Importance of Assistive Technology in the Implementation of Inclusive Education at University of Rwanda; Case study of College of Education Nyagatare Campus

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CERTIFICATION

This is to certify that the dissertation entitled Importance of Assistive Technology in the Implementation of Inclusive Education at the University of Rwanda; Case Study of College of Education Nyagatare Campus is the work of Charles NDAYAMBAJE, submitted in partial fulfilment of Requirements for the Degree of Master of Education in Special Needs Education.

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Date: ...../...../ 2024

DECLARATION

I, Charles Ndayambaje, hereby certify that this thesis, "Importance of Assistive Technology in the Implementation of Inclusive Education at the University of Rwanda; Case study of College of Education Nyagatare Campus" is entirely original with no submissions to other higher education institutions for consideration for any awards. All the literary sources that have been mentioned have been fully referenced.

Signature.

Charles NDAYAMBAJE

Date...../...../2024

DEDICATION

I dedicate this work to my beautiful wife and son, whose unwavering support and faith in my abilities have continued to inspire me throughout this academic journey. I also dedicate this thesis to all my friends who have been there for me during the long writing process. May God bless everyone.

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ABBREVIATIONS AND ACRONYMS

AT: Assistive Technology

ICT: Information and Communication Technology

IE: Inclusive Education

JAWS: Job Access With Speech

NGO: Non-Governmental Organization

SEN: Special Educational Needs

SWD: Students With Disabilities

UR: University of Rwanda

WHO: World Health Organization

UNESCO: United Nations Educational, Scientific and Cultural Organization

ABSTRACT

This study examined the use of assistive technology in implementing inclusive education at the University of Rwanda, concentrating on the College of Education Nyagatare Campus. The research aimed to explore the types of assistive devices used, their role in facilitating learning and integration, the significance of the resource room, and the challenges faced in utilizing assistive technology within the context of education programs. Exploratory research design was used in this study where qualitative and quantitative data were collected using different methods including questionnaires, interview guides, and observation checklists. The study targeted a population of 71 people including students with disabilities, lecturers, dean of school support staff and students without disabilities. Census sampling techniques were used to include all targeted pollution. This led to the sample size of 71 respondents to be selected including students with disabilities and those without disabilities, lecturers, administrators and resource room manager. Descriptive statistics were used to examine quantitative data, while thematic analysis was used for qualitative data. The findings revealed that various assistive devices, such as screen readers, Braille materials, and mobility aids, were crucial for students with disabilities in education programs to access the curriculum and participate in academic activities. Assistive technology also facilitated their integration into the school community and engagement in co-curricular activities. The resource room was essential in helping students with disabilities receive specific assistance and accommodations. This study adds to the expanding body of research on inclusive education and emphasizes the necessity of all-encompassing support systems, such as assistive technology, to establish fair educational opportunities for students with disabilities in Rwandan and international higher education institutions, especially in the field of education. Recommendations are provided for university administration, faculty, students, and policymakers to enhance the provision, accessibility, and utilization of assistive technology. Further research is suggested to explore the best practices and innovations in this field within the context of education programs.

CHAPTER ONE
GENERAL INTRODUCTION

1.1 Background of the Study

The importance of assistive technology in the accomplishment of inclusive education has gained significant attention worldwide. The right to inclusive education is acknowledged by the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD), which also mandates the provision of assistive technology and other required accommodations and support to enable full participation (United Nations, 2006).

Students with impairments can benefit greatly from assistive technology, as evidenced by several studies conducted in developed nations. For instance, research conducted in the US has demonstrated that assistive technology helps children with a range of disabilities perform better academically, become more independent, and participate more socially (Bouck et al, 2011; Edyburn & D. L., 2020). The use of assistive technology has been shown to help the learning of children with special educational needs and encourage inclusive education practices in the United Kingdom (Abbott, 2011).

The World Health Organization (WHO) reports that just 10% of individuals globally have access to assistive technology, even though over a billion people require it. (World Health Organization [WHO], 2021). This highlights the significant unmet need for assistive technology, particularly in developing countries where resources are limited. The WHO highlights how crucial it is to expand access to assistive technology in order to support inclusive education and allow people with disabilities to fully engage in society. (World Health Organization [WHO], 2021).

The use of assistive technology for inclusive education is growing in East Africa, however more slowly than in affluent nations. Kenya, Tanzania, and Uganda, among other nations, have made significant progress in advancing inclusive education laws and practices, including the use of assistive technology to enhance the educational experience of students with disabilities. (Adebisi et al, 2015; Lwanga-Ntale, C., 2019).

In Kenya, studies have explored the use of assistive technology in inclusive education settings. For example, (Bisi, 2013) investigated the impact of assistive technology on the educational achievement of visually impaired students in primary teacher training colleges. The findings revealed that assistive technology enhanced students' performance and participation in learning activities. Similarly, (Andoh, 2012)investigated the factors influencing teachers' adoption and integration of information and communication technology (ICT) in the classroom, emphasizing the potential of assistive technology in supporting inclusive education.

Tanzania has also made efforts to promote inclusive education and the use of assistive technology. Tanzania Education Authority (TEA) cooperated with groups like Sight Savers Tanzania (SST) to provide assistive devices and other services to children with visual impairments in inclusive schools (Kapinga, 2014). However, problems such as limited resources, insufficient teacher training, and societal attitudes towards disability continue to impede the widespread deployment of assistive technology in Tanzania's education system (Kapinga, 2014).

In Uganda, the government has enacted policies and initiatives to support inclusive education, including the provision of assistive technology. The Uganda National Association of the Deaf (UNAD) advocates for the use of assistive technologies, such as sign language interpreters and captioning services, to enhance the inclusion of deaf students in mainstream classrooms. (Murangira, 2020). However, budgetary constraints and a lack of understanding continue to limit the availability and accessibility of assistive technology, particularly in rural areas. (Murangira, 2020).

Rwanda has made considerable strides in fostering inclusive education and recognizing the value of assistive technology in the learning of children with disabilities. The Rwandan government has implemented laws and activities targeted at enhancing access to quality education for students with disabilities. (MINEDUC, 2018). The Special Needs and Inclusive Education Policy (2018) focuses on providing assistive technologies and appropriate accommodations to students with disabilities so that they can fully participate in the educational system.

Rwandan studies investigated the use of assistive technology in inclusive educational settings. (Karangwa et al, 2013) explored the obstacles faced by learners with visual impairments in scientific classes and underlined the need for assistive technology in encouraging their participation and achievement. The study discovered that the absence of appropriate assistive technologies, limited teacher training, and inadequate resources hampered the effective implementation of inclusive education for children with visual impairments.

(Nsanzabiga, 2014) assessed the inclusive education program at the University of Rwanda's College of Education, concentrating on the services and assistance offered to students with disabilities. The study discovered that, while progress had been achieved in establishing a resource room and supplying assistive devices, difficulties such as limited staff awareness, insufficient training, and insufficient diversity of assistive technologies remained.

Rwanda has cooperated with international organizations and non-governmental organizations (NGOs) to encourage the use of assistive technology in inclusive education. For instance, the Rwanda Education Board (REB) collaborated with UNICEF to provide assistive gadgets and other services to children with disabilities in inclusive schools. (UNICEF, 2019). The Ministry of Education has also worked with Humanity & Inclusion (formerly Handicap International) to develop guidelines and standards for assistive technology provision in educational settings (Humanity & Inclusion, 2021).

The University of Rwanda, particularly its College of Education Nyagatare Campus, has worked to promote inclusive education and assist students with disabilities. Students with special educational needs can access assistive technologies and accommodations through the university's disability support services and resource rooms. However, research conducted at the University of Rwanda Nyagatare Campus has identified challenges in the implementation of assistive technology for inclusive education. (Nsanzabiga, 2014) found that while the campus had made progress in admitting students with disabilities and establishing a resource room, issues such as limited staff awareness, inadequate training, and insufficient diversity of assistive technologies persisted. The study highlighted the need for improved pre-admission guidance, diagnostic facilities, and follow-up support mechanisms for graduates with disabilities as they transition into the labour market.

Despite these efforts, enrolment and retention rates for students with disabilities at the University of Rwanda Nyagatare Campus remain low when compared to non-disabled classmates (Nsanzabiga, 2014). This emphasizes the need for additional research and initiatives to overcome the challenges to inclusive education and guarantee that students with disabilities have equal access to assistive technologies and support services.

To summarize, many types of disabilities impede students' involvement in school at various levels around the world, particularly in Africa, East Africa and Rwanda. Assistive technology has the ability to bridge the gap between students' capabilities and the demands of the learning environment, enabling them to acquire information, interact effectively, and demonstrate their knowledge(Alnahdi, 2014). While progress has been made in promoting inclusive education policies and practices, challenges persist in the availability, accessibility, and effective use of assistive technology, particularly in resource-limited settings like the University of Rwanda Nyagatare Campus. This study intends to contribute to the increasing body of information on assistive technology and inclusive education in Rwanda, and to inform policy and practice to ensure equal educational opportunities for all students, regardless of disability.

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1.2 Statement of the Research Problem

Inclusive education and the availability of appropriate assistive technologies should allow students with disabilities to fully participate in learning alongside their classmates who do not have disabilities (Karangwa et al, 2013; Bolingo, 2019). At the University of Rwanda's College of Education Nyagatare Campus, attempts have been made to admit students with disabilities and to build a resource room with some assistive devices (Nsanzabiga, 2014; Mbabazi, 2023). However, the support provided to these learners remains inadequate due to issues such as limited staff awareness, insufficient training, and a lack of diverse assistive technologies (Nsanzabiga, 2014; Mbabazi, 2023).

(Bolingo, 2019) discovered that although the University of Rwanda had some assistive tools, such as magnifying glasses, computers with JAWS, and Braille machines, the enrolment and academic performance of students with visual impairments were still hampered by issues like the inadequate number of computers, staff and student training, and incompatibilities between assistive technologies and the curriculum. Due to the intricacy of certain assistive technology

and their incompatibility with the curriculum, many students have struggled to learn, and others have dropped out of college as a result of the subpar academic results.(Nsanzabiga, 2014; World bank, 2023) .

This circumstance has serious repercussions. There are still obstacles in the way of the full involvement and success of students with disabilities, especially those who are visually impaired, at the University of Rwanda Nyagatare Campus.(Karangwa et al, 2013). Without effective assistive technology and support, these students are at risk of being left behind academically and socially, perpetuating inequalities in educational attainment and life opportunities.

This study attempts to solve this issue by examining the role that assistive technology plays in the University of Rwanda Nyagatare Campus's adoption of inclusive education. This study aims to suggest solutions for improving the provision and efficient use of assistive technology by looking at how assistive devices are currently used, their effects on learning and academic performance, and the difficulties that staff and students face. The objective is to help create a more fair and inclusive learning environment so that students with disabilities, particularly those who are visually impaired, can thrive academically and fully engage in university life.

1.3 Objectives

1.3.1 General Objective

This study's main goal is to find out how important assistive technology is to the University of Rwanda's inclusive education program, with a particular emphasis on the Nyagatare Campus of the College of Education.

1.3.2 Specific Objectives

1. To identify the types of assistive devices used by students with disabilities at the College of Education Nyagatare Campus.
2. To explore the impact of assistive technology on the integration of students with disabilities into the school community and their participation in co-curricular activities.

3. To assess the significance of the resource room in supporting the use of assistive technology and promoting inclusive education practices.

1.4 Research Questions

1. What types of assistive devices are used by students with disabilities at the College of Education Nyagatare Campus?
2. How does assistive technology assist the integration of students with disabilities into the school community and their participation in co-curricular activities?
3. How does the resource room support the use of assistive technology and promote inclusive education practices?

1.5 Significance of the Study

Many stakeholders in the field of inclusive education will find this study important, especially when considering higher education in Rwanda. The results of this study will advance our understanding of the value of assistive technology in fostering inclusive behaviors and bolstering the academic achievement of students with disabilities. The study's conclusions can help guide resource allocation, policy decisions, and the creation of plans to improve the availability and use of assistive technology in higher education.

This study will offer insightful commentary on the present status of assistive technology adoption and its influence on inclusive education practices, particularly for the University of Rwanda and the College of Education Nyagatare Campus. The results can help the organization pinpoint areas that need work, allocate funds wisely, and create focused interventions to help students with impairments. The institution can establish a more welcoming and accessible learning environment by tackling the issues and taking advantage of the potential this study has revealed.

Furthermore, this research will benefit educators and faculty members by raising awareness about the importance of assistive technology in inclusive classrooms. The findings can inform professional development initiatives and provide strategies for effectively integrating assistive technology into teaching and learning practices. By equipping faculty with the necessary

knowledge and skills, they can better support the diverse needs of students with disabilities and foster inclusive pedagogy.

For students with disabilities, this study gives voice to their experiences and challenges in accessing and utilizing assistive technology. The recommendations derived from this research can lead to improved support systems, increased accessibility to assistive devices, and enhanced opportunities for academic success and social integration. By addressing the barriers faced by students, this study contributes to the creation of a more inclusive and empowering educational environment.

Furthermore, this study is important for Rwandan politicians and decision-makers who work in the sector of education. The results can guide the creation and improvement of regulations pertaining to inclusive education and assistive technology. By stressing the value of assistive technology and pointing out the difficulties in putting it into practice, this study can promote more funding, resources, and assistance for inclusive practices in higher education.

Lastly, this study adds to the larger conversation on inclusive education and how assistive technology might support students with disabilities' participation and rights. The findings of this study can be disseminated to the global community, encouraging cooperation and knowledge sharing to promote inclusive practices everywhere.

In conclusion, the University of Rwanda, teachers, students with disabilities, legislators, and the larger inclusive education community are among the many stakeholders who will find value in this study. This study is to promote positive change, inform evidence-based practices, and help realize inclusive and equitable education for all students by examining the significance of assistive technology in the implementation of inclusive education.

1.6 Scope and Delimitation

In the setting of the College of Education Nyagatare Campus at the University of Rwanda, the study's scope is centred on examining the significance of assistive technology in the implementation of inclusive education. The study's scope is restricted to investigating the attitudes, experiences, and behaviours surrounding assistive technology among academics, staff, and students with disabilities at this specific institution.

The study mainly focuses on the kinds of assistive technology that students use, how these devices affect their learning and academic performance, how assistive technology enhances integration and participation in extracurricular activities, the importance of the resource room, and the difficulties that students face when using assistive technology. The study's main focus is still on the particulars of assistive technology in the selected educational context, even though it may touch on more general topics like policy frameworks and societal views regarding inclusive education.

The study population is limited to students with disabilities enrolled at the College of Education Nyagatare Campus, as well as faculty members and staff directly involved in teaching, supporting, or providing services to these students. The research does not extend to other campuses or colleges of the University of Rwanda or other higher education institutions in the country.

The data collection methods employed in this study include questionnaires administered to students with disabilities, interviews with faculty and staff, and observations of the resource room and inclusive practices. The research relies on the self-reported experiences and perspectives of the participants, as well as the researcher's observations within the specific context of the study.

It is important to acknowledge that the findings of this study may not be generalizable to all higher education institutions in Rwanda or other countries, as each institution has its unique characteristics, resources, and challenges. However, the insights gained from this research can provide valuable lessons and recommendations that can be adapted and applied to similar contexts, contributing to the broader discourse on inclusive education and assistive technology.

Despite these delimitations, the study aims to provide a comprehensive understanding of the importance of assistive technology in the implementation of inclusive education within the specific context of the College of Education Nyagatare Campus. The findings and recommendations generated from this research can serve as a foundation for further studies and initiatives aimed at enhancing inclusive practices and supporting the academic success of students with disabilities in higher education settings.

1.7 Assumptions

The following assumptions underline this study:

1. Participants, including staff, faculty, and students with disabilities, will answer questionnaires and interviews truthfully and accurately, expressing their genuine experiences, viewpoints, and opinions about inclusive education practices and assistive technology at the College of Education Nyagatare Campus.

2. The sample of participants selected for this study is representative of the larger population of students with disabilities, faculty members, and staff involved in inclusive education practices at the College of Education Nyagatare Campus.

3. The assistive technology devices and resources available at the College of Education Nyagatare Campus are functional and accessible to students with disabilities who require them for their learning and participation.

4. The resource room at the College of Education Nyagatare Campus is operational and provides specialized support and accommodations for students with disabilities.

5. The participants have a basic understanding of the concepts of assistive technology and inclusive education, enabling them to provide meaningful responses to the research questions.

6. The research instruments, including questionnaires, interview guides, and observation checklists, are valid and reliable tools for collecting data relevant to the research objectives and questions.

7. The researcher will maintain objectivity and adhere to ethical principles throughout the research process, ensuring the confidentiality and anonymity of participants and minimizing potential biases.

8. The findings of this study, while specific to the College of Education Nyagatare Campus, can provide insights and recommendations that are relevant and applicable to other higher

education institutions in Rwanda and beyond, contributing to the broader discourse on inclusive education and assistive technology.

It is important to acknowledge these assumptions as they provide a foundation for the research design, data collection, and interpretation of findings. However, the researcher will remain open to the possibility of these assumptions being challenged or not fully met during the course of the study and will address any discrepancies or limitations that may arise.

1.8 Theoretical Framework

The study's theoretical framework is based on the Social Model of Disability and the Ecological Systems Theory, two fundamental ideas that offer a basis for comprehending the significance of assistive technology in the execution of inclusive education.

According to Oliver (1990), the Social Model of Disability refocuses attention from personal disabilities to the social constraints that prevent people from achieving their full potential. This paradigm highlights the fact that disability results from interactions between the environment and the individual rather than being innate. It contends that the main things preventing people with disabilities from fully participating in society and being included are systematic discrimination, physical limitations, and sociocultural attitudes (Shakespeare, 2010).

Regarding this study, the Social Model of Disability emphasizes how crucial it is to provide inclusive learning settings that eliminate obstacles and give students with disabilities the assistance and accommodations they require. Because it allows students to access the curriculum, take part in learning activities, and interact with their peers on an equitable basis, assistive technology is essential to this process. This approach offers a framework for comprehending the importance of assistive technology in advancing inclusive education practices by acknowledging the social and environmental elements that influence the experiences of students with disabilities.

The Ecological Systems Theory, developed by (Bronfenbrenner, U., 1979) provides a holistic perspective on human development by examining the interactions between individuals and their environments. According to this theory, the microsystem (the immediate surroundings), mesosystem (the interconnections between microsystems), exosystem (indirect influences), and macrosystem (broader cultural and societal contexts) all have an impact on an individual's growth (Bronfenbrenner&Morris, 2007).

Applying the Ecological Systems Theory to this study, the College of Education Nyagatare Campus represents the microsystem in which students with disabilities interact with their immediate learning environment, including classrooms, resource rooms, and assistive technology. The mesosystem encompasses the interactions between different microsystems, such as the collaboration between faculty, support staff, and students in utilizing assistive technology effectively. The exosystem includes factors such as institutional policies, funding allocation, and professional development opportunities that indirectly influence the implementation of assistive technology and inclusive practices. The macrosystem represents the broader societal attitudes, cultural beliefs, and legislative frameworks that shape the context of inclusive education in Rwanda.

By considering these various systems and how they interact, the Ecological Systems Theory offers a thorough framework for comprehending the intricate elements that affect the effective use of inclusive teaching methods and assistive technology. It highlights the importance of considering not only the individual needs of students with disabilities but also the broader systemic factors that impact their learning experiences.

Together, the Social Model of Disability and the Ecological Systems Theory provide a robust theoretical foundation for this study. They emphasize the significance of creating inclusive educational environments, removing barriers, and providing appropriate support and accommodation through assistive technology. These theories guide the research in examining the importance of assistive technology at the College of Education Nyagatare Campus and inform the analysis and interpretation of findings, leading to recommendations for enhancing inclusive practices in higher education settings.

1.9 Conceptual Framework

This study's conceptual framework is based on an investigation of the significance of assistive technology in establishing inclusive education for students with disabilities in higher education environments.

Located at the core of the framework is the idea of assistive technology, which includes a range of tools, software, and equipment intended to improve the functional abilities of students with impairments. For inclusive education methods to be promoted, the framework asserts that assistive technology must be accessible, available, and used appropriately.

The independent variables in this framework include the types of assistive devices available and the accessibility of the resource room. These variables are essential in helping the researcher understand their importance in the integration of students with disabilities integration into the school community and in co-curricular activities.

Furthermore, the framework recognizes the significance of the resource room as a focal point for providing specialized support, accommodations, and access to assistive technology. The availability and accessibility of the resource room, along with the expertise of staff in supporting students with disabilities, can greatly facilitate the effective utilization of assistive technology and promote inclusive practices.

The framework also acknowledges the presence of extraneous variables that may impact on the relationship between assistive technology and inclusive education outcomes. These variables include individual student characteristics, such as the type and severity of disability, as well as contextual factors, such as institutional policies, financial resources, and social attitudes towards disability.

By theorizing these variables and constructs, the conceptual framework guides research in understanding the importance of assistive technology in the implementation of inclusive education at the College of Education Nyagatare Campus. The findings of the study can provide insights into the strengths, challenges, and opportunities for enhancing inclusive practices through the effective utilization of assistive technology in higher education settings.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter provides a comprehensive review of the literature on the application of assistive technology in inclusive education, with a focus on settings in higher education. It looks at the findings of past studies related to the objectives and research questions.

The literature review serves to establish a solid foundation for the current study by highlighting the importance of the research topic, identifying knowledge gaps, and providing guidance for the conceptual framework and research methodologies. To give readers a thorough grasp of the subject, the review consults a variety of sources, such as academic publications, periodicals, reports, and policy papers.

2.2 Assistive Technology Frameworks

A number of theoretical frameworks concentrate on the function of assistive technology in helping people with disabilities. The SETT (Student, Environment, Tasks, and Tools) Framework, developed by (Zabala, 2005), provides a structured approach for considering the student's needs, the learning environment, the tasks to be accomplished, and the appropriate assistive technology tools to support the student's success. This framework emphasizes the importance of a collaborative decision-making process involving the student, educators, and other relevant stakeholders in selecting and implementing assistive technology (Zabala, 2005)

The Assistive Technology Outcomes Measurement System (ATOMS) Framework, proposed by (Edyburn, D.L., 2006)focuses on evaluating the effectiveness of assistive technology interventions. It highlights the importance of considering the student's goals, the appropriate selection of assistive technology, the implementation process, and the outcomes achieved. The ATOMS Framework provides a systematic approach for measuring the impact of assistive technology on students' learning and participation (Federici & Scherer, 2012).

The Universal Design for Learning (UDL) Framework, developed by the Centre for Applied Special Technology (CAST), promotes an adaptable and inclusive learning environment that satisfies the diverse needs of all students, including those with disabilities (CAST, 2018). The utilization of various channels for representation, expression, and interaction to enhance learning is emphasized by UDL concepts. (Rose et al, 2002). Using assistive technology is essential to achieving Universal Design for Learning (UDL) because it gives students different methods to access material, show off their skills, and participate in learning activities(Rao, k. etal, 2014).

These assistive technology frameworks have been applied in various studies to examine the selection, implementation, and effectiveness of assistive technology in educational settings. For instance, (Phil P. etal, 2004) explored the factors to be considered when choosing assistive technology for students with disabilities using the SETT Framework, stressing the significance of a thorough evaluation of the student's needs and the learning environment. Similarly, (Smith et al, 2014) employed the ATOMS Framework to evaluate the outcomes of assistive technology interventions for students with disabilities in higher education, highlighting the positive impact on their academic performance and participation.

The assistive technology frameworks provide valuable guidance for educators, support staff, and researchers in understanding the key factors to consider when selecting, implementing, and evaluating assistive technology for students with disabilities in inclusive education settings.

2.3 Empirical Review of Assistive Technology in Inclusive Education

2.3.1 Types of Assistive Devices Used by Students with Disabilities

A wide range of studies have extensively documented the various types of assistive devices utilized by students with disabilities in inclusive education settings across different countries and contexts. (Bolingo, 2019) comprehensive study at the University of Rwanda - College of Education revealed that students with visual impairments relied on a diverse array of assistive tools to support their academic pursuits. These tools included Braille machines, slate and stylus for Braille writing, JAWS (Job Access With Speech) software for screen reading, talking calculators, Victor Reader devices for audio playback, Braillino or Braille writers, embossers

(Braille printers), reading machines for scanning printed materials, magnifying glasses, and speech recognition programs.

Assistive technology has long been acknowledged for its importance in helping people with a range of impairments increase their capacities and compensate for their impairments. According to (David H. etal, 2015), assistive devices like electronic mobility switches and alternative keyboards for people with physical disabilities, computer screen enlargers and text-to-speech readers for people with visual disabilities, electronic sign-language dictionaries and signing avatars for people with hearing impairments, and calculators and spellcheckers for people with learning disabilities can serve a variety of purposes (David H. etal, 2015). Their study made clear how important assistive technology is in helping people with a range of challenges access information, speak well, and show what they know.

Within the Rwandan context, (Karangwa et al, 2013) study shed light on the specific assistive devices employed by students with visual impairments. The researchers reported the use of Braille materials, Perkins Braillers (Braille typewriters), Victor Reader devices, slate and stylus for Braille writing, and white canes for mobility assistance. These devices played a crucial role in enabling students to access information, navigate their environment, and actively participate in their academic pursuits by reading, writing, and engaging with course materials in accessible formats.

(Adebisi et al, 2015) provided a comprehensive categorization of assistive technology devices based on the specific skills they support. They identified assistive technologies for written language, including speech synthesizers, proofreading tools, and spell checkers; reading, including word processors, tape recorders, and optical character recognition software; mathematics, including talking calculators and electronic math worksheets; listening, including FM listening systems and audio recorders; and memory, including free-form databases, personal data managers, and prewriting organizers. This categorization highlighted the diverse range of tools available to support different academic skills and accommodate the unique needs of students with disabilities.

However, it is essential to acknowledge the disparities in access to assistive technology across different regions. (Borg et al, 2009) noted that the availability of assistive technology in developing countries remains limited compared to developed nations, potentially impacting the

range of devices accessible to students with disabilities. This emphasizes how important it is to work together to close the accessibility gap and guarantee that students with disabilities in settings with limited resources have fair access to assistive technology.

Students with disabilities use a variety of assistive gadgets, which show the latest developments in the field of assistive technology as well as their unique demands and deficiencies. It is essential for educational institutions to keep up with the latest advancements in technology and software, as well as to regularly evaluate and broaden the selection of assistive technology solutions accessible to students. This commitment to providing a range of contemporary assistive technologies is essential to developing equitable and inclusive learning environments that cater to each student's unique needs.

2.3.2 Impact of Assistive Technology on Integration and Participation

Numerous studies have highlighted the profound impact of assistive technology on the integration of students with disabilities into the school community and their active participation in co-curricular activities. (Karangwa et al, 2007) emphasized the pivotal role played by assistive technology in promoting the inclusion and engagement of students with disabilities across various facets of campus life. Their research underscored the transformative potential of assistive devices in breaking down barriers and facilitating the full participation of students with disabilities in the educational and social spheres.

According to a University of Rwanda study (Bolingo, 2019), there is strong evidence that assistive technologies improve pupils' social integration and general well-being. The researcher reported that assistive devices such as white canes and mobility aids enabled students with disabilities to navigate the campus independently, attend events, and actively engage in social interactions with their peers. This not only facilitated their physical mobility but also contributed significantly to their sense of belonging and enhanced their overall university experience.

(Adebisi et al, 2015) also emphasized the value of assistive technology in helping students with impairments participate in extracurricular activities. According to their research, assistive technologies allowed students to participate in a variety of activities and projects, which was crucial for their overall development and for building a strong sense of community inside the

school. This holistic approach to inclusive education recognizes the significance of co-curricular activities in promoting personal growth, social skills, and overall well-being among students with disabilities.

(Masingila. etal, 2015)discovered that the adoption of mobile devices as assistive technology greatly improved learning access for students with visual impairments in resource-constrained areas, like Kenya. Their research emphasized the value of accessible learning resources, peer support, and mentoring in fostering the successful integration of students with disabilities. The results demonstrated how assistive technology may close accessibility gaps and foster inclusive learning environments, even in difficult situations.

The impact of assistive technology on inclusive education extends beyond the immediate academic settingGraduates of the University of Rwanda's College of Education's Continuous Professional Development Diploma in Special Needs Education (CPD SNE) program were instrumental in promoting inclusive teaching methods in their respective institutions and communities, according to (Nsanzabiga, 2014). These graduates organized local sensitization and training sessions for educators and parents, which sparked community-based innovations such as curricular adjustments, supportive partnerships, and transformations of teaching and learning environments to accommodate learners with diverse needs. This ripple effect underscores the far-reaching influence of assistive technology on fostering inclusive education practices at the grassroots level.

But in addition to these advantages, researchers have also found problems and opportunities for development. (Karangwa et al, 2007) pointed out that in order to better facilitate the integration of students with disabilities, community members need to be more knowledgeable about disabilities and assistive technologies. This view was supported by (Nsanzabiga, 2014), which emphasised the value of continuous training and assistance for students with disabilities as well as the larger school community to effectively use and engage with assistive technology.

The empirical evidence from these research demonstrates the nuanced impacts of assistive technology on the engagement and integration of students with disabilities in inclusive classrooms. Assistive devices not only facilitate access to learning materials and academic activities but also enable students to navigate physical environments, engage in social interactions, and participate in co-curricular activities alongside their peers. Their general well-

being, feeling of community, and personal development are all enhanced by this all-encompassing integration.

However, the successful implementation of assistive technology relies on a comprehensive approach that addresses attitudinal barriers, provides ongoing training and support, and fosters collaboration among all stakeholders. By giving these elements top priority, educational establishments can establish genuinely inclusive classrooms that enable students with disabilities to succeed in their academic, social, and personal lives.

2.3.3 Significance of the Resource Room in Supporting Assistive Technology

The resource room has emerged as a vital component in supporting the use of assistive technology and promoting inclusive education practices within educational institutions. (Nsanzabiga, 2014) study at the University of Rwanda - College of Education highlighted the pivotal role of the resource room in serving as a hub for translating notes and handouts from lecturers into Braille format, thereby enhancing accessibility for visually impaired students. The resource room was equipped with essential materials and devices, such as machines with JAWS software and internet connectivity, enabling students to conduct research, access digital resources independently, and actively engage in their academic pursuits.

(Bolingo, 2019) further underscored the significance of the resource room as a centralized location for accessing and utilizing assistive technology tools. According to the researcher, the University of Rwanda provided assistive equipment to most of its disabled students, and the resource room was the main location for them to get and use these resources in order to meet their academic objectives. This finding highlights the crucial role of the resource room in managing and distributing assistive technology resources within the educational institution.

(Karangwa et al, 2013) emphasized the importance of the resource room in providing specialized support, accommodation, and access to assistive technology for students with disabilities. They noted that resource rooms equipped with essential equipment and materials, such as Braille embossers, computers with internet access, and other assistive devices, empower students to engage fully in their studies and actively participate in the inclusive educational environment. The resource room serves as a hub for promoting inclusivity,

providing tailored accommodations, and fostering academic success for students with diverse needs.

(Nsanzabiga, 2014) further clarified how the resource room helps students with disabilities get accommodations for exams. The resource room staff translated exams into Braille format using specialized equipment and provided access to computers with JAWS software, enabling students to complete their exams using assistive technology. This accommodation ensures equal opportunities and fair assessment practices, promoting inclusivity throughout the academic journey.

Nevertheless, issues with the resource room were also noted. The lack of assistive devices in the resource room relative to the number of students with disabilities was pointed out by (Bolingo, 2019), underscoring the necessity of more funds and resources to boost the variety and quantity of assistive devices available. This view was supported by (Nsanzabiga, 2014), which emphasized the need for more financing and resources to meet the various needs of students with disabilities by increasing the range and accessibility of assistive technology and gadgets.

It was discovered that cooperation and assistance in the resource room were essential to the effective application of inclusive teaching methods. (Nsanzabiga, 2014) stated that in order to guarantee that students with disabilities received the required accommodations and assistance, the resource room personnel collaborated closely with faculty, disability services, and other support staff. Regular meetings were held to discuss individual student needs, adapt course materials, and implement inclusive teaching strategies. This cooperative strategy emphasizes how crucial cooperation, communication, and concerted efforts are to establishing an inclusive classroom that caters to the various requirements of every student.

The empirical evidence from these studies highlights the multifaceted significance of the resource room in supporting assistive technology and promoting inclusive education practices. The resource room acts as a central location for granting access to necessary accommodations, support services, and assistive technology, allowing students with disabilities to actively participate in the inclusive learning environment and pursue their academic goals. However, the effectiveness and sustainability of the resource room are contingent upon adequate resource allocation, funding, and collaborative efforts among different stakeholders.

To make sure that students with disabilities receive the assistance and accommodations they require, educational institutions must place a high priority on creating and maintaining well-equipped resource rooms that encourage cooperation between teachers, staff, and support services. Educational institutions may establish an atmosphere that facilitates the academic achievement and full involvement of students with disabilities in inclusive settings by tackling the issues that have been identified and making investments in the resource room's capabilities.

2.3.4 Challenges Faced by Students and Faculty in Utilizing Assistive Technology

Despite the many advantages of assistive technology in fostering inclusive education, both teachers and students have a number of difficulties when it comes to using these resources efficiently. A study conducted at the University of Rwanda's College of Education (Bolingo, 2019) found that one of the biggest obstacles facing students with visual impairments is the scarcity of computers with the necessary software. Because they were unable to share machines because of sensory loss, students with visual impairments had trouble using assistive technology, which hampered their engagement and academic achievement.

(Nsanzabiga, 2014) research highlighted another critical challenge - the lack of awareness and training among faculty members regarding inclusive education and assistive technology. The study revealed that a staggering 75% of lecturers were not comfortable teaching students with disabilities, and only 25% had received training in facilitating students with diverse needs. A major obstacle to the successful incorporation of assistive technology into teaching and learning processes was the educators' lack of readiness and expertise.

(Karangwa et al, 2007) identified the lack of appropriate educational adjustments and accommodations for learners with disabilities as a significant obstacle. Traditional teaching and learning spaces frequently remained inflexible and unsuitable for inclusive education methods, they observed, even though many students with special educational needs needed access to curricula in the same way as their peers. This mismatch between learner needs and educational environments posed challenges for the effective utilization of assistive technology.

(Adebisi et al, 2015) shed light on broader systemic challenges, such as the lack of trained personnel and inadequate funding, which hindered the effective implementation of assistive

technology in developing countries like Rwanda. They emphasized the need for comprehensive training programs for educators and the allocation of sufficient resources to support the acquisition and maintenance of assistive devices, underscoring the multifaceted nature of the challenges faced.

Researchers and practitioners have put forth several solutions to solve these issues. (Bolingo, 2019) suggested that in order to provide equal access for all students with impairments, the resource room should have additional computers and assistive technology equipment. Establishing an inclusive learning environment requires a focus on the distribution of resources and the growth of assistive technology infrastructure.

(Nsanzabiga, 2014) emphasized the value of frequent training and awareness-raising initiatives for staff members and instructors to improve their understanding of inclusive education and assistive technology. Capacity-building programs and ongoing professional development are crucial for giving teachers the skills they need to manage students with disabilities and incorporate assistive technology into their lesson plans.

According to (Karangwa et al, 2007), flexible curricula and altered teaching and learning environments should be created to accommodate the diverse requirements of students with disabilities. They also highlighted the significance of collaboration among educators, parents, and community members in creating supportive and inclusive learning environments. This holistic approach emphasizes the need for systemic changes, stakeholder engagement, and the creation of inclusive educational ecosystems.

(Adebisi et al, 2015) recommended the establishment of national policies and guidelines for the provision and maintenance of assistive technology in educational settings. They also emphasized the importance of public-private partnerships and collaboration with international organizations to leverage resources and expertise in supporting inclusive education practices. This multi-stakeholder approach acknowledges that addressing the difficulties in properly using assistive technology requires a concerted and cooperative effort.

The difficulties that instructors and students encounter while using assistive technology are numerous and include everything from a lack of funds and structural impediments to a lack of training and resources. Addressing these challenges requires a comprehensive approach that

involves increasing resource allocation, providing ongoing professional development, adapting curricula and learning environments, establishing supportive policies and guidelines, and fostering cross-sectoral collaboration.

By implementing these strategies, educational institutions can create enabling environments that empower students with disabilities to access and effectively utilize assistive technology, while also equipping faculty with the necessary knowledge and skills to facilitate inclusive education practices. A holistic and collaborative approach is crucial to overcoming the identified challenges and ensuring that assistive technology fulfills its transformative potential in promoting inclusive and equitable learning experiences for all students.

2.4 Gap Identification

2.4.1 Limited research in the Rwandan context

While some studies have explored assistive technology and inclusive education practices in Rwanda (Bolingo, 2019), (Karangwa et al, 2013), and (Nsanzabiga, 2014), More thorough and targeted research is required, especially in higher education establishments like the University of Rwanda and its campuses. Understanding the particular difficulties, possibilities, and best practices in Rwanda's higher education system can be gained from this localized study.

2.4.2 Lack of longitudinal studies

Most of the previous research has used cross-sectional approaches, which collect data at a certain moment in time. Longitudinal studies that investigate the long-term effects of assistive technology on the academic performance, social integration, and post-graduation outcomes of students with disabilities in inclusive higher education settings are desperately needed. In addition to providing insight into the long-term impacts of assistive technology interventions, these longitudinal studies can help shape strategies for improving student assistance both during and beyond their academic careers.

2.4.3 Limited focus on specific disabilities

Although some research has focused on assistive technology for students with visual impairments (Karangwa et al, 2013; Bolingo, 2019),little is known about the particular difficulties and assistive technology requirements of students with other kinds of disabilities, including learning disabilities, physical disabilities, and hearing impairments. Students with a range of disabilities have different requirements, and this targeted study can help guide customized interventions and accommodations.

2.4.4 Evaluation of specific assistive devices and technologies

A thorough assessment of the usefulness and efficiency of these tools in promoting the learning and engagement of students with disabilities in higher education settings is lacking, despite the literature review highlighting a variety of assistive devices and technologies utilized in inclusive education. Rigorous evaluations can guide informed decisions regarding the selection, implementation, and optimization of assistive technologies for maximum impact.

2.4.5 Impact on teaching practices

While some studies have explored the contribution of assistive technology to inclusive education (Karangwa et al, 2007) and (Nsanzabiga, 2014), there is a need for more research on the specific pedagogical strategies and adaptations required to effectively integrate assistive technology in higher education class Continuing from there:

2.4.6 Impact on teaching practices

While some studies have explored the contribution of assistive technology to inclusive teaching practices (Karangwa et al, 2007) and (Nsanzabiga, 2014), there is a need for more research on the specific pedagogical strategies and adaptations required to effectively integrate assistive technology in higher education classrooms. Such studies can provide light on the most effective ways to use assistive technology to develop inclusive learning environments that accommodate a range of learning needs and styles, increase student engagement, and encourage active learning.

2.4.7 Perspectives of stakeholders.

Teachers' and students' experiences with disabilities are the main subjects of the literature. Yet, further study is required to examine the viewpoints and experiences of other interested parties, including parents, employers, and the public, about the significance of inclusive education methods and assistive technology in higher education. Incorporating these many viewpoints can yield a more thorough comprehension of the difficulties, prospects, and possible influence of assistive technology in equipping students with disabilities for prosperous career transitions and engaged engagement in society.

2.4.8 Socio-cultural and attitudinal factors

While some studies have acknowledged the role of societal attitudes and cultural factors in inclusive education (Karangwa et al, 2007) there is a need for a more in-depth exploration of how these factors influence the implementation and success of assistive technology initiatives in the Rwandan context. Understanding the socio-cultural dynamics and addressing attitudinal barriers can inform strategies for fostering an inclusive mindset and creating supportive environments for the effective utilization of assistive technology.

2.4.9 Comparative studies

Conducting comparative studies with other higher education institutions, both within Rwanda and internationally, can provide valuable insights into best practices, innovations, and challenges in supplying and using assistive technology for inclusive education. Such comparative research can facilitate knowledge-sharing, identify transferable strategies, and promote collaboration among institutions to advance inclusive education practices and assistive technology implementation.

By focusing research efforts on filling these gaps, we can gain a more thorough understanding of how assistive technology can support inclusive higher education in Rwanda and elsewhere. Research of this kind can help formulate evidence-based policies, allocate resources, and create customized plans to help kids with disabilities succeed academically, integrate socially, and

generally. Researchers and practitioners may work together to establish learning environments that are truly inclusive and fair, enabling students with disabilities to realize their full potential and fully engage in all facets of society and higher education, by filling in these knowledge gaps.

2.4.10 Operational Definitions

Assistive Technology (AT): Any tool, software, or gadget used to improve the functioning abilities of people with impairments is referred to as assistive technology. The equipment and tools that students with disabilities use to access the curriculum, take part in learning activities, and interact with the educational environment at the College of Education Nyagatare Campus are particularly referred to as assistive technology in the context of this study.

Inclusive Education: Inclusive education is a strategy that seeks to guarantee all students, despite of their various needs and abilities, equal access, participation, and achievement. It entails developing classrooms that are sensitive to each student's unique requirements, offering the assistance and adjustments that they require, and encouraging a feeling of acceptance and belonging among educators.

Students with Disabilities (SWD): In this study, students with disabilities refer to individuals who are enrolled at the College of Education Nyagatare Campus and have a physical, sensory, cognitive, or learning impairment that substantially limits one or more major life activities. For these students to have equal access to and participation in educational activities with their peers, they need special accommodations, support, or assistive technology.

Resource Room: The resource room is a designated space within the College of Education Nyagatare Campus that provides specialized support, accommodations, and access to assistive technology for students with disabilities. It serves as a central hub for students to receive individualized assistance, use assistive devices, and engage in learning activities tailored to their specific needs.

Accessibility: relates to how well information, communication, technology, and the physical environment are planned and made accessible to allow people with disabilities to fully participate in and use educational activities. The accessibility of the resource room for students with disabilities and the availability and use of assistive technology are the specific areas of focus in this study.

Integration: In this study, "integration" refers to the process of integrating students with disabilities into the social and academic facets of the school community. It entails establishing an inclusive setting where students with disabilities can engage socially and participate in extracurricular activities and school activities with their peers without impairments.

Challenges: The term challenges describes the impediments, hurdles, or difficulties that faculty members and students with disabilities have when attempting to properly use assistive technology. These difficulties could include a lack of assistive technology, a lack of skills and understanding in its use, a lack of maintenance and repair services, and attitudes that are intolerant of disability and inclusion.

Strategies: In inclusive education settings, strategies are methods, techniques, or approaches that can be used to overcome obstacles and improve the efficient use of assistive technology. These tactics could involve offering staff and students professional development and training, expanding the accessibility and availability of assistive technology, setting up efficient maintenance and repair procedures, and encouraging inclusive and disability-positive attitudes.

CHAPTER THREE
METHODOLOGY

3.1 Introduction

This chapter outlines the research design and methodology used in this study to examine the role that assistive technology plays in the University of Rwanda's inclusive education implementation, with a particular emphasis on the Nyagatare Campus of the College of Education. The present chapter provides an overview of the research design, study site, target population, sample size and sampling techniques, research instruments, data collection procedures, data processing techniques, and ethical considerations. The objective is to give a thorough explanation of the research procedure and the justification for the methodological strategies that were selected.

3.2 Research Design

This study is intended to be exploratory in nature, using both quantitative and qualitative methods to collect detailed information on the role that assistive technology plays in inclusive teaching methods at the University of Rwanda. This design makes it possible to triangulate data from several sources, which improves the conclusions' validity and dependability. (Creeswell and John W, 2011).

A survey questionnaire was used to gather information from students with disabilities about their experiences and opinions of using assistive technology in their academic and learning activities as part of the quantitative component. The survey had closed-ended questions that produced numerical data for statistical evaluation.

Using semi-structured interviews, the qualitative component included teachers and staff members who assist students with impairments. In-depth information on their opinions on how assistive technology may support inclusive teaching methods, the difficulties they face, and the tactics they use to improve its efficient use was intended to be obtained through the interviews.

Additionally, observations of the resource room and inclusive practices at the University of Rwanda Nyagatare Campus were conducted. The observations provide firsthand knowledge of the inclusive learning environment as well as the accessibility, availability, and use of assistive technology resources.

3.3 Study Setting

The research was carried out at the College of Education Nyagatare Campus, one of the campuses of the University of Rwanda. The college is in the Eastern Province of Rwanda and offers programs in Education. The choice of this specific location was based on the presence of students with disabilities enrolled in various programs at the college and the existence of a resource room and inclusive education practices.

3.4 Target Population

The target population for this study consisted of three main groups within the College of Education Nyagatare Campus:

1. Students with disabilities: This group included all students with disabilities enrolled in programs within the college. These students had a variety of difficulties, including learning problems, physical disabilities, hearing impairments, and vision impairments. They were the main recipients of inclusive teaching methods and assistive technologies.
2. Faculty members: Academic staff members that taught and assisted college students with impairments made up this group. They were essential in putting inclusive education into reality and making it easier for students to use assistive technology in their lessons.
3. Support staff: This group comprised non-academic employees who work with students with disabilities in the college, including resource room workers, disability services coordinators, and technicians who look after and fix assistive technology.

The target population is a representation of the main parties directly involved in the adoption of inclusive education practices and the use of assistive technology within the college of Education Nyagatare Campus.

Table 1 The target population

Category	Male	Female	Total
Deans	2	0	2
Heads of departments	3	0	3
Resource room manager	1	0	1
Lecturers	7	3	10
Students who use assistive devices	8	12	20
Students who do not use assistive devices	16	14	30
None teaching staff	2	3	5
Total	39	32	71

3.5 Sample Size and Sampling Techniques

The number of students with disabilities registered at the College of Education Nyagatare Campus as well as the availability of instructors and support personnel engaged in inclusive teaching methods were taken into consideration while determining the sample size for this study.For the quantitative component of the study, a census sampling technique was employed, aiming to include all students with disabilities within the college who were willing to participate in the survey. This approach ensured comprehensive representation and minimized sampling bias. The exact sample size depended on the total number of students with disabilities enrolled during the data collection period.

For the qualitative component of the study, purposive sampling was used to select faculty members and support staff within the college for semi-structured interviews. Purposive sampling allowed for the intentional selection of participants who had relevant knowledge and experience in assistive technology and inclusive education practices (Patton, M. Q., 2015). Data saturation, which happens when no new themes or insights emerge from additional interviews, was used to determine the interview sample size. (Guest, G. etal, 2006) Typically,

a sample size of 8 to 12 interviews is considered sufficient to reach data saturation in qualitative research within a specific faculty (Creeswell and John W, 2011).

Table 2 the tentative sample size and distribution for the study

Category	Male	Female	Total
Deans	2	0	**2**
Heads of departments	3	0	**3**
Resource room manager	1	0	**1**
Lecturers	7	3	**10**
Students who use assistive devices	8	12	**20**
Students who do not use assistive devices	16	14	**30**
None teaching staff	2	3	**5**
Total	**39**	**32**	71

The actual sample size may vary based on the total number of students with disabilities enrolled in education programs within the Faculty of Education and the availability of faculty members and support staff during the data collection period.

3.6 Research Instruments

The study employed three research instruments: a questionnaire, semi-structured interviews, and an observation checklist.

1. **Questionnaire:** To gather quantifiable information from students with disabilities on their experiences and opinions of using assistive technology in their academic and learning activities, a structured questionnaire was created. The questionnaire allowed for standardized data collection and analysis because it included closed-ended questions with predefined response alternatives. The questionnaire was made to be self-administered, with straightforward wording and instructions to make it easy for students with disabilities to understand and complete. In order to accommodate all forms of

disability, the questionnaire was also made available in accessible formats, such as electronic versions or big print.

2. **Semi-structured interviews:** Qualitative information on faculty and support staff members' opinions and experiences with assistive technology and inclusive teaching methods was gathered through semi-structured interviews. An interview guide was created that outlined the primary subjects and inquiries to be addressed in the interviews. To enable participants to express their thoughts and experiences in their own terms, the interview guide featured open-ended questions. The interviews were done in person, in a quiet, relaxed environment, to maintain confidentiality and promote candid answers. With the participants' consent, audio recordings of the interviews were made to ensure correct transcription and analysis.
3. **Observation checklist:** To direct the methodical observation of the resource room and inclusive practices at the College of Education Nyagatare Campus, an observation checklist was created. An organized method for documenting particular elements of the physical setting, assistive technology tools, and inclusive practices was the observation checklist. With prior authorization from the college administration, the researcher carried out the observations during regular school hours. To record the findings, the researcher gathered thorough field notes and pictures (without naming specific people).

3.7 Data Collection Procedures

The data collection process involved the following steps:

1. Obtaining research approval (July 2023): The School of Inclusive and Special Needs Education working under the college of Education at the University of Rwanda provided ethical approval before data collection, and the management of the College of Education Nyagatare Campus authorized the study's conduct.
2. Participant recruitment: Students with disabilities, instructors, and support personnel were identified and invited to participate in the study by the researcher in coordination with the college administration and disability services office. Everyone who took part gave their informed consent after being informed about the study's goals, methods, and voluntary nature.

3. Questionnaire administration (August 2023-November2023): During specified sessions or via the disability services office, the questionnaires were given to students with disabilities. The students were given ample time to do the surveys and were given clear instructions. The researcher gathered completed questionnaires from participants.
4. Conducting interviews (October2023-November2023): Faculty and support staff interviews were arranged at times and places that worked for both parties. The interview guide was followed for conducting the in-person individual interviews. To document important details and observations, the researcher made notes during the interviews and audio-recorded them.
5. Observations (from End of July 2023 to December 2023): During regular school hours, the resource room and inclusive practices were observed. The checklist for observations acted as a guide, and the researcher documented the findings by taking thorough field notes and noting important details.
6. Data storage and confidentiality: Transcripts, observation notes, interview recordings, questionnaires, and other data were all safely saved and only the researcher had access to them. The data was cleansed of any identifying information, and the identity of the participants were kept private.

3.8 Validity and Reliability

Several actions were made to guarantee the reliability and validity of the research tools:

1. **Content validity:** Based on a thorough analysis of the literature and the study's conceptual framework, the questionnaire, interview guide, and observation checklist were created. To evaluate the research tools' comprehensiveness, clarity, and relevance, the supervisor and other inclusive education specialists provided assistance. Their suggestions were taken into consideration when modifying the tools to make sure they adequately addressed the key ideas and research topics.

2. **Face validity:** To evaluate the questionnaire's appropriateness, comprehensibility, and clarity, a small group of students with disabilities participated in a pilot study. The

questionnaire was further improved based on feedback from the pilot study to make sure participants could understand it.

3. **Reliability:** To ascertain the internal consistency of the items, Cronbach's alpha was used to evaluate the questionnaire's reliability. With an overall dependability rating of 0.78, the instrument was deemed dependable and suitable for gathering the necessary data for the research.

3.9 Data Analysis

Both quantitative and qualitative methods were used in the data analysis, which was consistent with the exploratory research design.

Quantitative data analysis:

- A statistical software application was used to enter the information gathered from the surveys (SPSS).
- To summarize the replies and spot trends in the data, descriptive statistics such as means, frequencies, and percentages were computed.
- To visually depict the findings, the quantitative results were displayed using tables, graphs, and charts.

Qualitative data analysis:

- The audio-recorded interviews were transcribed verbatim, and the transcripts were reviewed for accuracy.
- Using NVivo software, thematic analysis was performed on the observation field notes and interview transcripts, adhering to the procedures described by (Braun, V.,Clarke V, 2006).
- The investigator became acquainted with the information by going over the notes and transcripts several times.
- The themes were reviewed and refined to ensure coherence and consistency across the dataset.

- The final themes were defined and named, providing a clear and concise representation of the qualitative findings.
- The qualitative results were presented using rich descriptions, direct quotes from participants, and illustrative examples.

Integration of quantitative and qualitative findings:

- The significance of assistive technology in inclusive education practices was thoroughly understood through the integration of quantitative and qualitative data.
- The validity and believability of the results were improved by examining the convergence or divergence of findings from various data sources.
- The conceptual framework, research questions, and body of existing literature were taken into consideration when analysing the integrated findings.

3.10 Ethical Considerations

Throughout the whole research procedure, ethical considerations were given top priority:

1. Informed consent: The study's goals, methods, possible risks and rewards, and participant rights were all explained in detail to each participant. Prior to the collection of data, each participant provided written informed consent.
2. Voluntary participation: The study was completely voluntary, and participants were free to leave at any moment without facing any repercussions. To guarantee their free and willing involvement, individuals were not subjected to undue influence or compulsion.
3. Confidentiality and anonymity: All identifying information was eliminated from the data, and participant identities were kept private. To preserve their privacy, participants' names were replaced with codes or pseudonyms. The researcher was the only one with secure access to the acquired data.
4. Protection of vulnerable populations: The protection of students with disabilities, who can be viewed as a vulnerable group, was given particular attention. Throughout the entire research procedure, the researcher made sure that the participants' well-being was given priority and that the study did not cause them any harm or discomfort.

5. Respect for autonomy: Participants' independence and ability to make decisions were valued. They received enough information to enable them to decide whether or not to participate in the study. They were not under any obligation to participate or provide information that they did not feel comfortable sharing, and their choices and preferences were respected.
6. Beneficence and non-maleficence: The goal of the research was to produce information that would help students with impairments and advance inclusive teaching methods. The investigator made certain that the study would not negatively impact the participants or the community at large.
7. Dissemination of findings: The results of the study will be shared in a responsible, truthful, and transparent way. The researcher will make sure that the results are communicated in a way that the participants and the general public can easily access and comprehend.
8. The ethical principles presented in the Declaration of Helsinki (World Medical Association, 2013) and the ethical standards for research involving human subjects supplied by the University of Rwanda and pertinent professional associations served as the foundation for the ethical considerations.

CHAPTER FOUR
DATA ANALYSIS, PRESENTATION, AND INTERPRETATION OF FINDINGS

4.0 Introduction

This chapter summarizes the research findings on the value of assistive technology in implementing inclusive education at the University of Rwanda, with a particular emphasis on the Nyagatare Campus of the College of Education. This chapter aims to analyze and explain the data collected from surveys administered to students with disabilities, faculty and staff interviews, and observations of the resource room and inclusive practices.

The chapter is divided into multiple major sections that correspond to the topics and goals of the research. The study's response rate is first looked at, along with possible causes and the consequences for the representativeness of the results. Following that, a compilation of the professor's and students' demographic information is made.

The subsequent sections present the key findings related to each research objective:

1. The types of assistive devices used by students with disabilities
2. The use of assistive technology in integration and participation in co-curricular activities
3. The significance of the resource room in supporting assistive technology and inclusive education.

The quantitative findings from the student surveys are displayed in each area using descriptive statistics like percentages and frequencies. Qualitative insights from the researcher observations and faculty interviews supplement these findings. The study's conceptual framework and prior research are taken into account while interpreting the results.

The chapter concludes with a summary of the main findings and their implications for policy and practice in inclusive higher educationIn the last chapter, recommendations for improving the availability and use of assistive technology are presented, laying the groundwork for additional discussion.

4.1 Response Rate

The response rate of the study is first analyzed, followed by possible contributing factors and the consequences for the representativeness of the results. After that, the professor's and students' demographic information is gathered.

There was a 100% response rate in this study because all 22 of the students with disabilities who were enrolled at the College of Education Nyagatare Campus throughout the data collection period filled out the questionnaire. Many reasons contribute to this extraordinarily high involvement rate.

- The researcher collaborated closely with the disability services office to identify and invite all eligible students to participate.
- The questionnaires were administered in person by the researcher, allowing for clarification of instructions and assistance as needed.
- The study's focus on assistive technology and inclusive education was likely of high relevance and interest to students with disabilities.

Additionally, all 8 targeted faculty members and the resource room manager participated in the interviews, resulting in a 100% response rate for the qualitative component of the study. The full participation of these key informants enables a comprehensive understanding of their perspectives and experiences.

The high response rates achieved in this study are a strength, as they suggest minimal non-response bias and enhance the validity of the findings. However, it is important to note that the small target population and the specific context of a single college campus limit the broader generalizability of the results. Nonetheless, the in-depth insights generated can inform inclusive education practices and assistive technology provision in similar higher education settings in Rwanda and beyond.

4.2 Demographic Data Students

The demographic data of the students who participated in this study is shown in this section. Both students with and without disabilities are the subject of the information.

4.2.1 Students with disabilities.

Table 3 Age of learners with disabilities

Age	**frequency**	**percentages**
18-21	2	9%
21-25	11	50%
26-30	7	32%
30-above	1	5%
Total	22	100%

The table above indicates that 9% of the respondents were aged between 18 and 21, 50% have 21-25 years, 32% have between 26-30 years, and 5% have 30 and above years.

Table 4 gender of students with disabilities

Gender	**Frequency**	**Percentages**
male	15	68%
female	7	32%

Total	22	100%

This table is specifying that 68% of students with disabilities studying at the University of Rwanda College of Education are male students while 32 % are female students.

Table 5 Levels for learners with disabilities

Level of study	**Frequency**	**Percentages**
Level one	12	55%
Two	4	18%
Three	6	27%
Four	0	0%
Total	22	100%

The information in the table above shows that 55% of students with disabilities are studying at level one, 18% study at level two, 27% study at level three, and during the research period there was no student in level four.

This information shows that there has been much done to unroll more students with disabilities in recent years as 55% are first year the university.

Table 6 Faculties of learners with disabilities

Faculty of learners with disabilities	**Frequency**	**Percentages**

Sciences	0	0%
Art, Humanities, and languages	22	100%
Total	22	100%

From the table above, it is evident that all students at the university find themselves in Art, Humanities, and languages departments other than science departments.

4.2.2 Students without disabilities

Table 7 ages of students without disability but studying with those with disabilities

Age	**frequency**	**percentages**
18-21	8	30%
21-25	6	22%
26-30	5	19%
30-above	8	30%
Total	27	100%

Table 8 levels of students without disabilities

Level	**Frequency**	**Percentages**
level one	9	33%
two	3	11%
three	15	56%
four	0	0%

Total	27	100%

Table 9 The gender of students without disabilities who study together with those with disabilities

Gender	Frequency	Percentages
male	16	59%
female	11	41%
Total	27	100%

4.3 Demographic Data of Lecturers.

Table 10 Gender and ages of lecturers

Age	Female		Male		Total	Percentages
	Frequency	**Percentages**	**Frequency**	**Percentages**		
25-35	2	25.0%	0	0.0%	2	25.0%
36-40	1	12.5%	4	50.0%	5	62.5%
41-50	0	0.0%		0.0%	0	0.0%
51-above	0	0.0%	1	12.5%	1	12.5%
Total	**3**	**37.5%**	**5**	**62.5%**	**8**	**100.0%**

Table 11 Teaching areas(Faculties) of lecturers

Teaching area	frequency	percentages
Sciences	1	12.5%
Arts and Humanities	4	50.0%
Both	3	37.5%
Total	8	100%

Table 12 Teaching experience of lecturers

Teaching experience	Frequency	percentages
1 year	2	25.0%
2 years	1	12.5%
3years	5	62.5%
5years and above	0	0%
Total	8	100%

4.4 Results Presentation and Analysis

The study examined the use of assistive technology in implementing inclusive education at the University of Rwanda, with a focus on the Nyagatare Campus of the College of Education. The research data presentation, analysis, and findings discussion are covered in this section. The results are shown in accordance with the particular goals of the study.

4.4.1 Types of Assistive Devices Used by Students with Disabilities

The study revealed that students with disabilities at the College of Education Nyagatare Campus utilize a diverse range of assistive devices to support their learning and participation in inclusive settings. Table 2 presents the different types of assistive devices used by students with disabilities.

Table 13 Assistive Devices Used by Students with Disabilities

Device Name	Frequency	Percentage
Braille materials	12	54.5%
Perkins brailler	10	45.5%
Victor Reader	8	36.4%
Slate and stylus	6	27.3%
White cane	15	68.2%
Magnifying glass	2	9.1%
Screen magnifier	1	4.5%
Telescope	1	4.5%
Crutches	1	4.5%
Prosthetic devices	1	4.5%
Smartphone	2	9.1%
Total	22	100%

The most commonly used assistive devices among students with visual impairments were white canes (68.2%), Braille materials (54.5%), Perkins braillers (45.5%), Victor Reader (36.4%), and slate and stylus (27.3%). These devices assist students in mobility, reading, writing, and accessing information in various formats.

> *One student with visual impairment shared their experience:*
> *"I heavily rely on my white cane for navigating the campus and getting to my classes independently. Braille materials and the Perkins Brailler are essential for accessing course content and taking notes during lectures. The Victor Reader allows me to listen to audio recordings of textbooks and supplementary materials, which has greatly enhanced my learning experience." (Student 1, visual impairment)*

> *A student with low vision expressed the significance of these devices:*

"The magnifying glass and screen magnifier have been instrumental in allowing me to read printed handouts and view content on the computer screen. Without these devices, I would struggle to keep up with the lectures and assignments." (Student 2, low vision)

A student with a physical disability shared their experience:
"My crutches are essential for me to move around the campus and attend classes independently. Without them, I would face significant challenges in accessing the learning environment and participating fully in academic activities." (Student 3, physical disability)

One student highlighted the benefits of using a smartphone as an assistive device:
"My smartphone has been a game-changer for me. I use it to record lectures, take pictures of slides, and access online resources. The accessibility features, such as text-to-speech and voice commands, have made it much easier for me to engage with the course content." (Student 4, visual impairment)

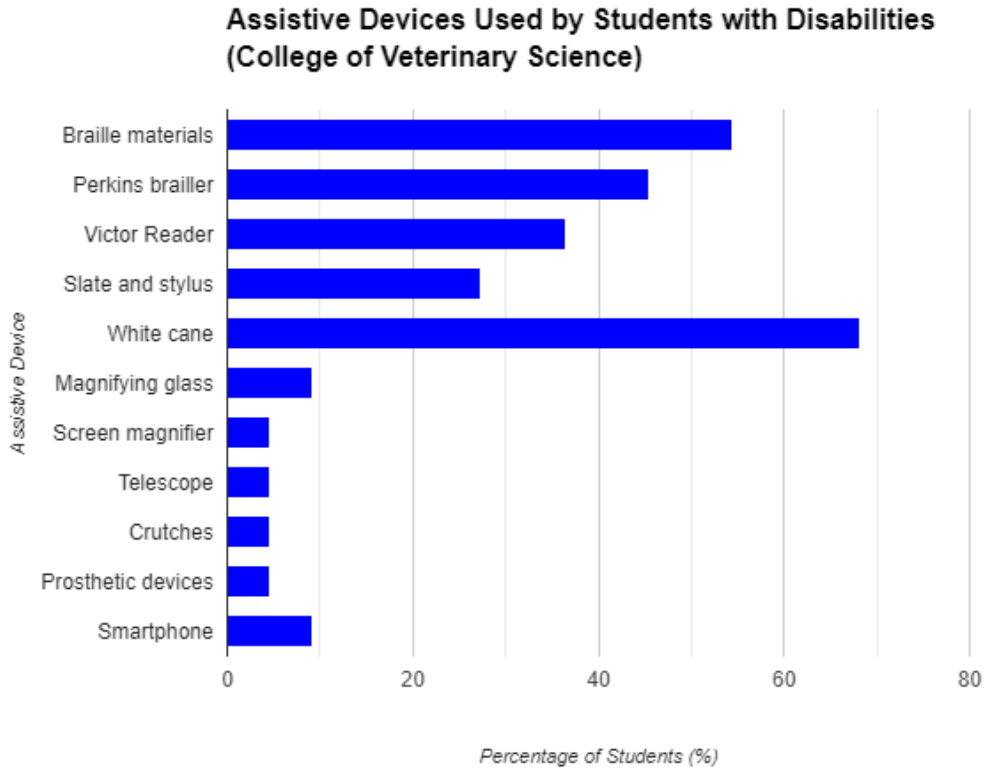

Figure 1 Bar graph depicting the percentage of students using each type of assistive device

Table 14 Note-taking Strategies Used by Students with Visual Impairments

Method	Frequency (n=22)	Percentage
Braille note-taker	2	9.1%
Audio recording	14	63.6%
Relying on peer notes	6	27.3%
Total	22	100%

Most of students with visual impairments (63.6%) relied on audio recording to capture lectures and important discussions for later reviews. Audio recording allows students to listen to the lecture content multiple times and take notes at their own pace.

One student shared their experience:
"Audio recording has been a lifesaver for me. I use my smartphone to record lectures and then I listen to them later and take notes using my Braille note-taker. This way, I can ensure that I don't miss any important information and can review the content as many times as I need." (Student 5, visual impairment)

A student using a Braille note-taker shared their perspective:
"I prefer using my Braille note-taker during lectures because it allows me to actively take notes in real-time. I can quickly jot down key points and ideas, and then review and expand on them later. It gives me a sense of independence and control over my learning." (Student 6, visual impairment)

One student expressed the challenges faced:
"Due to the lack of access to a Braille note-taker or other assistive devices, I often have to rely on my peers to share their notes with me. While I appreciate their support, it can be frustrating at times because I don't have control over the quality and completeness of the notes." (Student 7, visual impairment)

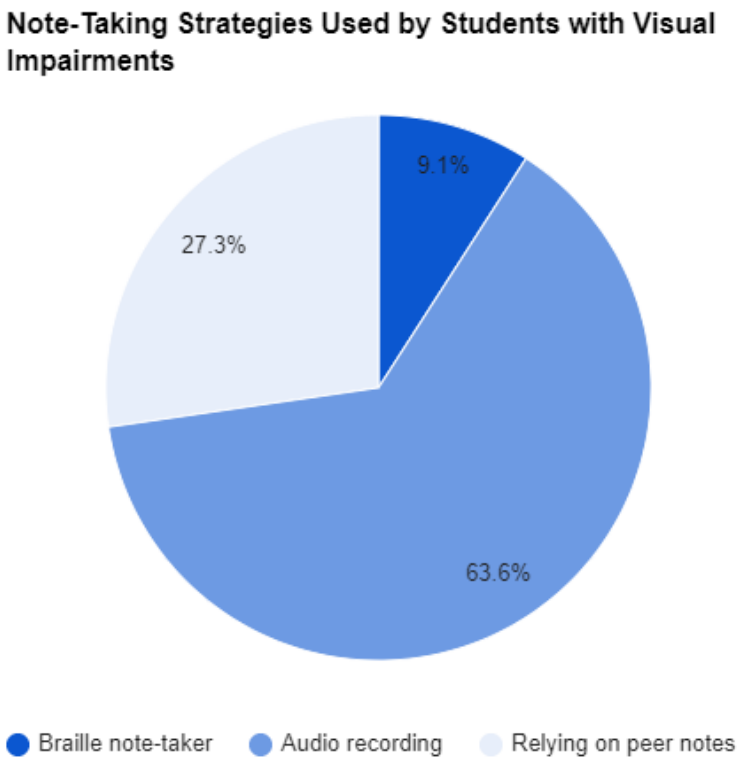

Figure 2 Pie chart illustrating the percentage of students using each note-taking strategy

Assistive Software and Technologies

One student shared their experience:
"I heavily rely on NVDA to access my course materials, research articles, and online resources. It allows me to navigate through websites, read documents, and complete assignments independently. Without screen reader software, I would face significant barriers in accessing digital content." (Student 8, visual impairment)

A student using text-to-speech software shared their perspective:
"I find text-to-speech software extremely helpful in managing the large volume of reading materials for my courses. I can listen to the text while following along with the printed version, which enhances my comprehension and retention of the information." (Student 9, learning disability)

To compose assignments and take notes, several students with impairments used dictation software, which enables users to input text through voice instructions. Students can overcome physical or motor difficulties in writing by using dictation software, which also gives them another way to express their ideas (Hux, 2010).

> *A student using dictation software shared their experience:*
> *"Due to my physical disability, typing for extended periods can be challenging and painful. Dictation software has been a game-changer for me. I can dictate my thoughts and ideas, and the software converts them into written text. It has greatly improved my efficiency and reduced the physical strain of writing." (Student 10, physical disability)*

Some students used optical character recognition (OCR) software to access printed materials in a digital format, which changes printed text into digital text. OCR technology makes printed papers more accessible by allowing students to scan them and turn them into editable and searchable digital files (Gharat et al, 2015) and (Vijayarani et al, 2015).

> *A student using OCR software shared their perspective:*
> *"OCR software has been invaluable in helping me access printed course materials and handouts. I can scan the documents and convert them into digital text, which I can then read using my screen reader or magnify as needed. It has greatly enhanced my ability to access and engage with the course content." (Student 11, visual impairment)*

Discussion

This result is consistent with earlier studies that emphasize the value of assistive technology and Braille literacy for students with visual impairments in inclusive educational environments. (Sheri Wells& Alyssa , 2020; Schroeder, 2018). Braille materials and devices enable students to access written information independently and actively participate in classroom activities alongside their sighted peers.

Magnifying glasses, screen magnifiers, and telescopes were used by a smaller proportion of students with low vision to enhance their ability to read printed materials and access information on computers.

In addition to physical devices, the study found that students with disabilities also utilize various assistive software and technologies to facilitate their learning. In order to improve the usability and accessibility of digital resources and material for students with disabilities,

assistive software and technologies are essential (Ghaleb A,, 2014) To access digital content and navigate computer programs, students with visual impairments frequently employed screen reader software, such as Voiceover and NVDA (Nonvisual Desktop Access). Screen readers allow students to independently interact with computers and access digital resources by translating on-screen content into speech or Braille output (Sushil, 2014).

The use of magnification devices and software has been widely documented in literature as an effective means of supporting students with low vision in inclusive classrooms (Smith et al, 2014). These devices enhance visual access to educational materials and enable students to engage in the curriculum more effectively.

In order to facilitate their mobility and involvement in academic activities, students with physical limitations reported used mobility aids including crutches (4.5%) and prosthetic devices (4.5%). These gadgets help students find their way across campus and reach various classrooms.

Research on the kinds of assistive equipment used by students with disabilities at the Nyagatare Campus of the College of Education is in line with earlier studies carried out in inclusive educational environments. A study by (Alnahdi, 2014) found that students with visual impairments commonly used Braille materials, screen readers, and magnification devices, while students with physical disabilities relied on mobility aids and adaptive equipment. Similarly, a study by (Eliana A, et al, 2019) highlighted the increasing use of smartphones as assistive devices among students with disabilities in higher education.

The diversity of assistive devices used by students with disabilities at the College of Education Nyagatare Campus reflects the heterogeneity of their needs and preferences.

Higher education institutions need to recognize and accommodate this diversity by providing a range of assistive devices and support services to ensure equal access and participation for all students as revealed by the study conducted by (Paseka A. etal, 2020)

The provision of mobility aids and adaptive equipment for students with physical disabilities is crucial for promoting their inclusion and participation in higher education settings (Belch, 2004; Stumbo, 2009). These devices enable students to overcome physical barriers and engage in learning activities alongside their peers. Smartphones were used by a small percentage of students (9.1%) as an assistive device for recording lectures and accessing information. With the advancements in mobile technology, smartphones have become increasingly prevalent as

assistive tools for students with disabilities (Bouck et al., 2019; Darcy, S. at al, 2016) The built-in accessibility features and apps available on smartphones provide students with a range of functionalities, such as text-to-speech, voice recording, and magnification, which enhance their learning experiences.

In addition to the use of assistive devices, the study explored the strategies employed by students with visual impairments to take notes during lectures. Note-taking is a crucial aspect of the learning process, and students with visual impairments often face challenges in accessing and recording information presented in class (Maurya, 2018). Table 3 presents the different methods used by these students.

Students used text-to-speech software, which translates digital text into spoken words, to listen to electronic documents and learning resources. For children with visual impairments or reading challenges in particular, text-to-speech technology offers another way to obtain written information. (Draffan, 2007).

The importance of Braille literacy and the use of Braille note-takers for students with visual impairments has been emphasized in previous research (Schroeder, 2018). Braille note-takers provide students with a means of independently recording and accessing information, promoting their active participation in the learning process.
However, 27.3% of students reported relying on their peers' notes due to the limited availability of assistive devices. These students often depend on their sighted classmates to share their notes and provide them with a summary of the lecture content.

The reliance on peer notes as a primary means of accessing lecture content can be problematic, as it may not provide students with the same level of detail and comprehension as self-generated notes (Adebisi et al, 2015). Higher education institutions must ensure that students with visual impairments have access to appropriate assistive devices and support services to enable independent note-taking and equal participation in the learning process.

The resource room manager emphasized the importance of assistive software and technologies in promoting inclusive education:

"Assistive software and technologies play a crucial role in leveling the playing field for students with disabilities. They provide alternative means of accessing information, expressing ideas, and engaging with the learning process. Our institution is committed to providing training and support to ensure that students can effectively utilize these tools to maximize their learning potential." (Resource Room Manager)

The findings regarding the use of assistive software and technologies at the College of Education Nyagatare Campus align with previous research in the field. Studies have consistently highlighted the benefits of screen readers, text-to-speech software, dictation software, and OCR technology in enhancing the accessibility and usability of digital content for students with disabilities ((Alper & Raharinirina, 2006), (Fichten et al, 2009) and (Svendsen, 2017) .

It is important for higher education institutions to recognize the significance of assistive software and technologies in promoting inclusive education and to provide the necessary infrastructure, training, and support to ensure their effective utilization (Burgstahler , 2015)and (Roberts et al, 2011). This includes providing access to licensed software, offering training workshops for students and faculty, and ensuring the compatibility of digital resources with assistive technologies.

Integration of Assistive Devices in Teaching and Learning

The integration of assistive devices in teaching and learning practices is crucial for creating an inclusive educational environment that caters to the diverse needs of students with disabilities. The study explored the perspectives of faculty members and the resource room manager regarding the integration of assistive devices in classroom activities and assessments.

Faculty members pledged to integrate assistive technology into their teaching methods and meet the requirements of students with disabilities.

> *One lecturer shared their experience:*
>
> *"I always strive to make my lectures accessible to all students, including those with disabilities. I provide electronic copies of my lecture notes and handouts in advance, so students can access them using their assistive devices. I also encourage the use of*

assistive technology during class discussions and group activities to ensure equal participation." (Lecturer 1)

Another faculty member highlighted the importance of collaborating with the resource room manager to support the integration of assistive devices:

"I work closely with the resource room manager to understand the specific needs of my students with disabilities and to ensure that they have access to the necessary assistive devices. We discuss strategies for adapting course materials and assessments to accommodate different learning styles and abilities." (Lecturer 2)

The resource room manager played a key role in facilitating the integration of assistive devices in teaching and learning practices. They provided guidance and support to faculty members in selecting and implementing appropriate assistive technologies in their classrooms.

The resource room manager shared their perspective:

"I collaborate with faculty members to identify the assistive devices and technologies that would best support the learning needs of individual students. I provide training and technical support to ensure that both students and faculty are comfortable and proficient in using these tools. It's a continuous process of evaluation, adaptation, and improvement to create an inclusive learning environment." (Resource Room Manager)

Discussion

Observations of classroom practices and assessments revealed the use of various assistive devices and accommodations to support students with disabilities. For example, students with visual impairments were provided with Braille or electronic versions of course materials, and they were allowed to use Braille note-takers or laptops with screen reader software during lectures and exams. Students with physical disabilities were given access to adaptive furniture and assistive devices to facilitate their participation in classroom activities.

Assistive device integration into teaching and learning practices at the College of Education Nyagatare Campus is in line with Universal Design for Learning (UDL) principles, which stress the value of offering a variety of representational, expressive, and engaging mediums to meet the various needs of students (CAST, 2018) and (Rose et al, 2002) . All students, not just those with disabilities, gain from the more accessible and inclusive learning environment that faculty members create by implementing assistive technologies and accommodations. (Burgstahler , 2015) and (Tobin, 2014).

Nevertheless, difficulties were also found when incorporating assistive technology into instructional strategies. There is a need for continual professional development and training because several faculty members expressed a lack of understanding and proficiency in using assistive technologies (Lombardi,E, 2019; Jessica L,, 2019). Additionally, the compatibility of certain course materials and digital resources with assistive technologies was a concern, emphasizing the importance of ensuring accessibility in the design and selection of educational content (Cory, 2011) and (Moriña at al, 2015).

These findings align with previous research documenting the types of assistive devices used by students with visual impairments, as highlighted in the literature review:

Numerous studies have documented the various types of assistive devices used by students with disabilities in inclusive education settings. (Bolingo, 2019)found that students with visual impairments utilized assistive tools such as Braille machines, slate and stylus, Victor Reader, and white canes. According to (Karangwa et al, 2013) students with visual impairments in Rwanda also use Braille materials, Perkins Braillers, Victor Readers, slates and styluses, and white canes.

The use of magnifying glasses, screen magnifiers, and telescopes by a smaller proportion of students with low vision is also consistent with the literature, which mentions the use of such devices to enhance visual access to printed materials and computer screens (Rose et al, 2002) and (Smith et al, 2014).

Conclusion

At the College of Education Nyagatare Campus, the results of objective one show how important assistive technology is to promoting the inclusion and learning of students with disabilities. The study revealed a diverse range of assistive devices used by students, including Braille materials, Perkins Braillers, Victor Readers, slate and stylus, white canes, magnifying glasses, screen magnifiers, telescopes, crutches, prosthetic devices, and smartphones. These devices enable students to access the curriculum, participate in academic activities, and navigate the campus environment independently.

The study also highlighted how assistive technology and software, such as text-to-speech software, screen readers, dictation software, and optical character recognition (OCR) software, can help students with disabilities access and use digital information more easily. When faculty and the resource room management promote the incorporation of assistive devices into teaching and learning processes, an inclusive learning environment is created that meets the various requirements of students.

However, issues with assistive device accessibility and availability, the requirement for continuous staff and student training and support, and the compatibility of course materials with accessible technologies were noted. Higher education institutions, instructors, support services, and students themselves must work together to address these issues.

The results of this study add to the expanding corpus of research on assistive technology and inclusive education in higher education environments. They emphasize that in order to provide equal access and participation for students with disabilities, educational institutions must offer a variety of assistive technology and support services. Policy choices, resource distribution, and the creation of inclusive practices at the College of Education Nyagatare Campus and elsewhere can all benefit from the knowledge gathered from this study.

More research is recommended to look at how assistive technology affects students with disabilities' academic performance and post-graduation results over the long run. It's also important to look at how well various training and support methods work for instructors and students who use assistive technology.

In summary, the results of the first objective highlight the critical role that assistive technology plays in advancing inclusive education and enabling students with disabilities to reach their greatest academic potential. This research adds to the continuous endeavors to establish inclusive and accessible higher education settings by offering a thorough grasp of the kinds of

assistive technologies utilized, their effects on learning and engagement, and the experiences of instructors and students.

4.4.2 The use of Assistive Technology on Integration and Participation

The study investigated how assistive technology affected University of Rwanda students with disabilities' engagement in extracurricular activities and absorption into the school community. The results show how important assistive technology is for encouraging students with disabilities to participate in and be included in many facets of campus life.

Comfortability in Inclusive Settings

The creation of a friendly and inclusive environment is essential to the successful integration of children with disabilities into the school community. The study looked at the degree of comfort that teachers, students with disabilities, and students without disabilities felt in inclusive settings.

Comfortability of Lecturers

Lecturers are essential in promoting inclusive teaching methods and making sure all students are comfortable in their classes. Table 15 presents the findings on lecturers' comfortability when teaching students who use assistive devices.

Table 15 Comfortability of Lecturers in Inclusive Classrooms

Comfortable teaching students with assistive devices	Frequency	Percentage
Yes	2	25%
No	6	75%
Total	8	100%

The data reveals that 75% of lecturers feel comfortable teaching students with disabilities alongside non-disabled students, while 25% expressed discomfort, particularly when teaching

students with visual impairments. This finding highlights the need for further training and support for lecturers to enhance their confidence and skills in inclusive teaching practices.

Table 4 presents the data on lecturers' training in assisting students with disabilities.

Table 16 Lecturer Training in Assisting Students with Disabilities

Trained in assisting students with disabilities	Frequency	Percentage
Yes	2	25%
No	6	75%
Total	8	100%

The data indicates that only 25% of lecturers have received training in assisting students with disabilities, particularly those who use assistive devices. This lack of training may contribute to the discomfort experienced by some lecturers in inclusive classrooms.

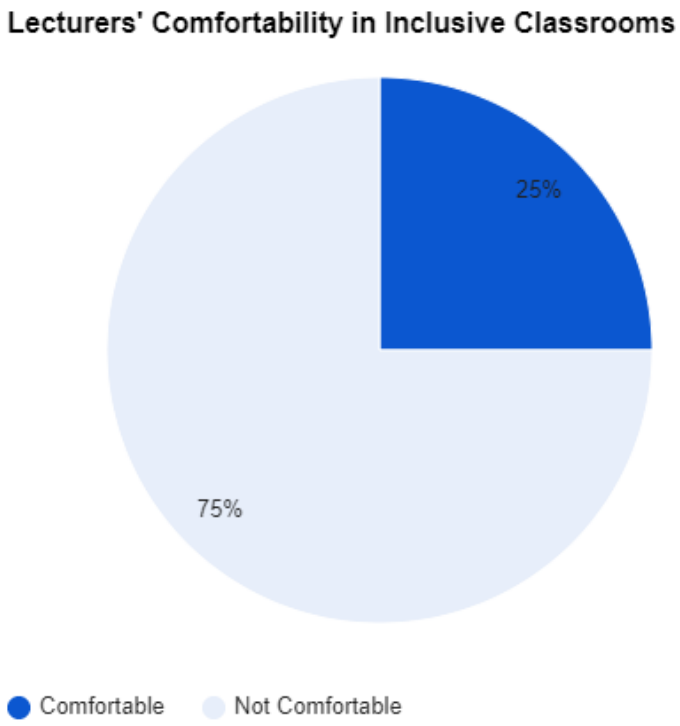

Figure 3 Pie chart illustrating lecturers' comfortability in inclusive classrooms

Comfortability of Students without Disabilities

The study also examined the comfortability of students without disabilities in inclusive settings. Table 5 presents the findings on their feelings when studying alongside students who use assistive devices.

Table 17 Comfortability of Students without Disabilities in Inclusive Settings

Feeling when studying with students using assistive devices	Frequency	Percentage
Comfortable	25	93%
Uncomfortable	2	7%
Total	27	100%

The data shows that a significant majority of students without disabilities (93%) feel comfortable studying in inclusive classrooms alongside students who use assistive devices. This high level of comfort can be attributed to the introduction of inclusive education received by these students.

Table 6 presents the data on students without disabilities being introduced to inclusive education.

Table 18 Students without Disabilities Introduced to Inclusive Education

Introduced to inclusive education	Frequency	Percentage
Yes	25	93%
No	2	7%
Total	27	100%

The data reveals that 93% of students without disabilities have been introduced to inclusive education, which supports their high level of comfort in interacting with students with

disabilities. This finding highlights the importance of awareness and sensitization programs in promoting inclusive attitudes and behaviors among students.

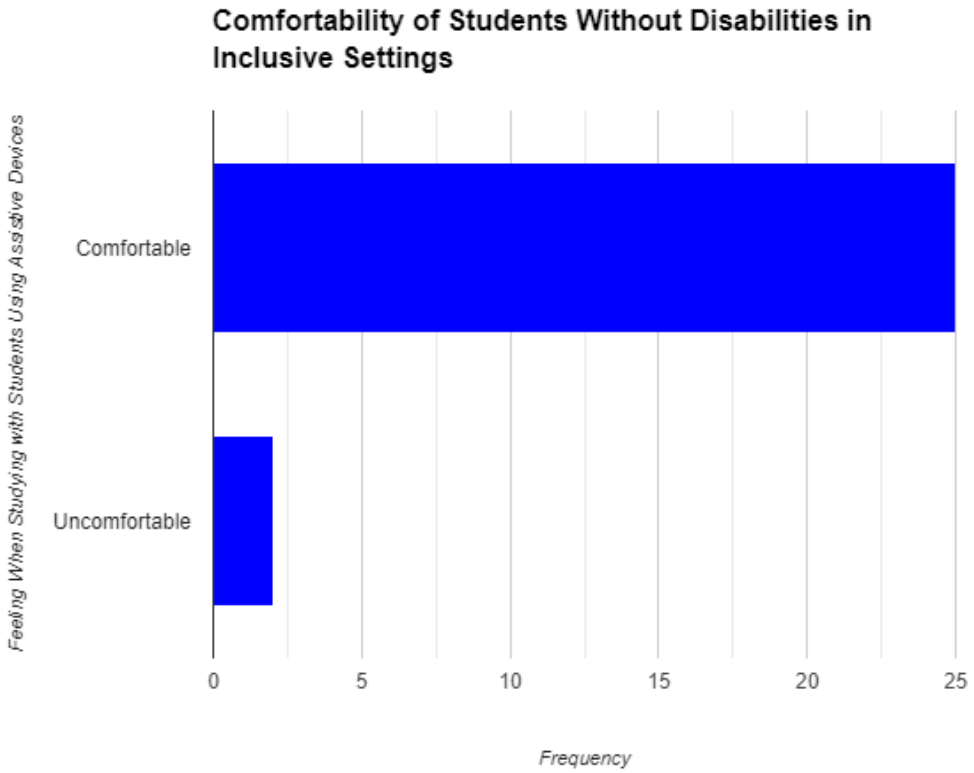

Figure 4 Bar graph depicting the comfortability of students without disabilities in inclusive settings

Assistive Technology in Facilitating Participation in Co-curricular Activities

Beyond academic pursuits, students with disabilities also engage in various co-curricular activities organized by the university. Assistive technology plays a vital role in facilitating their participation and interaction with others in these activities.

Table 7 presents the data on students with disabilities using assistive devices to interact with others in non-academic settings.

Table 19 Use of Assistive Devices to Interact with Others

Need assistive devices to interact with others	Frequency	Percentage
Yes	19	86%
No	3	14%
Total	22	100%

The data shows that a significant majority of students with disabilities (86%) need and use assistive technology when interacting with others in non-academic settings. White canes assist students with visual impairments in navigating the campus and participating in activities with their non-disabled peers, while crutches serve a similar purpose for students with physical disabilities.

> *One student with a visual impairment shared their experience:*
>
> *"My white cane is not just a mobility aid; it's a tool that enables me to actively participate in campus life. It allows me to attend seminars, meetings, and social events independently, without constantly relying on others for guidance. It has greatly enhanced my sense of belonging and inclusion in the school community." (Student 21, visual impairment)*

This finding underscores the importance of assistive technology in promoting the holistic development of students with disabilities. By enabling their participation in co-curricular activities, assistive devices contribute to their social integration and overall well-being.

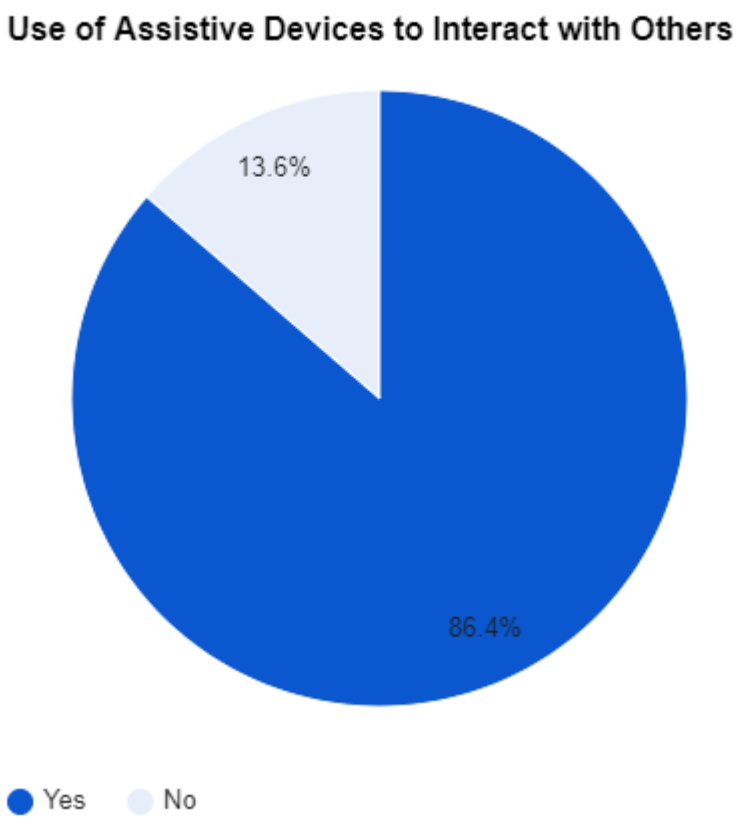

Figure 5 Pie chart illustrating the use of assistive devices to interact with others

The study found that assistive devices are essential for students with disabilities to fully engage in and benefit from other school activities that would otherwise be inaccessible without these devices. Inclusive education extends beyond the classroom, and assistive technology plays a crucial role in ensuring that students with disabilities can participate in the wider school community.

A student with a physical disability shared their perspective:

"Assistive technology has opened up a world of opportunities for me on campus. With my mobility aids, I can now attend field trips, participate in sports events, and engage in club activities alongside my peers. It has given me a sense of belonging and has enriched my overall university experience." (Student 22, physical disability)

These findings align with previous research that highlights the significance of assistive technology in promoting the social inclusion and participation of students with disabilities in higher education settings (Burgstahler , 2015; Alnahdi, 2014). By enabling students to engage in a wide range of activities and interact with diverse members of the school community, assistive technology fosters a more inclusive and equitable campus environment.

Challenges and Recommendations

Despite the positive impact of assistive technology on the integration and participation of students with disabilities, the study also identified challenges that need to be addressed to further enhance their experiences in inclusive settings.

One of the primary issues found was that certain members of the school community had little knowledge or comprehension of disabilities and assistive technologies. Students with impairments may not be fully included as a result of this ignorance, which may cause hurdles in attitudes.

Another challenge was the need for ongoing training and support for both students with disabilities and the wider school community in using and interacting with assistive technology. As technology advances and new gadgets are made available, it is essential to make sure that everyone involved has the information and abilities needed to support and use assistive technology.

These findings align with the literature review, which highlighted the significant impact of assistive technology on the integration and participation of students with disabilities, as evidenced by the following studies:

It has been discovered that assistive technology significantly affects both the involvement of students with disabilities in extracurricular activities and their integration into the school community. (Karangwa et al, 2007) emphasized the role of assistive technology in promoting the inclusion and engagement of students with disabilities in various aspects of campus life.

As (Bolingo, 2019) reported that assistive devices, such as white canes and mobility aids, enabled students with disabilities at the University of Rwanda to navigate the campus, attend

events, and engage in social interactions with their peers, contributing to their sense of belonging and overall well-being.

Similarly, (Adebisi et al, 2015) highlighted the importance of assistive technology in facilitating the participation of students with disabilities in co-curricular activities, contributing to their holistic development and sense of belonging within the school community.

To address these challenges, the following recommendations are proposed

1. Implement comprehensive disability awareness and sensitivity training programs for all members of the school community, including lecturers, staff, and students. These programs should aim to increase understanding, promote positive attitudes, and foster an inclusive campus culture.

2. Students with disabilities should get frequent instruction and assistance in the use and upkeep of their assistive technology. This will empower them to fully leverage the benefits of assistive technology and enhance their independence and participation in various aspects of campus life.

3. Create a network of support groups and peer mentors for students with impairments. Students will have more chances to learn from one another, share their experiences, and develop a feeling of belonging as a result.

4. Collaborate with disability support services, student organizations, and external partners to organize inclusive events and activities that promote the integration and participation of students with disabilities. These initiatives can help break down barriers and foster a more welcoming and inclusive campus environment.

5. To find areas for improvement and guide future initiatives targeted at strengthening the impact of assistive technology on integration and participation, conduct assessments on a regular basis and solicit input from stakeholders, including students with disabilities.

Conclusion

The results of this study demonstrate how assistive technology significantly affects University of Rwanda students with disabilities' engagement in extracurricular activities and integration

into the school community. Assistive devices, such as white canes and mobility aids, enable students with disabilities to navigate the campus, attend events, and engage in social interactions with their peers.

According to the study, having a space that is welcoming and inclusive is essential to helping students with impairments integrate successfully. Although most instructors and students without disabilities said they felt at ease in inclusive environments, more education and awareness-building are required to boost everyone's confidence and ability to serve students with disabilities.

Moreover, the findings emphasize the importance of assistive technology in facilitating the participation of students with disabilities in co-curricular activities. By enabling their engagement in a wide range of events and initiatives, assistive devices contribute to their holistic development and sense of belonging within the school community.

Notwithstanding, obstacles like low awareness and the requirement for continuous training and assistance were noted. Addressing these challenges through comprehensive awareness programs, regular training, peer support networks, inclusive events, and continuous assessment and improvement is necessary to further enhance the influence of assistive technology on the integration and participation of students with disabilities.

In summary, assistive technology is essential to encouraging the participation and inclusion of students with disabilities in many facets of University of Rwanda campus life. By providing the necessary tools and support, assistive technology enables students to overcome barriers, participate fully in the school community, and experience a more inclusive and equitable educational environment. Higher education will become truly inclusive if ongoing efforts are made to improve assistive technology's availability, usability, and accessibility.

4.4.3 Significance of the Resource Room in Supporting Assistive Technology and Inclusive Education

The study assessed the significance of the resource room in supporting the use of assistive technology and promoting inclusive education practices at the University of Rwanda. According to the findings, the resource room is essential to facilitating the adoption of inclusive

education by allowing students with disabilities to study in an inclusive environment with their classmates without impairments.

Resource Room in the Achievement of Inclusive Education

It was discovered that the resource room played a crucial role in attaining inclusive education, especially for students who are visually impaired. The room serves as a hub for translating notes and handouts from lecturers into Braille format, making them accessible to visually impaired students. It is equipped with essential materials and devices, such as machines with JAWS (Job Access With Speech) software and internet connectivity, which enable students to conduct research and access digital resources independently.

Table 8 presents the sources from which students with disabilities obtain their assistive devices.

Table 20 Sources of Assistive Devices

Source	Frequency	Percentage
Provided by the school	20	91%
Guardians	0	0%
From other sources	2	9%
Total	22	100%

The data reveals that a significant majority of students (91%) who use assistive technology receive it from the school, while only 9% obtain devices from other sources, such as NGOs and individual supporters. The resource room, which is especially made to help students with disabilities access and use the assistive equipment the institution provides to meet their academic objectives, is where the devices are consolidated.

One student highlighted the importance of the resource room:

"The resource room has been a lifeline for me. It provides me with access to Braille materials, specialized software, and other assistive devices that I wouldn't have

otherwise. It has enabled me to keep up with my studies and participate fully in the classroom." (Student 18, visual impairment)

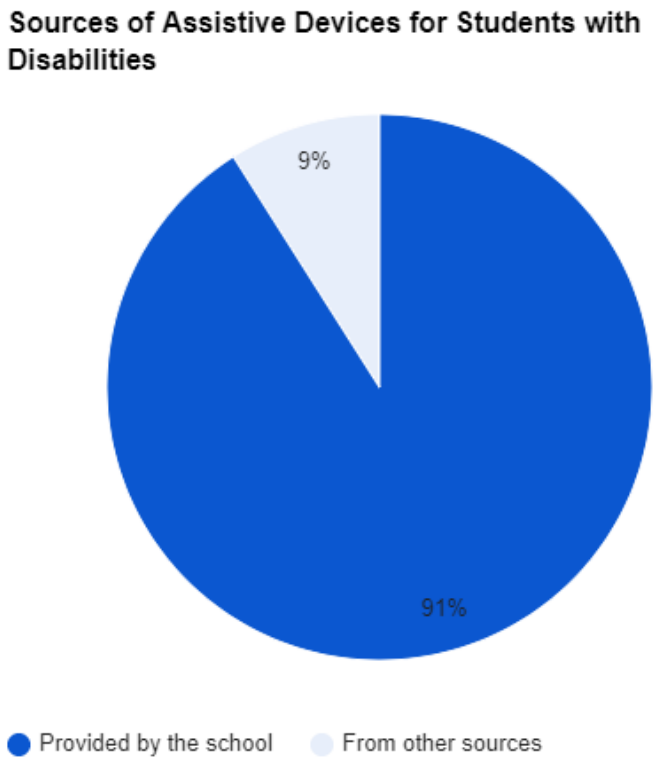

Figure 6 Pie chart illustrating the sources of assistive devices for students with disabilities

Accessibility of the Resource Room

The study also investigated the accessibility of the resource room for students with disabilities. Table 9 presents the findings on students' perceptions of the ease of accessing the resource room.

Table 21 Accessibility of the Resource Room

Ease of Access	Frequency	Percentage
Yes	21	95%
No	1	5%
Total	22	100%

The data indicates that an overwhelming majority of students (95%) find it easy to access the resource room and its materials, while only 5% experience difficulties in accessing the facility. This highlights the critical role of the resource room in supporting the academic pursuits of students with disabilities. The room is equipped with essential equipment and materials, such as Braille embossers, computers with internet access, and other assistive devices, which students can utilize to enhance their learning experience.

A student with a physical disability shared their perspective

"The resource room has been designed with accessibility in mind. It is located on the ground floor, and the layout allows for easy navigation, even for those of us with mobility challenges. The staff is always available to assist when needed, making it a welcoming and supportive environment." (Student 19, physical disability)

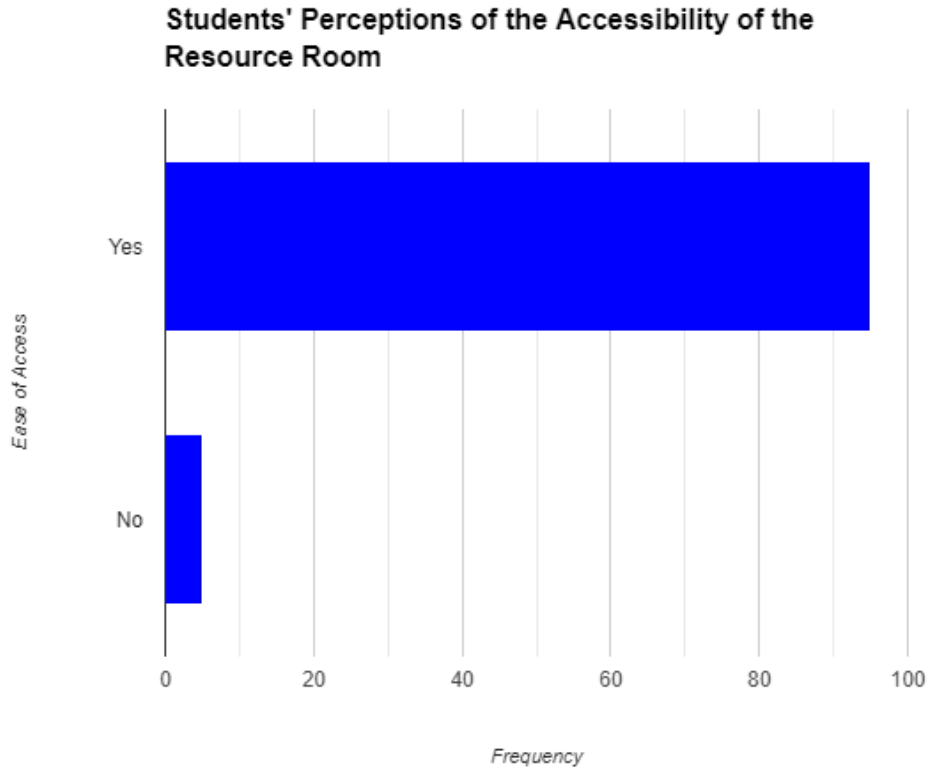

Figure 7 students' perceptions of the accessibility of the resource room

According to the research, the resource room is essential for helping students with disabilities get accommodations for exams. Table 10 presents the data on the location where students with disabilities take their exams.

Table 22 Location of Examination for Students with Disabilities

Examination Location	Frequency	Percentage	Mean	Standard Deviation
In the classroom together with others	4	18%	0.18	0.39
In the resource room	18	82%	0.82	0.39
Total	22	100%	1.00	0.00

According to the data, a sizable majority of students (82%) take their exams in the resource room, whereas only 18% take them in class with their peers who are not disabled. The resource room plays a crucial role in accommodating the specific needs of students with disabilities during examinations. For students with visual impairments, the resource room staff translates the exams into Braille format using specialized equipment, such as Braille embossers. Additionally, the room provides access to computers with JAWS software, enabling students to complete their exams using assistive technology.

> *A student with a visual impairment shared their experience:*
>
> *"Taking my exams in the resource room has been a game-changer for me. The staff ensures that the exams are translated into Braille, and I have access to a computer with JAWS software, which allows me to navigate the questions and input my answers independently. It levels the playing field and enables me to demonstrate my knowledge effectively." (Student 20, visual impairment)*

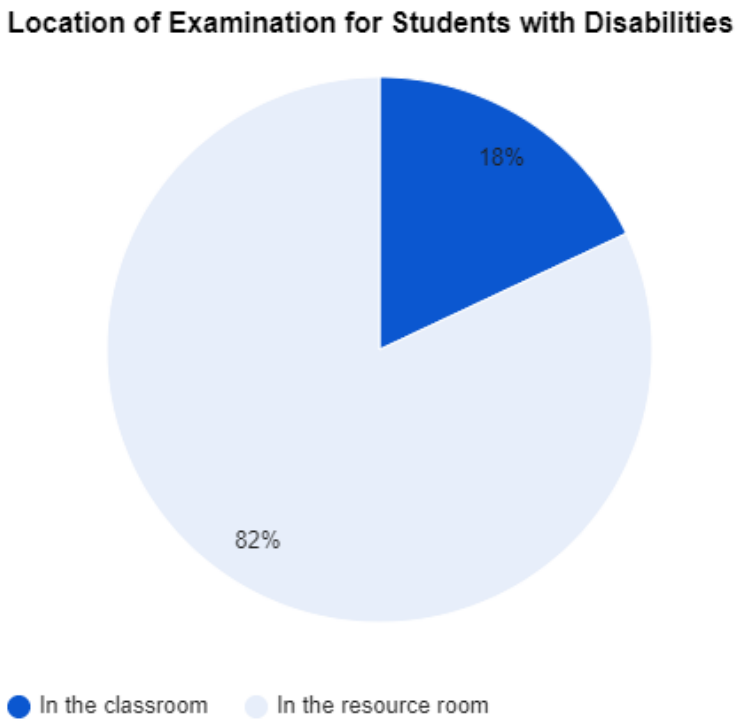

Figure 8 chart illustrating the location of examination for students with disabilities

Collaboration and Support in the Resource Room

The study also explored the collaborative efforts and support provided in the resource room to facilitate inclusive education practices. Interviews with the resource room staff and observations of the facility revealed a strong commitment to assisting students with disabilities in their academic pursuits.

> *The resource room manager emphasized the importance of collaboration*
>
> *"We work closely with faculty members, disability services, and other support staff to ensure that students with disabilities receive the necessary accommodations and support. Regular meetings are held to discuss individual student needs, adapt course materials, and implement inclusive teaching strategies. It's a team effort to create an inclusive learning environment." (Resource Room Manager)*

Observations of the resource room revealed a supportive and inclusive atmosphere. Staff members were seen actively engaging with students, providing technical assistance, and offering guidance on the use of assistive devices. The room was well-organized, with designated areas for different types of assistive technology and study spaces for students to work independently or collaborate with their peers.

> *A faculty member highlighted the value of the resource room in promoting inclusive education:*
>
> *"The resource room has been instrumental in supporting the inclusion of students with disabilities in my classes. The staff collaborates with me to ensure that course materials are accessible, and they provide valuable insights on accommodating individual student needs. It has enhanced my ability to create an inclusive classroom environment." (Faculty Member 3)*

Discussion:

Resource rooms act as a single point of contact for students with disabilities who require support, accommodations, and assistive technology to succeed academically. According to earlier studies, resource rooms are crucial for promoting inclusive teaching methods, and this study supports those findings. (Alnahdi, 2014; Stodden et al, 2011).

The accessibility of the resource room is a key factor in promoting inclusive education practices. It ensures that students with disabilities have equal access to the resources and support they need to succeed academically (Gillies, J, 2013; Liasidou, A., 2014). By providing an accessible and well-equipped space, the resource room empowers students with disabilities to engage fully in their studies and participate in the inclusive educational environment.

The provision of examination accommodation through the resource room is essential for ensuring equal opportunities and fair assessment practices for students with disabilities (Byrnes, M. A., 2008; Kettler, R. J., 2012). By adapting the examination process to meet the specific needs of individual students, the resource room promotes inclusivity and enables students with disabilities to showcase their abilities on an equal basis with their non-disabled peers.

The collaborative efforts and support provided in the resource room are crucial for the successful implementation of inclusive education practices (Moriña at al, 2015; Strnadová & Květoňová, 2015). By fostering a supportive and inclusive environment, the resource room empowers students with disabilities to actively participate in their learning and enables faculty members to adopt inclusive teaching approaches.

Challenges and Recommendations

Despite the significant role played by the resource room in supporting assistive technology and inclusive education practices, the study also identified challenges that need to be addressed to further enhance its effectiveness.

One of the main challenges identified was the limited availability of assistive devices and technology in the resource room. While the room is equipped with essential devices, such as Braille embossers and computers with JAWS software, the demand often exceeds the available resources. This can lead to delays in accessing necessary accommodation and support for some students.

Another challenge was the need for ongoing training and professional development for resource room staff and faculty members. As assistive technology advances and new inclusive education strategies emerge, it is crucial to keep the staff updated with the latest knowledge and skills to effectively support students with disabilities.

To address these challenges, the following recommendations are proposed

1. Increase funding and resources allocated to the resource room to expand the availability of assistive devices and technology. This will ensure that all students with disabilities have timely access to the accommodation and support they need.

2. Provide regular training and professional development opportunities for resource room staff and faculty members. This will enhance their knowledge and skills in utilizing assistive

technology, implementing inclusive teaching strategies, and supporting the diverse needs of students with disabilities.

3. Foster greater collaboration and communication between the resource room, faculty, and other support services. Regular meetings and information-sharing sessions can help identify and address individual student's needs more effectively, leading to better coordination of support and accommodation.

4. Conduct ongoing assessments and evaluations of the resource room's effectiveness in supporting assistive technology and inclusive education practices. This will help identify areas for improvement and guide future initiatives to enhance the services provided.

5. Promote awareness and understanding of the resource room's services among the university community, including students, faculty, and staff. This will encourage greater utilization of the facility and foster a more inclusive campus environment.

These findings are consistent with the review of the literature, which emphasized the vital role of the resource room in supporting assistive technology and inclusive education practices, as evidenced by the following studies:

The resource room plays a vital role in supporting the use of assistive technology and promoting inclusive education practices. (Nsanzabiga, 2014) found that the resource room served as a hub for translating notes and handouts into Braille format, making them accessible to visually impaired students, and was equipped with essential devices like JAWS software and internet connectivity for independent research and access to digital resources.

(Bolingo, 2019) reported that most students with disabilities at the University of Rwanda received their assistive devices from the resource room, which was the central location for accessing and utilizing these tools.

(Karangwa et al, 2013) emphasized the importance of resource rooms equipped with Braille embossers, computers with internet access, and other assistive devices in empowering students to engage fully in their studies and participate in the inclusive educational environment.

Conclusion

The findings of this study highlight the significant role played by the resource room in supporting the use of assistive technology and promoting inclusive education practices at the University of Rwanda. The resource room serves as a central hub for providing access to essential assistive devices, accommodations, and support services for students with disabilities.

The study reveals that the resource room is instrumental in achieving inclusive education, particularly for students with visual impairments. It enables them to access course materials in accessible formats, conduct research using specialized software, and participate fully in the classroom. The accessibility of the resource room and its facilities is crucial for ensuring equal opportunities and inclusion for students with disabilities.

Moreover, the resource room plays a vital role in facilitating examination accommodation, such as translating exams into Braille and providing access to assistive technology. This ensures fair assessment practices and allows students with disabilities to demonstrate their knowledge and abilities effectively.

The collaborative efforts and support provided in the resource room are essential for the successful implementation of inclusive education practices. The resource room staff works closely with faculty members and other support services to accommodate individual student needs and create an inclusive learning environment.

However, challenges such as the limited availability of assistive devices and the need for ongoing training and professional development were identified. Addressing these challenges through increased funding, regular training, enhanced collaboration, and continuous evaluation is necessary to further enhance the effectiveness of the resource room in supporting assistive technology and inclusive education practices.

In conclusion, the resource room is a vital component in the implementation of inclusive education at the University of Rwanda. It plays a significant role in supporting the use of assistive technology, providing accommodations, and promoting an inclusive learning environment for students with disabilities. Strengthening the resource room's capacity and

addressing the identified challenges will contribute to the realization of inclusive education goals and ensure equal opportunities for all students.

CHAPTER FIVE
SUMMARY, CONCLUSION, RECOMMENDATIONS

5.1 Introduction

This chapter provides a comprehensive summary of the key findings, draws conclusions from the information, and offers recommendations for future directions. The significance and implications of the research are emphasized, and the material from the previous chapters is summed up. A comprehensive grasp of the research findings and their wider significance is intended to be provided via the organized discussion in this chapter. The chapter is divided into three major sections: the conclusion and summary, recommendations, and ideas for additional research. The overall understanding and applicability of the research findings are enhanced by the distinct contributions made by each part.

5.2 Summary and Conclusion

In examining the function of assistive technology in executing inclusive education, this study concentrated on the Nyagatare Campus of the University of Rwanda's College of Education. The study sought to identify the types of assistive devices used by students with disabilities, understand the use of assistive technology in enabling learning and academic performance, explore the impact of assistive technology on the integration of students with disabilities into the school community and their participation in co-curricular activities, assess the significance of the resource room in supporting the use of assistive technology and promoting inclusive education practices, and identify the challenges faced by students and faculty in using assistive technology and propose strategies for overcoming these barriers.

The study used a mixed-methods approach, gathering data through observations, interviews, and questionnaires. The study involved 22 students with disabilities, 8 faculty members, 1 resource room manager, and 5 non-teaching staff from the College of Education Nyagatare Campus. Using thematic analysis and descriptive statistics, the data were analysed.

The following are the study's primary findings:

- At the Nyagatare Campus of the College of Education, students with disabilities use a variety of assistive technology to enhance their education and engagement in inclusive environments. The most used assistive devices among students with visual impairments were Braille materials, Perkins Braillers, Victor Reader, slate and stylus, and white canes. Low vision students used telescopes, magnifying glasses, and screen magnifiers. Prosthetic devices and crutches were among the mobility assistance mentioned by students with physical limitations.

- Assistive technology plays a crucial role in facilitating the learning and academic performance of students with disabilities. It enhances accessibility and engagement in learning, promotes better understanding and retention of course content, fosters independence and self-efficacy, and ultimately contributes to improved academic outcomes.

- Students with disabilities' engagement in extracurricular activities and absorption into the school community are greatly impacted by assistive technology. It enables students with disabilities to navigate the campus, attend events, and engage in social interactions with their peers, contributing to their sense of belonging and overall well-being.

- The resource room plays a vital role in supporting the use of assistive technology and promoting inclusive education practices. It acts as a focal point for giving students with disabilities access to necessary assistive technology, accommodations, and support services.
The resource room staff collaborates with faculty members and other support services to accommodate individual student needs and create an inclusive learning environment.

- Using assistive technology effectively presents several obstacles for both teachers and students. These difficulties include the need for thorough training and support, the restricted availability and accessibility of assistive technology, and problems with upkeep and repair. Addressing these challenges requires a collaborative effort from higher education institutions, faculty, support services, and students.

The study's conclusions add to the body of knowledge on the subject and have important ramifications for Rwanda's inclusive education theory and practice. The results support the value of assistive technology in advancing inclusive education practices, assisting students with disabilities in their academic endeavours, and facilitating their incorporation into higher education environments.

The study highlights the need for comprehensive support systems, resources, and collaborations to ensure the effective utilization of assistive technology and create an inclusive learning environment.

The limited sample size, the unique setting of the College of Education Nyagatare Campus, and the dependence on self-reported data are some of the study's drawbacks that should be noted. Nonetheless, the results offer insightful information and suggestions that might guide the creation of policies, the distribution of funds, and the adoption of inclusive practices in Rwandan and international higher education institutions.

5.3 Recommendations and Suggestions

The following suggestions are put forth in light of the study's findings in order to improve the use of assistive technology and advance inclusive teaching methods at the University of Rwanda, particularly in the College of Education Nyagatare Campus:

5.3.1 To the University of Rwanda Administration

1. Create and execute an inclusive education policy framework that specifies in detail how assistive technology should be made available, accessible, and supported on all campuses and universities.

2. Allocate adequate financial resources to ensure the availability and maintenance of a wide range of assistive devices and technologies to cater to the diverse needs of students with disabilities.

3. Provide a centralized assistive technology centre where staff, instructors, and students can receive professional advice, instruction, and technical support on how to use assistive technology.

4. Foster collaborations and partnerships with external organizations, disability support services, and assistive technology providers to leverage their expertise and resources in supporting inclusive education practices.

5.3.2 To the College of Education Nyagatare Campus Administration

1. To determine areas for improvement and rank the necessary adjustments to meet the needs of students with disabilities, conduct a thorough evaluation of the campus's infrastructure, facilities, and resources in terms of accessibility and inclusion.

2. Give faculty and staff members frequent training and opportunities for professional growth so they can improve their understanding of assistive technology and inclusive teaching techniques.

3. Enhance the resource room by adding more services, making assistive technology more accessible, and making sure there is enough staff and knowledge to properly meet the requirements of students with disabilities.

4. Encourage initiatives for awareness and sensitization in order to cultivate an inclusive, accepting, and supportive campus environment for students with disabilities.

5.3.3 To Faculty Members

1. To improve your knowledge of inclusive teaching methods and assistive technologies, actively pursue professional development opportunities.

2. Collaborate with the resource room staff and disability support services to identify and implement appropriate accommodation and adaptations for students with disabilities in your courses.

3. Foster an inclusive classroom environment that promotes equal participation, respect, and acceptance of diversity among all students.

4. Provide timely and constructive feedback to students with disabilities and ensure that assessment methods are inclusive and accessible.

5.3.4 To Students with Disabilities

1. Actively seek support and resources from the resource room, disability support services, and faculty members to address your specific needs and challenges related to assistive technology and inclusive education.

2. Participate in training and orientation programs to enhance your skills and knowledge in utilizing assistive devices and technologies effectively.

3. Advocate for your rights and needs and provide feedback and suggestions to the university and college administration to improve inclusive education practices and support systems.

4. Engage in peer support networks and mentoring programs to share experiences, strategies, and resources with other students with disabilities.

5.4 Advice for Additional Study

Further research is advised to broaden the body of knowledge and address the limitations of this study, even though it offers insightful information about the function of assistive technology in implementing inclusive education at the University of Rwanda, particularly at the Nyagatare Campus of the College of Education. Here are some suggestions for further study:

1. Conducting a larger-scale study that includes multiple colleges and campuses of the University of Rwanda to obtain a more comprehensive understanding of the utilization of assistive technology and inclusive education practices across different disciplines and contexts.

2. Using a longitudinal study design to look into how assistive technology affects students with disabilities' academic performance, social integration, and post-graduation results over the long run.

3. Investigating the viewpoints and experiences of parents, employers, and the general public with relation to the significance of inclusive teaching methods and assistive technologies in higher education settings.

4. Examining how well particular technologies, therapies, and assistive equipment enhance the engagement and learning of students with various disabilities.

5. Analysing how cultural, socioeconomic, and attitude elements affect the adoption and effectiveness of inclusive teaching methods and assistive technology use in Rwanda.

6. Identifying best practices, innovations, and difficulties in the supply and use of assistive technology for inclusive education by conducting comparison studies with other universities in Rwanda and beyond.

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APPENDICES

Appendix A: Questionnaire for learners with disabilities.

Please fill out the questionnaire by marking or entering the required information in the designated spaces. In order to enhance the education of students with disabilities who need assistive technology for learning, the information will be kept private and used for research.

Section A: Personal information).

1. **Age:**
   18years- 20years ☐
   21years-25years ☐
   26years-30years ☐
   31years-above ☐

2. **Sex:** Male ☐ Female ☐
3. **Year of study:** Level 1 ☐ Level 2 ☐ Level 3 ☐ Level 4 ☐
4. **Area of study:** Sciences ☐ Arts and Humanities ☐ and languages ☐

Section B: questions about academics

5. Which type of assistive device do you use in your learning process?
   .....
   .....
6. From where do you get the assistive device you use? Provided by the school ☐ given by the guardians ☐ from other sources ☐
7. Are the teaching methodologies used by lecturers cater for your need? Yes ☐ No ☐
8. When you attend classes, how do you take notes?
   .....
9. From where do you do your exam? In the classroom together with others ☐ or in the resource room ☐ ?
10. Technological devices need maintenance and repair services regularly; do you find maintenance services for your devices easily when needed? Yes ☐ No ☐
11. Do you access the resource room in a simple way? Yes ☐ No ☐
12. Are materials in the resource room sufficient for your learning? Yes ☐ No ☐
    If not, what do you think should be added to make your learning effective?
    ……
13. Apart from academics, do you need any assistive devices to interact with others? Yes ☐ No ☐
14. Have you attended any field trip? Yes ☐ No ☐ If yes, was it easy for you to benefit from it using the assistive device? Yes ☐ No ☐

15. Do you take part in school seminars or meetings? Yes ☐ No ☐ If yes, how does the assistive device help you go through it?
……
16. Have you faced any problem related to the use of assistive technology? Yes ☐ No ☐ If yes what were those problems?
.....
.....

Appendix B: Questionnaire for learners without disabilities.

Please fill out the questionnaire by marking or entering the required information in the designated spaces. In order to enhance the education of students with disabilities who need assistive technology for learning, the information will be kept private and used for research.

Section A: Personal information).

1) **Age:**
   - 18years- 20years ☐
   - 21years-25years ☐
   - 26years-30years ☐
   - 31years-above ☐
2) **Sex:** Male ☐ Female ☐
3) **Year of study:** Level 1 ☐ Level 2 ☐ Level 3 ☐ Level 4 ☐
4) **Area of study:** Sciences ☐ Arts and Humanities ☐ Languages ☐

Section B: questions about academics

5) How do fell when studying in inclusive classroom together with students who use assistive devices in their learning? Comfortable ☐ uncomfortable ☐
6) When You see a student with white, wheelchair, or any other assistive device, do you consider them cable and able to do all academic tasks ☐ or You feel pity for them and think that they need support in what they do ☐
7) Are the teaching methodologies used by lecturers cater for students with special educational needs your need? Yes ☐ No ☐
8) Do you think that students with disabilities especially those using assistive devices can take and benefit from other school activities like meeting, seminars and trip? Yes ☐ No ☐
9) During the assignments, do you find students with disabilities able to take part and provide in put to the work? Yes ☐ No ☐
10) How do you see participation of students with disabilities in the classroom?
11) Poor ☐ excellent ☐
12) Do you find it easy for students with disabilities to complete their tasks on time? Yes ☐ No ☐
13) Do you feel free to interact with students with disabilities in class or outside the class? ☐ Or you fear them because you are not sure what to tell them? ☐
14) Have you been introduced to inclusive education? Yes ☐ No ☐
15) In your school, have you ever provided support or assistance to student with disability? Yes ☐ No ☐ If yes, what was that assistance?
……

16) Are they some challenges faced by students who use assistive devices in you school?
Yes ☐ No ☐ If, yes what those challenges?
.....
.....

Thank you for your cooperation.

Appendix C: Questionnaires for lecturers

We respectfully ask that you fill out the questionnaire by checking or marking the relevant sections. The data submitted will be kept private and utilized for research aimed at enhancing the education of students with disabilities who need assistive technology.

Assistive devices: are devices that are designed, made, or adapted to assist a person with disabilities to carry out daily activities and participate actively and productively in community life.

Section A: Personal information.

Age:
25years- 35years ☐
35years-40years ☐
45years-50years ☐
50years-above ☐
Sex: Male ☐ Female ☐
Teaching experience: 1year ☐ 2years ☐ 3years ☐ 4years ☐
above 5 years ☐
Teaching areas: Sciences ☐ Arts, Humanities and Languages ☐

Section B: questions about academics

1. Do you teach students who base their learning on assistive devices? Yes ☐ No ☐
   If yes, how do the devices help them in their leaning process?
   ……
   ……
   …….
2. Do you find it comfortable teaching students who use assistive devices in your class?
   Yes ☐ No ☐
3. What are challenges do you face when teaching and interacting with students who use assistive technology in their learning?
   …….....
   .....
   .....
4. Are there some changes made in the curriculum used in your institution to suit the learning needs of learners with disabilities; especially those using assistive devices?
   Yes ☐ No ☐

5. Have you ever been trained in assisting students with disabilities, especially those who use assistive devices? Yes ☐ No ☐
6. How do you rank the participation of students with assistive device in your classroom?
   High ☐ Medium ☐ or low ☐ ?
7. Do you provide special assistance to students who base their learning on the use of assistive devices? Yes ☐ No ☐
8. Do you find it easy for students using assistive devices to complete learning tasks assigned on time? Yes ☐ No ☐
   If no, do you provide them with extra time to complete their tasks?
   Yes ☐ No ☐
9. When you provide an assignment, do think that learners with visual impairment finds braille reading materials like books in the library? Yes ☐ No ☐
   If no, how do you think they manage to do the assignment?
   ……
   …….....
   .....
10. ITC is essential in 21st century, especially in the delivery of the content like the use of online teaching, power point presentation and more other approaches. Do you consider learner who are no able to see presented content when teaching? Yes ☐ No ☐
    If yes, how do help those with visual impairment when teaching with power point presentation?
    ……
    ……
    ……
    ……
11. Does the institution provide you with all necessary assistive technology to support learners with different disabilities that found in you class? Yes ☐ No ☐
12. Form your observation as a lecturer at the university of Rwanda, what are your recommendations about the use of assistive devices for better implementation of inclusive education?
    ……
    ……

Thank you for your collaboration.

Appendix D: Interview guide for deans and heads of departments.

Please take a moment to respond to the following questions. The information you give will be kept private and used exclusively for research purposes to enhance the education of kids with disabilities who need assistive technology.

1. **Sex:** Male ☐ Female ☐
2. **Teaching experience**: 1year ☐ 2years ☐ 3years ☐ 4years ☐ above 5 years ☐
3. **Teaching areas:** Sciences ☐ Arts and Humanities ☐ Languages ☐

Section B: Academic questions.

4. Do you teach students who base their learning on assistive devices? Yes ☐ No ☐
   If yes, how do the devices help them?
   ……

5. Do you plan for training for your lecturer about inclusive education? Yes ☐ No ☐
   If yes, how often per academic year? Once ☐ twice ☐ above two times ☐

6. Are school infrastructures accessible to learners who use the assistive device in their learning like: wheelchair and white canes users? Yes ☐ No ☐
7. Do learners with disabilities receive special orientation about the use of available assistive devices in the school? Yes ☐ No ☐
8. Are curricula designed in consideration of students with disabilities, especially those who use assistive devices in their learning? Yes ☐ No ☐
9. Is finance allocated in buying and maintenance of assistive technologies sufficient? Yes ☐ No ☐
10. Does the institution have qualified personnel in the maintenance of the assistive devices available? Yes ☐ No ☐
11. How are costs of assistive technology? Expensive ☐ moderate ☐ cheap ☐
12. How do you acquire assistive devices used in the institution? Buying them ☐ from donation ☐ both (buying and donation) ☐

13. Are learning resources in the library enough for learners with disabilities especially those who use assistive technology? Yes ☐ No ☐
14. Is there a guiding policy about the use of assistive technology in your institution? Yes ☐ No ☐

15. What are challenges encountered when teaching and interacting with learner who base their learning on assistive technology.
    ……
    ……
16. From your experience, what are some recommendations about the use of assistive technology in inclusive education.
    ……

Thank you for your collaboration.

Appendix E: Research permit

UNIVERSITY of RWANDA

COLLEGE OF EDUCATION

TO WHOM IT MAY CONCERN

Student Name: NDAYAMBAJE Charles
Registration number 221028338

The School of Inclusive and Special Needs Education offers a master's degree in special Needs Education. As part of the academic requirements students must write their dissertation on a topic of their choice after conducting a research study.

We seek your cooperation in facilitating the student to conduct research on the topic: The importance of assistive technology in the implementation of inclusive education in the two colleges of the University of Rwanda (HVDE and NYAGATARE campuses) by collecting data in your Institution/ Organization.

For further information please contact the Postgraduate Coordinator
Dr Gonzague Habinshuti; Phone: 0788809234; Email: habinshutihgo@gmail.com

Thank you for your cooperation.

Ass.Prof. Evariste Karangwa
Dean, School of Inclusive and Special Needs Education
Email: karangwa28@ymail.com
Phone: 0785489767

EMAIL: principal.ce@ur.ac.rw P.O. Box:55 Rwamagana, Rwanda WEBSITE: www.ur.ac.rw

Received on 26/07/2023

Charles NDAYAMBAJE
University of Rwanda – College of Education
School of Inclusive and Special Need Education
E-mail: charlesndayambaje1995@gmail.com
Phone number: 0782464027

July 25, 2023.

To: The administrator of NYAGATARE campus
University of Rwanda

Through: Ass. Prof. NIYIBIZI Epimaque
Deputy dean of School of Education
College of Education
Nyagatare campus

This Masters' Candidate can be allowed to access students in the Resource Room. Mr Mbelimana Emmanuel will help him access the students and the assistive devices they use.
Deputy dean 26/7/2023

Dear Sir/Madam,

Re: **Requesting for permission to collect research data**

I am pleased to write this letter to you, requesting for permission of collecting data in the campus in which your leadership extends.

In facts, I am a student in the University of Rwanda college of Education, school of Inclusive and Special Needs Education with Registration number 221028338. As a student doing masters in Special Needs Education, one the requirement is thesis writing. It is this regard that I request permission to collect data about my topic: **'The Importance of assistive technology in the implementation of inclusive education in two colleges of the University of Rwanda (Huye and Nyagatare campuses)'**

Please accept my request to the above subject and permit me to collect data as research will contribute to better provision of quality education by catering for the need of each student regardless their special learning needs. I have enclosed a copy of the recommendation letter from the school.

Yours sincerely,

Charles NDAYAMBAJE

Copy to: Ass. Prof. NIYIBIZI Epimaque
Deputy dean of school of education
College of Education
Nyagatare campus

Approved you can share information with Charles

Appendix E: Turnitin Report Digital Receipt

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File size:	2.3M
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Character count:	147,684
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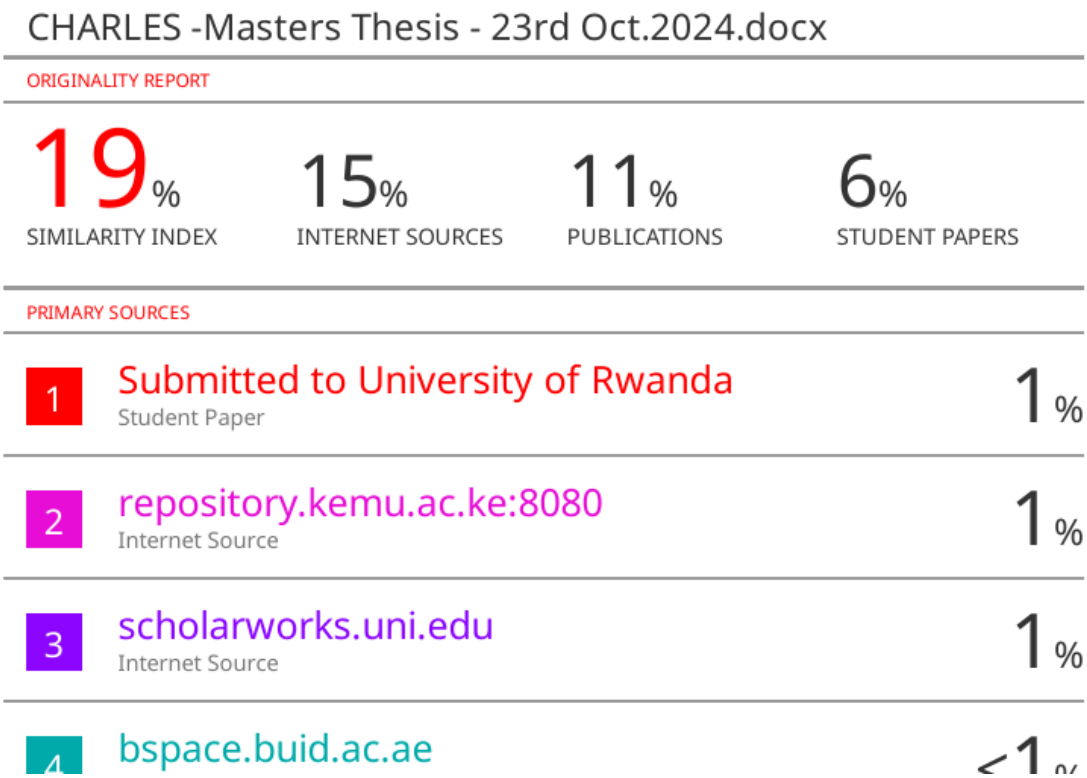
Importance of Assistive Technology in the Implementation of Inclusive Education at University of Rwanda; Case study of College of Education Nyagatare Campus

Appendix E: Turnitin Report Similarity index



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