated that *"technology… can test your patients…. You want to teach your while 40 minutes using ICT, then to your surprise, you will spend 20 minutes just because of some weird problems with the computers or projector……it can be inconvenient".*

4.6. Strategies to ensure effective ICT integration into the teaching of Geography AS level

Participants were asked to suggest ways of ensuring effective ICT integration into the Geography AS level syllabus to promote achieving SDG 4. Their suggestions targeted addressing the challenges they faced: the introduction of compulsory computer studies in the primary phase, Training for teachers on ICT, the provision of ICT tools in schools, and internet accessibility in schools. Their suggestions are presented in detail below.

4.6.1 Introduction of compulsory Computer Studies in the primary phase

Based on the findings, two principals and two HoDs suggested that computer studies should be introduced in education as early as possible for learners to acquire basic computer skills and not struggle at the secondary phase. If introduced at a tender age, this would boost learners' confidence in using ICT. For example, Principal A *said, "For our learners to be able to integrate ICT in their learning confidently, they need to be exposed to ICT from a young age, and this starts with the introduction of computer studies in junior primary…. We need to invest in technology; the world is going digital, so should we as a country?"* Principal B said, *"We need a compulsory computer study as a promotional subject for our learners from junior primary to secondary to be exposed to technology. This is why our AS learners shy away from using technology".*

4.6.2 Training of teachers on ICT

Training for teachers was one of the strategies suggested by the participants in this study. Three out of ten participants felt that such Training would assist teachers in integrating ICT into the teaching and learning process. HoD A was the first participant to point out that *"In-service training should be done in schools to train teachers on how to use the multimedia projector to ensure effective usage of it as it is the main ICT tool that the Ministry of Education provided to ensure effective implementation of AS"*. HoD C offered similar sentiments, *"Training or workshops on the use of ICT should be made mandatory for all AS teachers and allow ICT Continuing Professional Development for teachers in schools".* Similarly, Teacher A added that, *"Teachers should receive more Training on how to use ICT tools to gain confidence and to be competent in using ICT. Schools can arrange in-service training".*

4.6.3 Provision of ICT tools in schools

Participants suggested the provision of ICT equipment in schools. They regarded this as a priority area. Participants called upon the Ministry of Education, Arts and Culture to ensure enough ICT tools are in schools for both teachers and learners to achieve quality education and for schools to pour their budget into buying ICT tools for their schools. Teacher A remarked by saying:

"The Ministry needs to ensure that it provides enough ICT tools like computers for learners not to be requested by schools to bring their own devices like cell phones". HoD C stated that; *"the Ministry needs to provide schools with more ICT resources in order to ensure that this ICT policy is well implemented in schools."* Teacher B and HoD D, however, emphasized that *"school should also make some internal arrangements to ensure better provision of ICT resources in their schools .... They*

should not always wait for the government". HoD D emphasized that: "*schools should direct some portions of their budgets towards purchasing enough ICT tools such as computer projectors".*

4.6.4 Improve internet accessibility and connection in schools

Participants suggested that schools needed better internet connectivity for teachers to use ICT properly. They suggested that schools liaise directly with network companies that can offer them a better service. Teacher B suggested, *"I would also like the issue of internet connection to be addressed; at least the school should go in contract agreement with network companies that offer better internet services like telecom … offer social corporate responsibilities by offering internet to schools."* While principal C suggested, *"yes also……network providers should improve on their network coverage systems".*

4.7 Summary

This chapter presents the findings from interviews and document analysis following the research questions. The findings are based on the data gathered from teachers, HoDs, and school principals, with supporting data generated from document analysis. Some participants embrace the use of ICT in their teaching of Geography, while others view it as time-consuming. Participants who used ICT tools faced challenges integrating ICT into their teaching effectively, including a lack of ICT skills among teachers and learners, a need for more ICT tools, and a poor internet connection. The next chapter discusses the findings of the study.

CHAPTER 5: DISCUSSION OF FINDINGS

5.1 Introduction

This chapter discusses the study's main findings on promoting SDG 4 through ICT integration in the Geography AS curriculum. The findings are discussed based on the themes presented in Chapter 4, namely: the ICT tools available in schools, teachers' integration of ICT in the Geography AS curriculum, challenges teachers experience when integrating ICT in the Geography AS curriculum; and lastly, strategies to integrate ICT in Geography AS curriculum effectively.

5.2 Availability of ICT tools in schools

According to Namibia's official ICT Policy for Education of 2005, teachers are expected to integrate ICT into their teaching. Geography AS-curriculum teachers who participated in this study acknowledged the availability and utility of ICT tools in teaching subject content. From the participants' interviews, it was clear that all selected schools had ICT tools, and participants had a positive outlook on using ICT tools in their teachings of Geography. It emerged that tools such as computers, projectors, laptops, and multimedia projectors were available in schools and were used by participants in their teachings of Geography. A study by Ogbomo (2011) pointed to printers, audio/video, radio and TV, computers, and the internet as ICT tools that teachers can use in teaching their subjects. The same author further argued that ICT may include school-specific technologies, e.g., interactive whiteboards, and technologies used across formal and informal boundaries (e.g., Edugames), and it may comprise both stand-alone and online, networked technologies. Ratheeswari (2018) added that ICTs mix ancient and new technologies. Radio, television, and the telephone are old tools, while computers, satellites, the internet, and wireless

technology are examples of new tools. In this study, it became clear that Geography AS curriculum teachers were using a mixture of both ancient and new technologies in the teaching of Geography.

5.3 Teachers' Integration of ICT into Geography AS level

The study findings revealed that even though all schools had computer laboratories, some computers were not operational and accessible to learners in schools. The present study showed that schools were provided with multimedia projectors by the Ministry of Education, Arts, and Culture to assist teachers in integrating ICT into their teachings. Furthermore, it was reported that some schools permit learners to bring their own devices to access the internet, including laptops and tablets. This was to ensure that learners use ICT in their learning process. This finding aligns with Benjamin and Nato (2011), who found that schools that struggle with providing ICT tools can encourage learners to bring their own devices and provide for those who cannot afford them.

The study by Tay (2016) identified the most common ICT devices, such as cellular phones, scientific calculators, computers, radios, and televisions, being used in teaching Geography. This is similar to the study's finding that some schools allowed learners to bring their own devices, such as cell phones, tablets and laptops; however, the study showed that televisions and radio were not used in the sampled schools.

The MoE (2005), noted that ICT integration into teaching is a valuable instrument for improving educational quality and enhancing the teaching-learning process, provided that the ICT tools are used successfully and efficiently. The ICT education strategy in Namibia is to educate all Namibian learners, students, instructors, and communities for the future world economy by producing ICT-literate citizens (Das, 2019). Based

on the findings of this study, it is revealed that participants understood the positive impacts that ICT might have on learners' outcomes and the quality of education. The study findings further showed that teachers believed that ICT, like computers, has the power to stimulate teaching and learning. Furthermore, it makes teaching much more interesting to learners, for example, through watching videos and images and using recommended websites. As a result, this enhances and broadens their understanding of the subject.

Similarly, a study by Schulz (2015) identified two main ICT tools that stimulate learning among learners in Geography: Google Maps and Google Earth. The participants also mentioned these tools. However, a concern was observed during the document analysis of the Geography syllabus as only two topics had recommended websites for teachers to integrate during teaching and learning; hence, this proves that there is a need for curriculum implementers to promote the desire and interest of ICT integration in the curriculum by stipulating how ICT can be integrated in the classroom to teach Geography topics in the syllabus.

The study's findings further reveal that using ICT in classrooms promotes independent learning among learners. Similarly, this was recommended by Bohn (2020), as he argued for the use of ICT to enhance independent learning and higher-order thinking skills. A study by McMahon (2009) shows statistically significant links between ICT-assisted learning and developing critical thinking abilities. More time spent in an ICT setting may encourage students' more vital critical thinking abilities. Similarly, a study by Lowther (2008) observed that students who utilize ICT to take charge of their learning are said to be independent. This implies that learners become more capable of functioning independently and collaboratively due to using ICT tools. This

observation was evident from the findings of this study, that teachers allow learners to use ICT tools during their free time to look for in-depth information regarding Geography topics that promote independent learning among learners. Reid (2002) points out that ICT allows students to spend more time exploring beyond the mechanics of course content, helping them to gain a greater understanding of concepts.

Participants believed that ICT encouraged learners to become more engaged, have fun, and enjoy the lessons more, thus improving their understanding and knowledge retention. ICT in education was also characterized as inclusive in that it helped ensure that learners with various needs and learning abilities were catered for. This observation is similar to the UNESCO report on SDG 4, which states that ICT has the potential to improve education by complementing, enriching, and transforming it. Furthermore, ICT can provide various options for taking in and processing information, making sense of concepts, and expressing learning to students with varied learning styles. ICT can assist learners to 'feel' the material rather than merely reading and hearing it, as over 87 per cent of students learn better through visual and tactile modalities (UNESCO, 2021).

Participants confirmed that Namibian education's ICT strategy helped achieve SDG4 because ICT provides several benefits in delivering a reasonable and competent education system. According to the findings, this provides an opportunity to improve all Namibians' lives indirectly. Furthermore, incorporating ICT into education increased educational quality by exposing students to a wide range of material within the subjects they studied, including Geography. Some participants believed that ICT enabled learners to become more engaged, have fun, and enjoy the lessons more, which improved their learning and knowledge retention. ICT in education was also

regarded as inclusive in that it helped to accommodate all learners with varying requirements.

5.4 Challenges faced by teachers when integrating ICT into the teaching of Geography AS level

Even though the utilization of ICT in teaching is crucial, teachers experience numerous challenges in trying to do so. These include a lack of computer skills among learners, limited internet accessibility/connectivity, insufficient ICT infrastructure, teachers' beliefs and attitudes towards using ICT tools in teaching Geography, and teachers' insufficient ICT training.

5.4.1 Lack of computer skills among learners

Learners' competency in computer literacy was identified as one of the challenges to effectively integrating ICT in Geography. Some of the participants indicated that some learners needed to gain basic computer skills to operate a computer. As a result, they were not comfortable using them when assigned work that required ICT. This finding shows that some learners still need basic computer literacy even though the curriculum offers a subject called IC.

A study by Katsarou (2021) examined the connections between computer self-efficacy, computer attitudes, and the value of learning computer skills among students. According to the study, students' perceptions of their comfort or fear with computers influenced how confident they felt about them and using them. This supports this study's findings as the study shows that due to poor computer skills among learners, they have developed discomfort or fear of using them.

5.4.2 Limited internet accessibility/connectivity

The study revealed that participants found it challenging to consistently use ICT as the internet connectivity in schools needed improvement. Participants pointed out that there were times when they experienced the challenge of internet connection in the schools. Furthermore, some classrooms need internet connections. This understandably gets in the way of the effective integration of ICT into the teaching of Geography.

5.4.3 Insufficient ICT Infrastructure

The study revealed that teachers faced the challenge of insufficient ICT infrastructure. According to Kafyulilo and Keengwe (2014), insufficient ICT infrastructure has a profound negative impact on the use of ICT in teaching and learning. This supports the study's findings as it revealed that teachers were faced with insufficient ICT tools like a lack of computers. This research findings discovery also concurs with Gamira (2019), who claims that a significant obstacle to ICT usage in schools is a lack of ICT resources. When there is a need for ICT tools and software, it can limit teachers' ability to do anything with ICT.

5.4.4 Teachers' Attitudes and Beliefs about ICT

The study revealed that some teachers had negative attitudes towards using ICT tools in teaching Geography. A study by Khan (2012) showed that teachers' attitudes toward using ICT for instruction and learning are essential to ICT integration in teaching. Therefore, ICT can only be effectively integrated if teachers are optimistic about the use of ICT in their teaching. This resonates with Kadhim (2020), who narrates that teachers with fewer technological skills and positive attitudes toward ICT need less encouragement and learning support to acquire the skills required for integrating ICT

into their design activities in the classroom. Therefore, teachers who are optimistic about ICT in general will be positive about using it in the classroom.

Furthermore, Kadhim (2020) further reveals that participants with negative attitudes toward ICT were less adaptable to using them and, as a result, were less likely to accept and adapt to technology than those with positive attitudes. The above argument came out during the study as some participants who had negative attitudes toward integrating ICT into teaching Geography did not support using ICT daily, as they viewed it as time-consuming. Kadhim's study concluded that improving people's ICT skills requires changing their unfavourable attitudes. Hence, instructors must have a favourable attitude towards using technology if they hope to succeed in their classrooms (Kadhim, 2020).

5.4.5 Lack of Training on ICT, knowledge and skills among teachers

The findings of this study repeatedly indicated that due to lack of Training on ICT, some teachers needed to gain the necessary knowledge and skills on how to integrate ICT into their teaching. A study by Khan (2012) reported that teachers' lack of knowledge and expertise is one of the most significant barriers to using ICT in education in both developed and developing nations. Furthermore, a study by Benjamin and Nato (2011) also identified limited knowledge and experience of ICT in teaching contexts and a lack of specific knowledge about technology and how to combine it with the existing pedagogical content knowledge to support student learning as one of the challenges of integrating ICT in education among teachers.

5.4.6 Lack of time to integrate ICT into the teaching of Geography

The study revealed that participants need help with utilizing ICT in their teaching as they view it as time-consuming for them to set up during lessons. This situation can discourage participants from using them as they already have much content to cover in a year. These findings follow Singh and Singh (2013), who found that one of the most significant barriers to ICT integration into teaching and learning situations is more time. Teachers require time to design lessons, work with other teachers on projects, and learn how to utilize the hardware and software.

5.5 Strategies to ensure effective ICT integration into the teaching of Geography AS level

Participants were asked to suggest ways of ensuring effective ICT integration into the Geography AS level syllabus to promote achieving SDG 4. Their suggestions addressed the challenges they faced: the introduction of compulsory computer studies in the primary phase and training for teachers on ICT.

5.5.1 Introduction of compulsory and promotional Information and communication in the primary phase

The study reported a need for more skills among AS learners to use ICT in their learning process. Some participants believed that ICT should be a compulsory and promotional subject in schools as the primary phase to ease this gap in skills and knowledge among learners. Currently, in the Namibian curriculum, IC serves as a support rather than a promotional subject. As a result, the subject needs to be taken seriously by most schools as it is mainly used as a lesson for promotional subjects.

5.5.2 Training for teachers on ICT

The study revealed that some participants complained of needing training on using the multimedia projector. Participants suggested that the Ministry of Education should offer Training to all AS schools on the use of the multimedia projector; schools should conduct in-service Training on the integration of ICT in teaching by inviting ICT experts; and schools should offer continuous professional development for teachers in terms of ICT integration in the teaching and learning process. In a review by Shan (2013), he highlighted some recommendations for schools to integrate ICT in schools effectively, including offering technology-related professional development activities to update teachers' skills and knowledge and providing technical support when necessary. Furthermore, Frederick and Schwelzer (2006) recommended that schools offer workshops that enable teachers to consider successful strategies for integrating technology into instruction by adding technology-enhanced materials to curricula. Hutchison and Reinking (2011), advised giving teachers enough freedom in selecting and covering curriculum materials and offering efficient, timely, and ongoing Training to improve ICT skills and manage a technology-rich classroom.

5.5.3 Provision of ICT tools in schools

The study reported insufficient ICT infrastructure in schools. The participants suggested that the Ministry of Education, Arts, and Culture ensure enough ICT tools for teachers and learners to achieve quality education and that schools pour their budgets into buying ICT tools for their schools. A study by Bingimlas (2009) and a study by Serhan (2009), to some degree, agrees with the above finding, as the study argues that when schools are provided with suitable ICT tools, this increases the chance of effective and excellent ICT integration in the teaching and learning process.

5.6 Summary

This chapter discussed the main findings of the study. The findings confirmed that ICT has the potential to contribute to SDG 4, and the utilization of ICT in teaching is crucial. Even though the utilization of ICT in teaching is crucial, there were numerous challenges that teachers are experiencing in trying to integrate ICT into their teaching of Geography. The challenges articulated by the participants are, amongst others, inadequate Training for teachers, insufficient provision of ICT equipment, and internet accessibility and connectivity. Teachers can only embrace integrating ICT in their teachings if they are well-trained and the challenges mentioned above are minimized. The next chapter provides recommendations, a summary and a study conclusion.

CHAPTER 6: SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter presents the summary, conclusion and recommendations for the study. The recommendations are divided into three categories: recommendations for the Ministry of Education, Arts and Culture, schools and further research studies.

6.2 Summary of the findings of the study

This study aimed at promoting SDG 4 through ICT integration in Geography at AS level at selected schools in the Ohangwena region. The study employed a qualitative approach, using a multiple-case study design. A purposive sampling was used to select four secondary schools offering the AS curriculum. A total of ten participants took part in this study, comprising two teachers, four HoDs, and four school principals. Teachers were selected purposively because they were teaching Geography at the AS level. Semi-structured interviews and document analysis were used to collect data. Data were thematically analyzed.

The study revealed that different types of ICT were identified in the four selected schools; these included computers, projectors, laptops, and multimedia projectors. All schools selected during the study had ICT facilities, specifically a computer laboratory. It was found that some schools' laboratories were not operational and accessible to AS learners. Furthermore, some schools allowed their learners to bring their own devices, such as laptops and tablets, for internet access, while other schools did not permit learners to bring any devices to school. Most participants had a positive perspective toward ICT usage in their teaching; however, some were uncomfortable integrating them into their teaching. They indicated that it is time-consuming when setting up devices like projectors; they also mentioned that they did not receive

sufficient ICT training, insufficient ICT infrastructure, and poor internet connections and accessibility. The study recommends the introduction of compulsory and promotional IC in the primary phase, training for teachers on the integration of ICT, provision of ICT tools in schools and improved internet accessibility and connectivity in schools.

6.3 Conclusions

Integrating SDGs into any education system is crucial, especially SDG 4, which deals with quality education. Given the current impact of COVID-19 on education, ICT has become even more critical in delivering quality education in Namibia and elsewhere. During the pandemic, education has not come to a standstill. The use of ICT has become critical in navigating and facilitating teaching and learning to ensure quality education for sustainable development. Based on this study, it has been revealed that Geography AS teachers make use of ICT tools in teaching the subject. It was also found that with the use of ICT tools, learners become more engaged in their work and develop independent thinking skills, an outcome in line with SDG 4, which focuses on quality and inclusive education. However, it also emerged that teachers experience several challenges, such as a lack of ICT skills among AS learners, a lack of training among teachers, poor internet connectivity, teachers' beliefs and attitudes towards the use of ICT, and poor ICT infrastructure when integrating ICT into the teaching of Geography at the AS level. Participants, therefore, suggested that teacher training on ICT, introducing compulsory and promotional Information and Communication in schools, and providing adequate ICT tools were necessary. With many challenges facing education systems, such as COVID-19 and the world moving into the Fourth Industrial Revolution (FIR), ICT integration must be reinforced in teaching all school subjects, including Geography.

6. 4 Recommendations

Based on the findings of the study, the following recommendations were made. The recommendations were grouped into three categories: recommendations for the Ministry of Education, Arts and Culture, schools and future research studies as presented below.

6.4.1 Recommendations for the Ministry of Education, Arts and Culture

a) Curriculum developers should consider making Information and Communication a promotional and compulsory subject in all schools to promote inclusivity among all Namibian children and expose them to ICT at a tender age.
b) Curriculum developers should promote the desire and interest in ICT integration in the curriculum by stipulating how ICT can be integrated into the classroom and providing more recommended websites for teachers and learners to use during teaching and learning.
c) Teacher training programs should include IC to enhance teachers' skills in ICT. The study recommends that the training be done at school, circuit, regional, or cross-regional levels.

6.4.2 Recommendations for Schools

a) School management should ensure that the Geography teachers receive in-service training in using ICT in the classroom. This can be done through cluster centers or school-based initiatives by inviting ICT experts.
b) Schools should ensure the provision of stable internet connectivity and accessibility by prioritizing ICT in their budget to allow teachers and learners to have better access to information relevant to their teaching and learning.

c) The school management should ensure that the school has at least one technical staff member who can help learners and teachers, for example, getting an ICT lab ready when they want to use ICT in their teaching.
d) Heads of the Department should ensure the necessary ICT facilities for proper Geography ICT integration and make these facilities available to the schools to teach and learn the subject's practical components, like map work.

6.4.3 Recommendations for future research

a) The study was done in the Ohangwena Region, where only four schools participated; therefore, future studies need to include many schools across political regions of Namibia to compare the findings and establish an understanding of promoting SDG 4 through ICT integration in Geography.
b) The study recommends that a similar study be carried out to evaluate the promotion of SDG 4 through ICT integration into Geography from learners' perspectives.

6.5 Summary

This section looked at the summary of the findings, conclusions and recommendations for the study. The recommendations were divided into three categories: recommendations for the Ministry of Education, Arts and Culture, schools and further research studies.

REFERENCES

Bayat, W. F. (2007). A guide to Managing Research. In H. C. D, *Evaluating Education and Training Services: A Primer – Chapter 9 Research Design: Qualitative Research.* (pp. 250–270). Florida: Saint Leo University.

Benjamin, W. & Nato, N. (2011). Types of ICT Materials available for Teaching of Geography in Secondary Schools in Rongo District. *Journal of Educational Technology*, (10),40-60.

Bhandari, P. (2020). *Introduction to Qualitative Research.* London: Adventure Works Publisher.

Bingimlas, K. A. (2009). Barriers to the successful integration of ICT in teaching and learning environments: A review of the literature. *Eurasia Journal of Mathematics, Science and Technology Education*, 235-245.

Bohn, E. (2020). *Most frequently asked questions from the public on the revised curriculum.* NIED Okahandja: Ministry of Education Arts and Culture.

Bowen, G. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 27–40.

Camiller, M.A & Camiller, A.C. (2020). *The Sustainable Development Goals on Quality Education: The future of UN Sustainable Development Goals, sustainability, ethics and governance.* New York: Springer Cham.

Christensen, J. &. Lopez, V. (2008). Quantitative research methods: A synopsis approach. Kuwait Chapter of Arabian. *Journal of Business and Management*, (5), 200–240.

Das, K. (2019). The role and impact of ICT in improving the quality of education: Overview. *International Journal of Innovation Studies in Sociology and Humanities*, 20–30.

Dorji, S. & Nitwat, S. (2015). Gender differences in students' learning achievements and awareness through residence energy saving game-based inquiry playing." *Journal of Computer Education*, 227-243.

De-Villers. (2021). *Critical understanding of ICT: Concept and Principles.* Berlin: Springer.

Espinoza, Y. Z. (2014). Relationships among computer self-efficacy, attitudes toward computers, and desirability of learning computing skills. *Journal of Research on Computing in Education*, (30), 420-436.

Flynn, N. & Clare, O. (2017). *Theory of Change.* Retrieved from society.info@intrac.org. on 25 July 2022.

Gamira, D. (2019). The Integration of ICT in Geography in Selected Kadoma High Schools, Zimbabwe. *Journal on School Educational Technology*, (15), 3–50.

Goddard, S. M. (2004). *Research Methodology: An Introduction.* Chicago: Blackwell Publishing.

Hensely, R. (2017). Approaches to education for sustainable development (ESD) in Kesennnuma: a qualitative case study of continuous challenge faced by educators pursuing sustainability in the teaching. *Adventure Publishing*, 55–79.

Hesselmark, O. & Miller, A. (2003). *A country ICT survey for Namibia.* Windhoek: SIDA.

Hopkins. (2002). *What is Research? Dissecting the Dimensions of Research.* Auckland NZ: AUT University.

Hutchison, D. & Reinking. (2011). Teachers perceptions of integrating information and communication technologies into literacy instruction: A national survey in the United States. *Reading Research Quarterly*, 312–333.

Iipinge, S. & Julius, L.H. (2016). Quality education within universal primary education: A case study of a selected rural primary school in Namibia. *NERA Journal*, 49–75.

Kadhim, A. (2020). Effective Use of ICT for Learning and Teaching Geography. *Aalborg Academy Journal of Human and Social Sciences*, (1), 15–42.

Katsarou, E. (2021). The Effects of Computer Anxiety and Self-Efficacy on L2 Learners' Self-Perceived Digital Competence and Satisfaction in Higher Education. *Journal of Education and E-Learning Research,* 8(2), 158–172.

Kafyulilo, J . & Keengwe. (2014). Teachers' perspectives on their use of ICT in teaching and learning: A case study. *Education and Information Technologies*, (19), 913-923.

Khan, M. (2012). Barriers to the introduction of ICT into education in developing countries: The example of Bangladesh. *International Journal of Instruction*, (5), 250-300.

Kawulich, B. (2014). Data Analysis Techniques in Qualitative Research. *State University of West Georgia*, 96–113.

Liang, M. (2023). A review of ICT-enabled learning for school girls in Asia and its impact on education equity. *Education technology and research*, 267–293.

Liu, S. (2009). Teachers' attitudes toward technology integration in schools: A four-year study. Teachers and Teaching: theory and practice. *Journal of Education*, (10), 300-320.

Lowther, D. L. (2008). Does technology integration work when key barriers are removed? *Education Media International*, (45), 195-213.

Levin, W. R. (2006). Teachers' beliefs and practices in technology-based classrooms: A developmental view. *Journal of Research on Technology in Education*, (45), 195–213.

Macmahon, G. (2009). Critical thinking and ICT integration in a Western Australian secondary school. *Educational Technology and Sociology*, (12), 269–281.

Makrakis, V. L. (2012). ICT-enabled climate change education for Sustainable Development across the school curriculum. *Journal of Teacher Education for Sustainability*, 54-72.

Ministry of Education (2005). *Educational Training Sector Improvement Performance.* Okahandja: NIED.

Ministry of Education (2007). *ICT policy of Education.* Okahandja: NIED.

Newcomer, S. (2015). Systematic methodological review: developing a framework for a qualitative semi-structured interview guide. *Journal of Advance Nursing*, (3), 330–360.

Obuba, O. (2017). Assessment of Teachers' Challenges in Integrating ICT in Teaching Geography in NyamiraNorth Sub-County. *Journal of Technology in Education*, (30) , 350–369.

Ofeimanu, P. & Didham, R.J. (2018). Advancing policy to achieve quality education for Sustainable Development. In J. H. A Leicht, *Issues and trends in education for Sustainable Development* (pp. 108-300). Paris: UNESCO.

Ogbomo, F. E. (2011). Issues and challenges of Information Communication Technology (ICTs) in education. *Journal of information and knowledge management*, 20-30.

Ormrod, D. L. (2005). *Practical Research: Planning and Design.* New York: Pearson Education: Upper Saddle of River.

Pathak, A ,& Intratat, P. (2012). *A Guide to Using Qualitative Research Methodology.* Florida: Medicins Sans Frontieres.

Pelgrum, W. (2001). Obstacles to the integration of ICT in education: results from a worldwide educational assessment. *Computer and Education*, (37), 163–178.

Rangel-Pérez, C. G.-B.-N.-A. (2021). The Massive Implementation of ICT in Universities and its implication for ensuring SDG4: Challenges and difficulties for professors. *Sustainability Works*, 13-30.

Ratheeswari, K. (2018). Information communication technology in education. *Department of Value Education* (pp. 87-97). India: Tamilnadu Teachers Education University.

Reid, S. (2002). The integration of information and communication technology into classroom teaching. *Alberta Journal of Educational Research*, 48 (1).

Schulz, G. I. (2015). Investigating teachers' motivation to use ICT tools in higher education. . *Internet Technologies and Application*, pp. 62-67.

Fredrick, A. & Schwelzer, G. (2006). Lowe," After the in-service course: Challenges of technology integration. *Journal of ICT integration in Education*, (23.), 73-84.

Seers, K. (2012). Qualitative data analysis. Evidence-based nursing. *American Journal of Qualitative Res*earch, pp. 2–5.

Serhan, D. (2009). Preparing preservice teachers for computer technology integration. *International Journal of Instruction*, (36), 439–447.

Shan, J. F. (2013). ICT in Education: A Critical Literature Review and Its Implications. *National Institute of Education*, (9), 112–125.

Singh. C & Singh. B (2013). Integrating geography information system in teaching geography in Malaysian secondary smart schools. *Educational Journal*, (2), 149–154.

Tay, H. (2016). Longitudinal study on impact of iPad use on teaching and learning. *Congent Education*, pp. 107–220.

Thomas, D. (2006). A general inductive approach for analysing qualitative evaluation data. *American Journal of Evaluation*, 237–246.

Tjoa, M. T. (2016). The role of ICT to achieve the UN Sustainable Development Goals (SDG). *IFIP World Information Technology Forum Conference*. Switzerland: Springer International Publishing.

Trickly, L. (2010). *The framework for quality Education.* Bristol: University of Bristol.

UNESCO. (2018, October 16). *UNESCO.* Retrieved from UNESCO: https://www.unesco.org

UNESCO. (2021). *ICT in Education.* Italy: UNESCO.

United Nations. (2015). *Transforming our world: the 2030 Agenda for Sustainable Development.* New York, USA: United Nations.

Valters, C. (2015). *Theories of change: Time for a readical approach to learning in development.* London: The Asia Foundation.

Ward, E. W. (2013). Learning about qualitative document analysis. *International Journal Qualitative Res*earch, pp. 20–30.

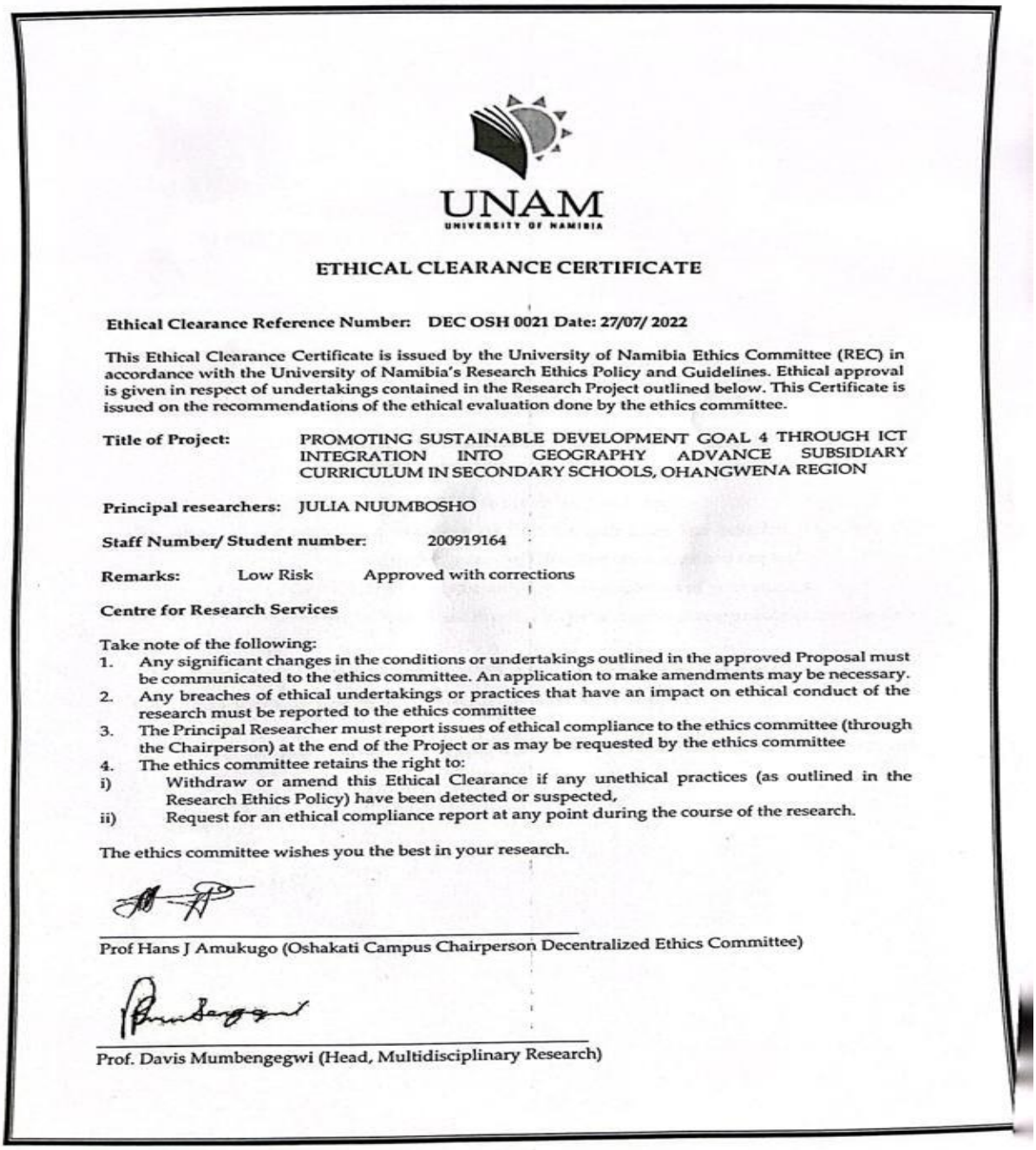
Whitehead, D. & Lopez, P. (2013). Sampling data and data collection in qualitative research. Nursing & midwifery research: Methods and appraisal for evidence-based practice. *Research for Nursing Institute*, (10), 220–240.

Wu, J. (2021). The role of information and communication technology in realising Sustainable Education by 2030. *Journal of Education Research*, (30), 230–250.

Yildirim, S. (2007). Current utilisation of ICT in Turkish basic education schools: A review of teachers' ICT use and barriers to integration. *Instruction Journal of Instructional Media*, (34), 171–186.

APPENDICES

Appendix 1: Ethical clearance certificate



UNAM
UNIVERSITY OF NAMIBIA

ETHICAL CLEARANCE CERTIFICATE

Ethical Clearance Reference Number: DEC OSH 0021 Date: 27/07/ 2022

This Ethical Clearance Certificate is issued by the University of Namibia Ethics Committee (REC) 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 ethics committee.

Title of Project: PROMOTING SUSTAINABLE DEVELOPMENT GOAL 4 THROUGH ICT INTEGRATION INTO GEOGRAPHY ADVANCE SUBSIDIARY CURRICULUM IN SECONDARY SCHOOLS, OHANGWENA REGION

Principal researchers: JULIA NUUMBOSHO

Staff Number/ Student number: 200919164

Remarks: Low Risk Approved with corrections

Centre for Research Services

Take note of the following:

1. Any significant changes in the conditions or undertakings outlined in the approved Proposal must be communicated to the ethics committee. An application to make amendments may be necessary.
2. Any breaches of ethical undertakings or practices that have an impact on ethical conduct of the research must be reported to the ethics committee
3. The Principal Researcher must report issues of ethical compliance to the ethics committee (through the Chairperson) at the end of the Project or as may be requested by the ethics committee
4. The ethics committee 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.

The ethics committee wishes you the best in your research.

Prof Hans J Amukugo (Oshakati Campus Chairperson Decentralized Ethics Committee)

Prof. Davis Mumbengegwi (Head, Multidisciplinary Research)

Appendix 2: Letter to Regional Director of Education for Ohangwena Region

Julia F Nuumbosho
PO Box 1569
Ondangwa
12 July 2022

Regional Director of Education
Ministry of Education Arts and Culture
Private Bag 88005
Eenhana

RE: Request for permission to conduct Developmental Research in the Ohangwena Region on the topic 'PROMOTING SUSTAINABLE DEVELOPMENT GOAL 4 THROUGH ICT INTEGRATION INTO THE GEOGRAPHY ADVANCED SUBSIDIARY CURRICULUM IN OHANGEWNA REGION'

Education for Sustainable Development (ESD) stands as a potent instrument in driving the attainment of Namibia's Sustainable Development Goals (SDGs). Namibia's comprehensive implementation of primary and secondary education resonates with the SDGs, notably SDG 4, as highlighted by Iipinge and Julius (2016). SDG 4, according to the United Nations (2015), recognizes education's pivotal role across societal, economic, and political domains by ensuring accessible and equitable high-quality education, along with fostering continuous learning opportunities for all. The significance of technological advancement in bolstering the effective realization of SDG 4 is underscored by the United Nations (2015). Against this backdrop, the researcher aims to explore the role of ICT in advancing Sustainable Development Goal 4. One of the study's objectives is to scrutinize the integration of ICT within the Geography AS curriculum, contributing to the accomplishment of Goal 4 within the Sustainable Development Goals.

I kindly request authorization from your esteemed office to conduct research in four senior secondary level schools within your region, specifically focusing on the AS level. The research will involve conducting semi-structured interviews with school principals, teachers, and Heads of Departments (HoDs) in the Social Sciences field. Additionally, a thorough document analysis of the Geography syllabus for grade 12 will be carried out.

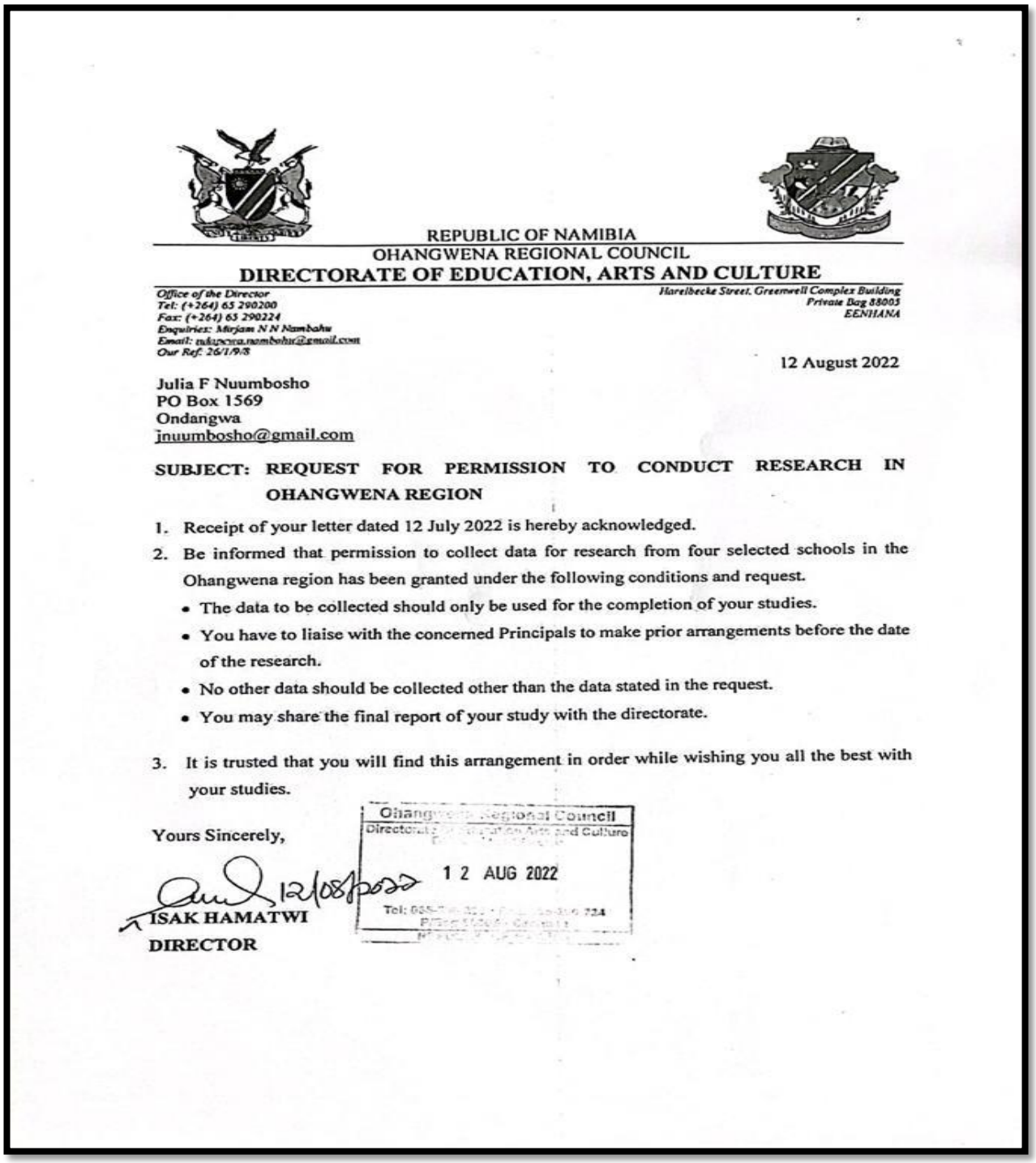
Prior to participation, all involved participants will receive comprehensive information about the study's objectives, purpose, and potential benefits to them. They will also be briefed on their rights to participate voluntarily and to withdraw from the study at any point if they wish to do so.

The aim of this study is to inform the Ministry of Education and curriculum developers about the significance of ICT integration within the AS curriculum. Additionally, it aims to explore the challenges that teachers encounter while integrating ICT into the new AS curriculum. The insights gained from participants' recommendations and suggestions could significantly contribute to the effective implementation of the updated AS curriculum.

Yours sincerely

Julia F Nuumbosho
Master's student
University of Namibia

Appendix 3. Approval letter from the Regional Director of Education for Ohangwena Region



REPUBLIC OF NAMIBIA
OHANGWENA REGIONAL COUNCIL
DIRECTORATE OF EDUCATION, ARTS AND CULTURE

Office of the Director
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Our Ref: 26/1/9/8

Harelbecke Street, Greenwell Complex Building
Private Bag 88005
EENHANA

12 August 2022

Julia F Nuumbosho
PO Box 1569
Ondangwa
jnuumbosho@gmail.com

SUBJECT: REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN OHANGWENA REGION

1. Receipt of your letter dated 12 July 2022 is hereby acknowledged.
2. Be informed that permission to collect data for research from four selected schools in the Ohangwena region has been granted under the following conditions and request.
   - The data to be collected should only be used for the completion of your studies.
   - You have to liaise with the concerned Principals to make prior arrangements before the date of the research.
   - No other data should be collected other than the data stated in the request.
   - You may share the final report of your study with the directorate.
3. It is trusted that you will find this arrangement in order while wishing you all the best with your studies.

Yours Sincerely,

12/08/2022

ISAK HAMATWI
DIRECTOR

Ohangwena Regional Council
Directorate ... Education Arts and Culture
12 AUG 2022

Appendix 4: Consent letter to participants

Individual interview

Dear Participant

I, Julia Nuumbosho, am a student at the University of Namibia in the Department of Social Sciences. I am doing a Master's Degree in Development Studies, and as part of completing the qualification, one must conduct research. The title of my study is Promoting Sustainable Development Goal 4 through ICT integration in the Geography Advance Subsidiary curriculum in the Ohangwena region. The answers you will provide in this interview and the interview recordings will be treated with the highest confidentiality and used for academic purposes only. Participation in this study is voluntary, and you can withdraw anytime. Kindly feel free to respond to all the questions I will ask you. The UNAM Research Ethics Committee has approved the research I am conducting. I would appreciate it very much if you would participate in an interview, and I would like to assure you of the following:

You are under no obligation to partake in this interview if you choose not to; you retain the right to cease participation at any point before its conclusion without facing any adverse repercussions. Your involvement will remain entirely anonymous throughout this process. Even if I inquire about information that could potentially reveal your identity or if I am acquainted with you personally, I am strictly prohibited from disclosing your identity to anyone. In presenting my findings derived from the interviews, I will refrain from including any personal details that could lead to participant identification. Instead, I will employ a coding system such as "Respondent A believes that…" when referencing specific participants.

Should there be a necessity to make an audio or video recording of the interview, I must acquire your explicit consent beforehand. You are at liberty to decline having the interview recorded, and this decision will not result in any negative consequences. In such cases, I will solely record the interview's contents in my written notes. All interview data will be securely stored, and only authorized University officials, my supervisor, and myself will have access to it. After a period of three years, all data will be responsibly and ecologically disposed of. Should you have any queries regarding this interview or require clarification on any aspect, please do not hesitate to ask, and I will gladly provide explanations. Furthermore, if you wish to gain a deeper understanding of the research I am conducting, feel free to inquire, and I will be more than willing to offer additional information.

The interview should take about 1 hour. You can reach me on my cell phone at 0817784776 or e-mail me at jnuumbosgho@gmail.com if you have any questions about this research.

If you want to contact the UNAM Centre for Research and Publications for more information or have a comment or complaint about this research or me, please call (+ 264 61) 206 4673 or e-mail research@unam.na. Please provide specific information.

Thank you very much for your willingness to participate in this research!

Appendix 5: Interview guide for teachers and HoDs

I, Julia Nuumbosho, am a student at the University of Namibia in the Department of Social Sciences. I am doing a Master's Degree in Development Studies, and as part of completing the qualification, one must carry out research. The title of my study is Promoting Sustainable Development Goal 4 through ICT integration in the Geography Advance Subsidiary curriculum in the Ohangwena region. The answers you will provide in this interview and the interview recordings will be treated with the highest confidentiality and used for academic purposes only. Participation in this study is voluntary, and you can withdraw anytime. Kindly feel free to respond to all the questions I will ask you.

Interviewee: _____

Place: _____

Date: _____

Time: _____

Biographical information

Gender

Male

Female

Years of teaching experience

1-10 years

11-19 years

20-29 years

30 – 39 years

and above

1. How is ICT being integrated into the Geography Advance Subsidiary (AS) curriculum to promote achieving Goal 4 of Sustainable Development Goals?

What are the ICT tools that are available in your school?

Do you use these tools to teach Geography AS, and why?

Please explain how you use them in your teaching.

How does ICT integration in education contribute to SDG 4?

2. What challenges do you experience when integrating ICT in the teaching of Geography?

Have you received any training on ICT to integrate its geography? If not, how do you integrate it?

Connectivity, how is it a challenge?

Do you sometimes experience a challenge when incorporating ICT into your teaching?

Is the policy of ICT clear to you?

3. What strategies can be used to ensure effective ICT integration in teaching Geography?

Appendix 6: Interview guide for principals

I, Julia Nuumbosho, am a student at the University of Namibia in the Department of Social Sciences. I am doing a Master's Degree in Development Studies, and as part of completing the qualification, one must carry out research. The title of my study is Promoting Sustainable Development Goal 4 through ICT integration in the Geography Advance Subsidiary curriculum in the Ohangwena region. The answers you will provide in this interview and the interview recordings will be treated with the highest confidentiality and used for academic purposes only. Participation in this study is voluntary, and you can withdraw anytime. Kindly feel free to respond to all the questions I will ask you.

Interviewee: _____

Place: _____

Date: _____

Time: _____

Biographical information

Gender

Male

Female

Years of teaching experience

1-10 years
11-19 years
20-29 years
30 – 39 years
40 and above

Interview question

- How do you ensure this policy is effectively integrated into the Advance Subsidiary curriculum?
- Are you aware of the ICT policy for education in Namibia?
- Do you understand what the policy entails?
- How do you implement the policy in the school?
- Explain how the ICT policy in education contributes to realising Sustainable Development Goal 4 (SDG) in the Advance Subsidiary curriculum.
- What challenges does the school face when implementing the policy?
- Do you experience internet Connectivity issues?
- How clear is the policy of ICT to teachers?
- What are the shortcomings of the policy in implementing it in your school?
- What should be done to ensure effective ICT integration to promote SDG 4 in schools?

Appendix 7: Document analysis guide

GEOGRAPHY THEMES	TOPICS	WEBSITES RECOMMENDED
1. Physical geography	1.1 Plate tectonics	
	1.2 Processes on Slopes	
	1.3 River channel processes and landforms	
	1.4 The drainage basin system	
	1.5 Rainfall-discharge relationship within drainage basins	
	1.6 Atmospheric processes	
Economic activities and use of resources	2.1 Manufacturing industries	
	2.2 Agriculture	
	2.3 Energy and mining	
3. Human geography	3.1 Population studies	
	3.2 Population movements	
	3.3 Settlement studies	
4. Interpretation of topographic maps	4.1 Interpretation of topographic map	

Appendix 8: Lesson Plan