UNIVERSITY OF KWAZULU-NATAL

Perceptions of the use of IsiZulu Termbank Technology at University of KwaZulu-Natal

By

Njabulo Hadebe

213505670

A dissertation submitted in fulfilment of the requirements for the degree of

Master of Commerce

School of Management, Information Technology, and Governance

College of Law and Management Studies

Supervisor: Dr Ntabeni Jere

Co-Supervisor: Prof Irene Govender

2023

DECLARATION

I Njabulo Hadebe, declare that

i. The research reported in this dissertation/thesis, except where otherwise indicated, is my original research.

ii. This dissertation/thesis has not been submitted for any degree or examination at any other university.

iii. This dissertation/thesis does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.

iv. This dissertation/thesis does not contain other persons' writing, unless specifically acknowledged as being sourced from other researchers. Where other written sources have been quoted, then:

a) their words have been re-written but the general information attributed to them has been referenced;

b) where their exact words have been used, their writing has been placed inside quotation marks, and referenced.

v. Where I have reproduced a publication of which I am author, co-author or editor, I have indicated in detail which part of the publication was actually written by myself alone and have fully referenced such publications.

vi. This dissertation/thesis does not contain text, graphics or tables copied and pasted from the Internet, unless specifically acknowledged, and the source being detailed in the dissertation/thesis and in the References sections.

Signed

Date: 01/12/2023

ACKNOWLEDGEMENTS

Allow me to seize this moment and express my gratitude to my divine God and my ancestors. I thank him for the grace and mercy he has always shown me and for keeping me safe throughout all phases of writing this paper. My sincerest appreciation and deepest gratitude go to myself for not giving up on this journey.

I extend my heartfelt gratitude to Dr. Jere for his unwavering support and continuous availability for consultation. His tireless dedication to assisting me, even beyond regular working hours, has been truly remarkable. Under his expert supervision, I have acquired invaluable knowledge and skills. Thank you immensely, Dr. Jere, for everything you have done for me. Working under your supervision has been an honour and a privilege, and I am grateful for the opportunity. Prof. Irene Govender, my co-supervisor, deserves my sincere gratitude for her great mentoring, constant support, helpful counsel, and insightful recommendations that have shaped my research career. I am grateful for her knowledge and constant support, which have considerably aided my academic progress and development. To Dr. Jere and Prof. Govender (my supervisors), I would have given up without your patience and support. My thanks go to you for your wise and attentive supervision, as well as your knowledge and patience.

I am truly appreciative of the invaluable assistance provided by the University Language Planning and Development Office (ULPDO) during the data collection process. Their support and contribution to my research were of utmost importance, playing a vital role in the successful completion of this project.

Most importantly, moral support is of utmost importance. My family and friends have extended their unconditional support and encouragement to me throughout my journey. This is a perfect opportunity for me to express my profound appreciation for their unwavering and wholehearted support. Their steadfast commitment and unconditional assistance have been instrumental in my journey, and I am genuinely grateful for their unwavering dedication. A special thank you is extended out to Nokubonga Mthembu for dedicating his time to me and ensuring that I was able to get what I asked for.

I extend my heartfelt thanks to each and every individual who has contributed in diverse ways to this study. Each and every individual involved has played a significant role, and I extend a special thanks to each one of them. Your contributions have been invaluable, and I am truly grateful for your support.

GLOSSARY OF ACRONYMS

ITB - IsiZulu Termbank

UKZN - University of KwaZulu-Natal

INC - IsiZulu National Corpus

IMA - IsiZulu Mobile Application

HLTs - Human Language Technologies

HEIs - Higher Education Institutions

IS - Information Systems

IT - Information Technology

UTAUT - Unified Theory of Acceptance and Use of Technology

DOI - Diffusion of Innovation

TOE - Technology, Organization, Environment

TRA - Theory of Reasoned Action

TAM - Technology Acceptance Model

SPSS - Statistical Package for Social Sciences

KMO - Kaiser-Meyer-Olson

ANOVA - Analysis of Variance

PE - Performance Expectancy

EE - Effort Expectancy

SI - Social Influence

FC - Facilitating Conditions

BI - Behavioral Intention

IOT - Internet of Things

TPACK -Technological, Pedagogical, and Content Knowledge

ABSTRACT

The use of multilingualism in higher education institutions was motivated by the arguments that student performance is affected by the language used for teaching and learning purposes. As a means of overcoming the aforementioned barrier, the Department of Education proposed a language policy which was implemented in 2002. The initiative goal of this policy was to enhance multilingualism in higher education institutions. In its response, the University of KwaZulu-Natal (UKZN) in turn implemented at institutional level a language policy in early 2004, which made both English and IsiZulu as its official languages to be used in the institution. UKZN engaged in terminology development to develop isiZulu terms from various disciplines to aid in the development of isiZulu as a language that can be used in higher education. To allow students to access the developed terms, the IsiZulu Termbank (ITB) was designed. This study seeks to investigate end-users' perceptions of the adoption of the ITB for their academic teaching and learning activities.

This research investigated the variables that impact the perceptions of end-users to use the isiZulu Termbank technology at UKZN. This study made use of quantitative methods of analysis and a questionnaire was employed to collect data from 13 disciplines across the university. The sample sizes consisted of 275 students and 134 staff members. The study used the Unified Theory of Acceptance and Use of Technology (UTAUT) theory as the lens through which to explain the factors that influence the perceptions of end-users to use the isiZulu Termbank technology at UKZN.

Correlations and regression analysis were employed to analyse the connection between UTAUT factors. Utilizing SPSS as the tool to examine data, it was discovered that social influence (SI) with a regression weight of 0.368 was the most influential factor with regard to students adopting the ITB technology. In contrast, Performance Expectancy (PE) with a regression weight of 0.435 was determined to be the most influential factor with regards to staff members' adoption of ITB. Furthermore, the study revealed that workshops and symposiums which are intended to help end-users in the adoption of the IsiZulu Termbank Technology did not meet both students or staff members expectations.

TABLE OF CONTENT

DECLARATION ..... **i**

ACKNOWLEDGEMENTS ..... **ii**

GLOSSARY OF ACRONYMS ..... **iii**

ABSTRACT ..... **iv**

TABLE OF CONTENT ..... **v**

LIST OF FIGURES ..... **ix**

LIST OF TABLES ..... **x**

CHAPTER 0NE: INTRODUCTION TO THE STUDY **1**

1.1 Introduction and Background 1

1.2 Problem Statement 3

1.3 Research Questions 3

1.4 Research Objectives 3

1.5 Justification for the Research 4

1.6 Significance of the Research 4

1.7 Methodology overview 4

1.8 Layout Structure of Dissertation 5

1.9 Summary 6

CHAPTER TW0: LITERATURE REVIEW **7**

2.1 Introduction 7

2.2 Language as a Barrier in Higher learning 7

2.3 Globalization of Human Language Technology (HLTs) 9

2.4 Evolution of Human Language Technologies (HLTs) 10

2.5 Types of HLTs 14

2.6 Adoption of HLTs 18

2.7 Benefits of HLTs adoption 19

2.8 Benefits of HLTs adoption in education 20

2.9 Challenges of HLT adoption in Education 20

2.10 Challenges in the adoption of a HLTs 21
2.11 Statistical estimation of the adoption of HLTs 25
2.12 Theoretical framework 26
Theory of Reasoned Action (TRA) 29
2.13 Application of UTAUT in human language technology (HLTs) adoption studies 35
2.14 Conceptual framework based on UTAUT model 36
2.15 Conclusion 38
CHAPTER THREE: METHODOLOGY 39
3.1 Introduction 39
3.2 Research design and Methodology 40
3.2.1 Research design 40
3.2.2 Methodology 40
3.3 The research processes 41
3.3.1 Research Philosophy 42
3.3.2 Research Approaches 43
3.3.3 Research Strategies 44
3.3.4 Research Choice 44
3.3.5 Research Time horizon 45
3.3.6 Research Method 45
3.3.7 Data collection method 48
3.3.8 Data Analysis 52
3.4 Ethical Clearance 55
3.5 Conclusion 55
CHAPTER FOUR: ANALYSIS AND DISCUSSIONS 56
4.1 Introduction 56
4.2 Statistical tests 56
4.3 Response rate 57
4.4 Analyses of Student Responses 57
4.4.1 Consistency and reliability 57

4.4.2 Student normality tests 58
4.4.3 Descriptive Analysis of the data 59
4.4.4 Inferential Statistics of the Student data – Relationships among the constructs 61
4.4.4.1 Analyses of sampling adequacy for students 61
4.4.4.2 Relationship among the independent constructs and Behavioral intention 62
4.4.4.3 Exploring Facilitating Conditions that affect usage 67
4.4.4.4 Challenges Experienced by students 70
4.5 Analyses of Staff Responses 75
4.5.1 Staff members consistency and reliability 75
4.5.2 Staff members normality tests 76
4.5.3 Descriptive statistics of the data 77
4.5.4 Inferential Statistics of the Staff members data – Relationships among the constructs 79
4.5.4.1 Analyses of sampling adequacy for staff members 79
4.5.4.2 Relationship among the independent constructs and Behavioral intention 80
4.5.4.3 Exploring Facilitating conditions that affect usage 83
4.5.4.4 Challenges experience by staff members 87
4.6 Comparison between student vs Staff members 91
4.7 Chapter summary 95
CHAPTER FIVE: SUMMARIES, RECOMMENDATIONS, AND CONCLUSIONS 97
5.1 Introduction 97
5.2 Answers to critical Questions of the study for Students 97
5.3 Answers to critical Questions of the study for Staff members 101
5.4 Recommendations 104
5.5 Limitations of the study 105
5.6 Conclusion 106
REFERENCES 107
APPENDIX A: Descriptive statistics for students 122
APPENDIX B: Descriptive statistics for Staff members 123
APPENDIX C: Research Questionnaire 124

APPENDIX D: Ethical Clearance from UKZN 129

LIST OF FIGURES

Figure 2. 1: Internet world penetration rate 23
Figure 2. 2: HLT Language measure, source. 26
Figure 2. 3 UTAUT Diagram 35
Figure 2. 4 Model utilized for the study 37
Figure 3. 1 The research process onion 41
Figure 3. 2 Research Choice 44
Figure 4. 1 Student Disciplines 61
Figure 4. 2 Items of measurement 63
Figure 4. 3 Regression for students 66
Figure 4. 4 Students responding to Item of measurement 1 68
Figure 4. 5 Students responding to item of measurement 2. 68
Figure 4. 6 Student responding to item of measurement 3 69
Figure 4. 7 Students responding to item of measurement 4. 69
Figure 4. 8 Challenge 1 presentation for students 71
Figure 4. 9 Challenge 2 presentation for students 71
Figure 4. 10 Challenge 3 presentation for students 72
Figure 4. 11 Challenge 4 presentation for students 72
Figure 4. 12 Disciplines of staff members 79
Figure 4. 13 Regression for staff members 82
Figure 4. 14 Staff members responding to item of measurement 1 83
Figure 4. 15 Staff members responding to item of measurement 2 84
Figure 4. 16 Staff members responding to item of measurement 3. 85
Figure 4. 17 staff members response to item of measurement 4. 86
Figure 4. 18 Challenge 1 presentation for staff members 88
Figure 4. 19 Challenge 2 presentation for staff members 88
Figure 4. 20 Challenge 3 presentation for staff members 89
Figure 4. 21 Challenge 4 presentation for staff members 89

LIST OF TABLES

Table 4.1 Consistency and reliability test for students' data 58
Table 4.2 Normality test for students 59
Table 4.3 Student gender 60
Table 4.4 Student age 60
Table 4.5 Student experience on the use of ITB 60
Table 4.6 Adequacy for students 62
Table 4.7 Correlation of UTAUT for students 64
Table 4.8 Correlation between BI and FC for students 70
Table 4.9 One-Sample tests for student challenges 74
Table 4.10 Test reliability of UTAUT constructs for staff data 76
Table 4.11 Normality test for staff members 77
Table 4.12 staff members' gender 78
Table 4.13 Staff members' age 78
Table 4.14 Staff members experience on the use of ITB 78
Table 4.15 KMO and Bartlett's test for staff members 79
Table 4.16 Correlation of UTAUT framework for staff members 80
Table 4.17 Correlation between BI and FC for staff members 87
Table 4.18 One-sample test for staff members challenges 90

CHAPTER 0NE: INTRODUCTION TO THE STUDY

1.1 Introduction and Background

The word "multilingualism" refers to the use of many languages as part of the teaching process in a classroom or lecture setting. This approach is part of translanguaging, which is the deliberate and seamless blending of several languages to enhance successful communication and learning (Heugh et al., 2019). A number of academics use multilingualism, alternating and blending languages to assist them in their teaching and learning processes. Existing literature indicates that scholars demonstrate enhanced learning outcomes when they receive education in their home language (Al-Bataineh & Gallagher, 2021). In 2017, Minister of Higher Education Professor Hlengiwe Mkhize revisited and implemented a language policy (Nzimande, 2020). This policy was developed to enhance multilingualism in higher education institutions. Students have the option of choosing their preferred language for education through language policy (Sah & Li, 2022). The use of multilingualism in higher education institutions was motivated by the fact that student performance is affected by the language used to access information (Mthombeni & Ogunnubi, 2021). In an attempt to strengthen the pedagogy and learning experience of scholars, the University of KwaZulu-Natal (UKZN) has adopted a language policy that adds isiZulu as a second official language to complement English to support teaching and learning processes (Ngcobo & Barnes, 2021). The Department of Education notes that South African educational institutions have adequate funding and resources to adopt and implement language policies although most institutions are still unresponsive to this (Cele, 2021; du Plessis et al., 2022). The majority (65% per institution) of students enrolling in South African higher education institutions are not fully trained to use English for teaching and learning (Ajani & Gamede, 2020). Moreover, the benefits of multilingualism include increased intellectual flexibility and creativity. It has been found that students who speak multiple languages from a young age are more mentally flexible and perceptive than those who only speak one (Charamba, 2020).

A key challenge to making institutions multilingual in South Africa by adopting a local language to complement English is the lack of corresponding academic terms in languages other than English to be used in teaching and learning (Magocha et al., 2019). A number of published papers show that South African higher learning lack the capacity to implement the policy (Mawonde & Togo, 2019; Van Schalkwyk et al., 2022). English continues to be a required language for students, serving as the principal language for academic purposes and educational advancement. A number of challenges have been identified as a barrier to implement language policy. To outline a few, lack of qualified lecturers to teach in African languages (Tewari & Ilesanmi, 2020), lack of resources such as textbooks written in African languages (Du Plessis & Mestry, 2019; Omidire & Ayob, 2022), lack of scientific terminology development (Mayaba et al., 2018), and lack of academic studies conducted in African languages (Mohohlwane, 2019). Up to this point, these are the foremost obstacles recognized in the

implementation of multilingualism within higher education institutions. South African higher education institutions are trying by all means to adopt and use the language policy. Currently, UKZN is the leading institution in adopting and implementing the language policy (Mthombeni & Ogunnubi, 2021). The University of KwaZulu-Natal adopted the policy in early 2004, which granted permission for the utilization of both English and IsiZulu as authorized languages within the university. IsiZulu was chosen due to the high number of students speaking isiZulu as their native language. About 70% of UKZN students speak isiZulu (Naidoo et al., 2018). As it is explained in the policy, the purpose of using both isiZulu and English are to boost the capacity of understanding.

To overcome the aforementioned barriers, the University of KwaZulu-Natal firstly engaged in the terminology development process (Khumalo, 2017). The purpose of this process was to develop isiZulu terms from different disciplines. Then later, technology was adopted, specifically human language technologies to store and allow students to access the developed terms. Human language technologies are a wide variety of tools with the aim of fulfilling the end-users' requirements for communicating with machines (Liberman & Wayne, 2020). Currently, the existing human language technologies in UKZN are isiZulu Termbank (ITB), Zululex Mobile Application (ZMA), IsiZulu National Corpus (INC) and isiZulu spellchecker (Keet & Khumalo, 2017). These technologies provide different support to enhance the isiZulu language. This study will focus on the IsiZulu Termbank which is publicly available at the following URL:link. A Termbank is simply a database of terms with different functions, such as a help button, a search box, and options to choose disciplines (Keet & Khumalo, 2017).

Nonetheless, the primary purpose of the ITB is to supply the end-users' access to isiZulu terminology which has been standardized for a range of disciplines such as Research, Mathematics, Computer science, etc (Khumalo, 2017). UKZN terminology development is structured into five steps, including gathering existing usage terms, describing and translating terminology, consulting end-users on proposed terminology, and standardizing their use through official national procedures (Khumalo, 2017).

The ITB allows incremental additions of standardized isiZulu terms for existing disciplines in the database. Administrators of this tool can also create new disciplines in the database and add new isiZulu terms for a particular discipline. The end-users can look for words by firstly typing words in the search box, choose the discipline, choose word structure (prefix, suffix, or complete) and choose the outputting language (English, isiZulu, or both). As a public tool, isiZulu Term Bank is freely available to all UKZN members and other isiZulu related end-users.

This study seeks to investigate the perception of end-users in UKZN campuses regarding the adoption of ITB for their school activities with the goal of improving academic performance and strengthening research using the isiZulu language.

1.2 Problem Statement

It is argued that the utilization of native language is beneficial to students to better understand academic content (Maluleke, 2019). The implementation of multiple languages in institutions of higher learning provides students with a choice of preferred language of use to access academic content and learn with. In 2004, UKZN accepted and implemented the South African official language policy. The policy was adopted to assist students whose mother tongue is IsiZulu, to access information in the IsiZulu language, which is the second authorized language within the university. In this way a bilingual institution is supported.In order to implement the language policy of adopting IsiZulu, the IsiZulu terminology development was embarked upon. A number of terms from different disciplines were developed and stored in the ITB. The ITB is a database used by end-users to access isiZulu terms. There is little literature on studies that investigate and identify the variables that contribute to effective adoption of ITB from a South African perspective.

This study seeks to investigate the perception of end-users in UKZN campuses regarding the adoption of ITB for their school activities with the goal of improving academic performance and strengthening research using the isiZulu language.

1.3 Research Questions

The study makes use of the UTAUT framework as the lens through which to understand the phenomenon. This means that the UTAUT framework is core to the study through its constructs. Hence, the developed research questions of the study were guided by the UTAUT framework, serving as a roadmap to understand the phenomenon under study. In this study, the UKZN isiZulu Termbank technology will be evaluated for its adoption. The research is driven by the questions outlined below.

a. How does performance expectancy affect behavioural intention to use the ITB?
b. To what extent does effort expectancy influence behavioural intention to use ITB?
c. How does social influence affect behavioural intention to use ITB?
d. What are the facilitating conditions that affect usage?
e. What are the challenges end-users experienced when adopting ITB?

1.4 Research Objectives

a. To investigate the effect of performance expectancy on the behavioural intention to use the ITB.
b. To determine the extent that effort expectancy influences the behavioural intention to use ITB.
c. To assess the effect of social influence on the behavioural intention to use ITB.
d. To investigate the facilitating conditions that affect usage.
e. To understand the challenges experienced by end-users in the adoption of ITB.

1.5 Justification for the Research

Although UKZN offers free ITB, there are limited studies regarding how end-users perceive the use of ITB and the barriers to adopt ITB. As a result, there is very little literature available to measure the quality of ITB. It is therefore important to research the end-users' perception of ITB. This will assist to gain insight of end-users and the challenges associated with ITB adoption. If end-users have a negative attitude towards ITB, this could negatively affect the development of isiZulu in the institution as official language of instructions. Also, it could affect the performance of students who really need help to access information with the isiZulu language. It is therefore vital to understand the end-users' perception about ITB. It will also assist in identifying areas that need to be improved upon when planning to upgrade the ITB. This improvement will make ITB an important and useful database to store terms and hence for posterity as well.

1.6 Significance of the Research

This study contributes to the body of knowledge by obtaining a better understanding of how ITB adoption can be improved. Additionally, the information gained from this research will be vital to the developers of ITB, by providing them with some of the challenges end-users face when using ITB. By researching the perceptions of end-users about ITB, and by understanding the barriers experienced by end-users, there could be an improvement in the way ITB is implemented and thus motivating institutions to adopt isiZulu as official language of instructions.

1.7 Methodology overview

The research philosophy used in this study is positivism, and the research approach adopted is deductive approach. Utilizing the quantitative method was a deliberate choice, as it involves examining the relationships between variables through numerical data. This data is then analyzed using quantitative statistical techniques and graphics, as outlined by (Saunders et al., 2007). The selection of the quantitative method was made with the aim of obtaining a comprehensive understanding of the research problem and gaining insights into the factors influencing the adoption of ITB by UKZN end-users. Additionally, the study employed a descriptive research design, intending to illustrate and elucidate relationships between variables based on theoretically grounded assumptions concerning the interconnections within the UTAUT framework.

The target population for this research comprised registered students and staff members at the University of KwaZulu Natal. During the data collection period in 2022, a total of 1201 students and 205 staff members from 13 selected disciplines were included in the study. This study used an online questionnaire survey as a primary method to collect data

The analysis was conducted using specific features of the Statistical Package for Social Sciences (SPSS) version 28, including descriptive measurements and one-sample t-tests for significance. Reliability

analysis, utilizing Cronbach's Alpha, ensured internal consistency and was facilitated by SPSS software. Validity assessments were conducted through question selection, exploratory factor analysis, and pilot test feedback, leveraging SPSS capabilities. A more detailed report of the methodology is provided in chapter three.

1.8 Layout Structure of Dissertation

The structure of this paper encompasses five chapters, thoughtfully organized in accordance with the chronological progression of the research undertaken. Each chapter represents a distinct phase of the study, contributing to a comprehensive exploration of the topic at hand. To provide a glimpse into the content covered, below is a brief summary of the key objectives and goals explored in each chapter.

Chapter 1 establishes the study background, identifies research problem statement, and highlights the study questions that the researcher seeks to answer. It also clarifies the study's objectives, aims, and the rationale behind conducting research.

Chapter 2 is a comprehensive look of the relevant literature, which begins with an introduction, language as a barrier in higher education institutions, globalization of Human Language Technologies (HLTs), evolution of language technologies, types of HLTs, adoption of HLTs, factors that discourage the adoption of a HLTs, statistical estimation of the adoption of HLTs, and the effects of Satisfaction and Trust. In addition, this chapter details the UTAUT theoretical framework as well as the conceptual framework adopted for this dissertation is presented.

Chapter 3 covers the used methodology to handle research. It addresses ethical considerations, including obtaining necessary permissions and clearances from relevant departments. Additionally, it discusses the target population, sample selection, and sample size. The section also delves into the data collection instruments and procedures, as well as the reliability and validity of these instruments. A concise description of the questionnaires utilized in the study has been emphasized.

Chapter 4 presents data analysis and discussion about findings. This section presents the descriptive analysis regarding socio-demographics including gender, age, and years of experience of use. It further looks at the findings of research results.

Chapter 5 serves as the concluding chapter of the dissertation. It begins by providing a comprehensive summary of the preceding chapters, highlighting their key points and contributions towards answering the research questions. The chapter proceeds to offer conclusive responses to the study questions based on the outcomes obtained throughout the research. Moreover, it examines constraints encountered during the research process and puts forth suggestions for future research undertakings. Finally, the

chapter concludes by providing a final overall conclusion that synthesizes the main findings, underscores the study significance and potentially suggests avenues for further investigation.

1.9 Summary

The initial chapter introduces the study phenomenon, specifically focusing on the perceptions of using IsiZulu Termbank technology at the University of KwaZulu-Natal. It provides a detailed examination of the adoption of IsiZulu Termbank Technology (ITB) within the university. The chapter elucidates the problem statement, research questions, and objectives, highlighting the importance of the study. Furthermore, this chapter provides an overview of the methodology of the study. The layout overview of the dissertation, spanning from Chapter 1 to Chapter 5, is also presented in this chapter. The next chapter provides a comprehensive literature review.

CHAPTER TW0: LITERATURE REVIEW

2.1 Introduction

This chapter outline an overview of the existing literature concerning the adoption of ITB (isiZulu Termbank). Literature gaps related to the questions of this study will be identified in order to determine its validity. As stated in the problem statement, five questions will be investigated. Technology adoption refers to the acceptance, utilization, and usage of technology in society (Granić, 2022b). In other words, when introducing a new system, it is important to remember that not all users of that system are created equal. It should also meet the needs of different types of end-users so that the maximum benefit from it can be achieved. As a starting point, this chapter briefly reviews the development of human language technologies in general. It then examines how human language technologies are adopted. Afterwards, the chapter moves on to the factors influencing technology adoption. It will look at the theoretical framework that will be used to analyse the data, as well as the explanation of that theoretical framework.

2.2 Language as a Barrier in Higher learning

South Africa is the southern country of Africa, located in the southernmost region of Africa (Adams & Rajkaran, 2021). South Africa is dominated by multi-ethnic and multicultural societies. South Africa being a diverse country, constituted eleven official languages (Mkhize & Balfour, 2017). Almost a quarter of South Africans (23%) speak IsiZulu as their home language. Other recognized languages consist of "isiXhosa (spoken by 16%), Afrikaans (13.5%), English (10%), Sesotho sa Leboa (9%), Setswana and Sesotho (both 8%), Xitsonga (4.5%), siSwati and Tshivenda (both 2.5%), and isiNdebele (2%)" (Alexander, 2023; Seethal, 2023). Historically, South Africa had a complex history of language policy periodically shaped by political interests (Keynes et al., 2021). As a result of the South African Liberation Movement in the early 19th century, English became the dominant language of communication (Dallywater, 2020). Consequently, English has been adopted as the primary language for instructional purposes for administration, education, business, and government states (Mzangwa, 2019). Although South Africa has 11 official languages, English is extensively used and holds a dominant position as the primary language in official and commercial domains throughout the country. This also made the influence of English increase rapidly in Higher education of South Africa. Another notable development has been the rise of black students entering universities following the end of Apartheid in 1994 when educational opportunities were extended to previously disadvantaged populations (Dukhan, 2020; Karlsson et al., 2020). Many students come from rural schools where teachers often utilize code-switching, employing multiple languages simultaneously, as a strategy to enhance students' understanding of complex concepts. Code-switching (also known as language mixing) is defined as the act of shifting between the learners' native language and other language, usually English with the purpose of making intricate concepts more understandable for students, including those in high school (Agbozo & ResCue, 2021; Maluleke, 2019). The consequence of this

code-switching is that a large number of learners were unable to develop English proficiency, which is crucial for academic success at the university level (Adler-Greene, 2019; MacCann et al., 2020). Nevertheless, the country continues to face significant challenges in ensuring equality in education because the educational system struggles to accommodate the needs of students who are not fully equipped to use English for teaching and learning. This was highlighted in the study of MacCann et al. (2020), where they elaborated that student performance is affected by a lack of content understanding. This notion was supported by Mlachila and Moeletsi (2019), who claimed that students are not challenged by answering the questions but are challenged by understanding what exactly is needed by the question (Nartiningrum & Nugroho, 2020). In South Africa, language is a complex issue that requires a great deal of attention.

In addition, a poor understanding of learning styles and insufficient writing skills make learning more difficult. Research findings have identified that students struggle to follow concepts from the lecture, which is exacerbated by the pace of the lecture. According to Tang et al. (2022), a lecturer's teaching style can act as an obstacle instead of allowing students to grasp content quickly and easily. Lecturers should provide the students with illustrations that are relevant to their understanding of the lesson. The study demonstrated that students in the English educational system have difficulty meeting academic standards. They struggle to keep up with school activities and homework, causing them to spend more time reading and revising what was covered during lecture hours (Rachmadtullah et al., 2020). In a very recent study, Zhao et al. (2021) examined the challenges encountered by non-native English-speaking students in the United States when accessing public libraries. The study found that these students often faced language barriers, limited knowledge of electronic resources, and difficulties in understanding library policies and procedures. Additionally, the research highlighted the need for improved support services and resources customized for the unique requirements of this demographic to improve their library experience and academic success (Zhao et al., 2021). While the primary focus of discussion remains on South Africa, these international references serve to highlight that similar issues exist within the study context. South African students who are not proficient in English often grapple with a lack of confidence due to language limitations, leading them to seek assistance from peers rather than librarians, mirroring the findings in the U.S. Additionally, the challenges faced by Japanese students studying in South Africa may closely parallel those of their counterparts in Canada. Language barriers can significantly impact students' self-assurance and hinder their ability to comfortably access and utilize school libraries (Ozdemir & Papi, 2022). This comparative perspective underscores the relevance of addressing language-related challenges within the South African educational landscape, emphasizing the importance of research within the broader context of international experiences. The language barriers experienced by non-English speaking students in Africa are related to speech, pronunciation, and poor writing skills. Among the major issues facing African students who study abroad is that their

lecturers are less supportive of them due to their English pronunciation when asking questions during classes (Gong et al., 2021).

The analysis of the South African study revealed that the academic language used in lectures hindered engineering students' ability to take notes during lectures, which led to poor outcomes. Between 43 and 60 percent of the participants were students with no prior exposure to English as home language. The study found that students who were learning English as a second language didn't realize that lecture slides were meant to be a starting point for developing a deeper understanding. They mistakenly viewed the slides as just text, rather than recognizing them as a foundation to build upon for a better grasp of the subject. Students faced a noticeable challenge in effectively transcribing information from slides and simultaneously taking notes while listening to the lecturer, leading to a negative impact on their comprehension during class and the thoroughness of their notes after class. According to students, they encountered difficulties in both replicating content from slides and capturing information provided through verbal explanations by the lecturers (Stander et al., 2022).

2.3 Globalization of Human Language Technology (HLTs)

Technological advancements have affected the methods of teaching and learning used in universities, including interaction and communication (Abbas et al., 2019). A huge number of higher educational institutions (HEIs) are increasingly utilizing human language technologies (HLT) (Christopher, 2021). HLTs exist because of technology and language. The HLTs approach involves using Information Systems and Technologies (IST) (e.g. the Internet, computers, mobile phones, etc.) to support language activities. There has been an increase in the number of HLTs developed and implemented in different educational institutions. Thus, there exist various types of Human Language Technologies (HLTs). For the scope of this study, HLTs encompass speech and text technology, language Termbank, and Spellcheckers (Liberman & Wayne, 2020).

HLT adoption in educational institutions is progressing slowly due to the complexity of maintaining and updating the current HLTs especially in African institutions (Ezumah, 2020; Nzimande, 2020). In the United States, higher education institutions' issues regarding machine translations and language databases created for research and project purposes, were similar to those in Europe. One important finding was that students and researchers were unfamiliar with the available language technologies including machine translations and language databases (Fidalgo et al., 2020). The investigation by Mager et al. (2018) indicated the slow progress of HLTs adoption, machine translations and language databases were not that much exposed to institutions throughout Europe and America. Language databases are a type of data storage used in the United States and Europe that houses texts, audio files, transcriptions, and linguistic documentation (Dash & Ramamoorthy, 2019).

The use of HLT tools (speech and text technology, language Termbank, and Spellcheckers etc.) can assist in the development of creative teaching strategies and is associated with methods like engaging learning. These tools serve as the strategy that provides a variety of benefits to students including increased motivation, increased participation, improved communication, and enhanced social skills (Kirchmeier et al., 2020). Language technology tools can help educators improve their understanding of how students learn cognitively by analysing how students respond to technology adoption and how the technology enhances student productivity (Ramuedzisi et al., 2019; Slater et al., 2017). An example of HLT tools that are largely implemented in developed institutions is text summarizers. Text summarizers have gained popularity in research departments. This tool is frequently used by students to conduct research since it cuts down on the time needed to go through lengthy texts, thus enabling students to read more documents than they normally do without using the text summarizer (Peter J. Liu, 2020).

HLTs are being adopted in different places for different purposes, but few institutions have been able to provide evidence around successful implementation. Speech and text technology is not generally used in higher education and adoption has been slow (Granić, 2022a). According to the end-users, there was a reported deficiency in knowledge regarding the utilization of speech and text technology, as well as a lack of adequate support (Dew et al., 2018). Training opportunities for end-users were designed according to the end-users' needs and perceptions of the intended populations in order to develop sufficient knowledge and confidence (Mahdum et al., 2019).

2.4 Evolution of Human Language Technologies (HLTs)

In today's globalized society, it has become imperative that people can communicate across languages. In order to promote strong relationships between individuals, meaningful communication is necessary (Fox, 2019). Language services and the technology that facilitates communication among people continue to grow as markets become more global and cultures interact more (Kessler, 2018). The vast majority of online services today are integrated with translation technology so that all or most content is available in multiple languages (Costa-jussà et al., 2022). As a result, Facebook and Twitter have become the highly favoured social media platforms. They both offer an artificial translation tool. The end-user is able to post in his preferred language and the post can be translated into many languages (Thompson & Post, 2020). These illustrations showcase the impact of language-related technological advancements on the growth and global presence of companies, the continuous adaptation of these technologies to meet market requirements, and the ways in which they facilitate effective cross-cultural interaction and communication.

The necessity for high-quality language tools is not a new idea. The understanding of the importance of communication between people has always been evident through translation activities dating back

approximately 3,000 years (Park et al., 2020). In Flickinger et al. (2021) view, language technology has evolved over time into three distinct phases. In the first phase, he describes it as the structural phase, in which drill-based grammar practice was offered to end-users on mainframe computers in order to make them better at grammar rules. A second phase of the process was the communicative phase (1980s to 1990s) which made extensive use of personal computers for communicative exercises that were aimed at improving accuracy and fluency through communication. In the final phase of the process, known as the integrative phase (21st Century), various mediums such as multimedia, the internet, and other technologies have been utilized to expose end-users to real-world language content. This exposure aims to enhance their accuracy, fluency, and ability to express themselves effectively. Due to the absence of audio and video capabilities during that period, Dyer (2022) have renamed the aforementioned stages as follows: 1) Dumb language technologies (1970s to 1980s); 2) Multimedia language technologies (1990s onwards); and 3) Web language technology (1993 onwards). At first, the web language technology used mostly behaviouristic activities because of the limited capabilities of the web, as web 2.0 emerged, sound and video quality got better, leading to increased engagement. It has also been proposed by Baumgärtel (2021) to make changes to Flickinger et al. (2021) phases in order to better reflect attitudes in the early years of language technology with respect to integrating technology into the classroom.

Language technology evolved during an era when hardware caught up to what we expected, and the Internet first offered a means of both information transfer and communication. A more important benefit may have been that it opened up the possibility of expanding our perspective beyond our own countries and language contexts. Eventually, people from around the world who were interested in this new and exciting medium technology began to meet each other and to get together in order to explore different projects and experiments in language technologies together. There have been a number of early experiments that used email and chat as their primary means of communication because they can be used on slower connections (Aceto et al., 2019; Heidari et al., 2022). In the early stages, students from different countries exchanged e-mail penpals, and regular chat sessions were conducted to facilitate an exchange of ideas between students from different cultures. After innovators of these technologies realized the potential benefits of these technologies, including expanding connections and bringing the world into the hands of individuals, it was only a matter of time before their maximum capabilities and extensive possibilities would be fully realized (Moshood et al., 2020; Munirathinam, 2020).

Despite more than half of the global population having integrated the internet into their daily lives for several years, it became apparent that language technology, despite its existence for a considerable period, was not being fully utilized (Joshi et al., 2020). Although more and more researchers are discovering the language technology projects almost every day, it remains crucial to remember that

HLTs are still relatively recent tools, considering that despite more than half of the global population having used the WIFI in their daily lives for several years, and that they can take some time for a new resource to become adopted by the general public (Blodgett et al., 2020). The accessibility of technology was hindered by the fact that end-users had to physically relocate between spaces in order to establish an internet connection, resulting in a disruption to the overall connectivity. An attempt was made to rectify the issue of access by the construction of computer labs in the past few years, and by placing one or two connecting towers and computers closer to the end-users, sometimes with a data connection, so that the whole end-users could enjoy the benefit of the computer resources. It has only been in the last few years that steps have been taken to remedy this situation (Greenstein, 2020).

It was clear from the very beginning that linguistic issues and the needs of language technology would need to be addressed, but the strategy adopted by the research community was to deal with syntax first, in order to make machine learning techniques applicable to syntax more immediately (Shorten et al., 2021). Some researchers have, however, devoted particular attention to linguistics, either because they saw it as the complex issue that semantically-driven processing would be a better approach because it was seen as the more challenging one (Kamath et al., 2019). The linguistic pattern matching method used by professionals was based on the use of conceptual case frames and linguistic categories (Kamath et al., 2019). Kulmanov et al. (2021) extended language semantics in the context of world knowledge as well as language networks as a device to represent knowledge. Chen et al. (2020) revealed that external knowledge was needed in interpreting and responding to language input and that semantics played an explicit role in representation and semantically-driven processing, as demonstrated by general-purpose semantics with case structures (Shorten et al., 2021).

A range of approaches has been utilized for the development of language technologies. However, the majority of these approaches rely on manually crafted rules that machines can understand and match (Sunitha et al., 2022). However, in the 1980s, a revolutionary field of technology was edging its way into a broad range of areas including computing (Johri et al., 2021). This transformation occurred within the realm of data-driven learning. The pivotal shift from manually defined rules to machine learning entailed the transition from explicitly specifying rules to developing algorithms that could acquire knowledge from data. Utilizing machine learning algorithms allowed for a more advanced and nuanced approach to interpreting and addressing ambiguity. It further provides evidence that will provide a sufficient basis for a decision to be taken (Sunitha et al., 2022). Numerous algorithms employ techniques such as if-then rules to infer the best possible outcome. Additionally, probabilistic algorithms serve as a support mechanism for the machine's decision-making process by offering sufficient confidence in the obtained results (Johri et al., 2021). As of right now, deep learning is becoming a significant trend in machine learning. Thus, deep learning is taking over when it comes to performing activities that are challenging to accomplish using straightforward rules and rigid criteria

(Johri et al., 2021). This is due to its dominance. Natural Language Processing (NLP) cannot provide a solution to the problem of ambiguity that is inherent in different languages if it is to deal with NLP. If a single word is used in a certain context, it may have multiple meanings. Therefore, it is impossible to create a rule for every meaning or to create a decision tree that represents all possible meanings for every word. With deep learning, this problem can be solved efficiently. This is because it eliminates the requirement for human intervention in specifying decision rules. Instead, the automated model derives the process of mapping input to output by examining the input and output data (Chang et al., 2021).

The goal of language technology is to make computers capable of understanding, interpreting, and manipulating the language of humans (Khyani et al., 2021). It has traditionally been the case that humans interact with computers through the use of programming languages. Achieving human-computer interaction through natural language can indeed be quite challenging. The inherent ambiguity, usage of colloquial language with unconventional meanings, and incorporation of social contexts in human language make the process of enabling effective interaction with computers complex and demanding (Chowdhary & Chowdhary, 2020; Razno, 2019). It becomes more difficult when one considers the accents of people from different regions, as people from different regions have varying accents when it comes to speaking the language. In the realm of language technologies, two primary tasks are encompassed: sentence structure analysis and language meaning analysis. Through sentence structure analysis, the arrangement of vocabularies in a paragraph is organized in a manner that ensures grammatical coherence, thereby enabling the construction of grammatically correct sentences (Pilehvar & Camacho-Collados, 2020). By employing this approach, machines can deduce the clear understanding conveyed by paragraph or sentence, this is done by examining the grammatical rules utilized within that sentence or paragraph. Language meaning is the process of discovering the meaning behind the words and how they are used within a sentence (Fitria, 2021). NLP uses it as a means of understanding a sentence's structure and meaning by using its semantic analysis (Li et al., 2021). In light of the copious amount of textual data available in its natural language format and the growing significance of language technology in machine learning, researchers in the domain of NLP have increasingly focused on language technology. While traditional language technology resources and methods are suitable, deep learning has completely transformed the entire process (Aarts et al., 2019).

Deep learning, specifically in the realm of machine learning, entails the application of neural networks with multiple layers to understand and process human language (Lauriola et al., 2022). As a subset of machine learning, deep learning models for NLP are designed to automatically learn intricate patterns and representations from text data (Janiesch et al., 2021). Deep learning is gaining tremendous traction due to the growth of the amount of data available today, there are a tremendous amount of data available, and the rate of increase continues to accelerate with the growth technological applications. There was a time when machine learning had a limited amount of data to work with, so it was not able to gain this

much exposure (Chatterjee et al., 2019). The computationally intensive requirements of deep learning models mandate the use of high-performance computers with accelerated processing capabilities. These capabilities are essential for effectively executing the algorithmic modelling and fitting processes at various levels. It is important to acknowledge that in previous times, the capabilities of machines were insufficient to meet the demands for high processing power. Fortunately, the positive development is that the necessary hardware for conducting deep learning operations is now readily accessible, enabling effective and efficient execution of such tasks (LeCun, 2019).

2.5 Types of HLTs

Over the past few years, the growing usage of the WIFI connection and internet has resulted in a substantial rise in the accessibility of online content, including written text, audio files, and recordings (Reitmaier et al., 2022). To allow end-users to maintain all this content properly, advanced tools focused on HLT must be created. These tools can deal with language at different stages. Several initiatives have been taken to incorporate African languages into the digital world since the arrival of language technology in Africa in the middle of the 1990s (Bangani, 2018). Different language technologies have been developed and implemented for different purposes. The following tools are developed, implemented, and largely dominated globally:

Spelling and grammar checkers: (Blazquez & Fan, 2019) defines this technology as one which identifies obvious mistakes in grammar and spelling by referring to an associated database (corpora, dictionaries, etc.) and a set of rules for correct usage. Frequently, they are available as software's of word-processing applications for personal computers or as stand-alone internet. It is difficult to use a spell checkers on documents that contain many foreign terms that are not included in the database since spell checkers usually cannot determine spelling errors. On the other hand, grammar checkers generally examine punctuation, sentence structure, and other aspects of style, referring to a set of rules (Fitria, 2021).

An analysis of end-users' attitudes towards portable spell checkers was conducted in Kuching Sarawak. The research discovered that, despite the assistance of spell-checkers in correcting spelling during a dictation exercise, users consistently made the same spelling errors even after using the tool. Consequently, the study concluded that although spell-checkers are successful in dealing with superficial errors, their ability to rectify errors at the cognitive level is minimal (Toraman & Akay, 2015). During the conducted study, machine learning-based proofreading tools such as Google Docs, MS Word, Ginger, Gingerly, and Trinka were examined alongside a human language checker. The objective was to evaluate their effectiveness in detecting errors and enhancing the readability of four crucial sentences in a scientific document authored by someone whose native language is not English. The findings of the study revealed that Grammarly and Trinka could only detect one error, and none of

the six significant enhancements to readability were recognized by any of the machine language checkers. Furthermore, the machine checkers also generated multiple inaccurate error identifications (Daly, 2021). These findings collectively emphasize the limitations of machine learning checkers in effectively identifying errors and enhancing readability. This suggests a research gap in understanding and improving the performance of spell-checkers and machine learning checkers, particularly in addressing errors at a cognitive level and improving the overall quality of written content.

Electronic dictionaries: Dictionaries reference book containing the meaning of words arranged alphabetically. Besides explaining words, dictionaries provide details such as pronunciation, grammar rules, synonyms, syntax, and alternate spellings (Müller et al., 2022). Overall, a dictionary is a collection of words and the information they contain. An excellent dictionary is an essential part of your university education. An electronic dictionary offers a large number of entries along with an easy-to-use search facility. An electronic dictionary can be searched by typing a word in the command line of the dictionary or by using the alphabetic root search tool (Müller et al., 2022). These days, electronic dictionaries are readily available on the Internet and are often consulted for vocabulary development. This is due to the fact that electronic dictionaries provide several advantages over paper dictionaries, including ease of use and speed (Kamilla, 2021).

End-users' perceptions of attitudes towards electronic dictionaries in education have been examined in several studies. Hakim et al. (2018) conducted an experiment in Iceland to examine the effectiveness of using paper and electronic dictionaries for terminology development. A paper dictionary was used by the control group, while an electronic dictionary was used by the experimental group. The outcome revealed that the experimental group showed significant improvement with regards to terminology development compared to the control group. Hakim et al. (2018) also investigated the effectiveness of electronic dictionaries in the studying of foreign languages by undergraduates in the arts and natural sciences. Electronic dictionaries were reported to have a number of very important advantages including the rapidity of reference. Familiarizing individuals with the information on grammatical category and collocations found in dictionaries can be valuable in boosting their ability to produce language effectively (Alhaisoni, 2016).

Wimhurst (2020) investigated how Japanese students use e-dictionaries to understand electronic content in Japanese. Even though e-dictionaries were beneficial for improving the reading ability of mid-level students, monolingual dictionary were most helpful for improving the reading ability of high-level students. Another study highlighted the problem of the usefulness of electronic dictionaries. Researcher surveyed three groups of science students from University of Islam. His findings indicated that students preferred electronic dictionaries to paper dictionaries and were enthusiastic about using electronic dictionaries in studying English (Oktriviani, 2022).

Text-to-speech and speech-to-text: Converting technology is a new and powerful artificial intelligence technology that assists end-users in converting text to speech or vice versa (Trivedi et al., 2018). Martínez-Plumed et al. (2021) mentioned out that a converting tool offers rapid information retrieval and a direct route to the desired data. However, Daly (2021) states that translations generated by converting tools may be inaccurate and lead to errors. Some researchers are currently conducting research on speech technologies as demonstrated by Ghounane (2020). In his research, Ghounane revealed that Arabian students did not make full use of all the text changer tools available, and they were not educated about how to use text changers appropriately.

The *e-text analyser* was found to be more effective than other text-to-speech systems. Sao et al. (2021) presented evidence that the e-text analyser facilitated faster reading for students compared to the original text duration. Moreover, it facilitates better memory recall in the context of vocabulary lecturing. Consequently, the e-text analyser is more efficient and effective at improving vocabulary comprehension. (Sao et al., 2021) further states that e-text analysers are not an obstacle to student writing efforts if the students are unaware of the output.

Translation tools: Translation tools have been defined as software that translate source language to targeted language (Khan, 2020). A machine translation tool is a very useful tool for bilingual speakers since it permits members to be capable of speaking and writing from the source language to the targeted language. Study results Ducar (2018) indicate that translation tools can be helpful for spreading information. Specifically, translation tools facilitate end-users building connections between forms and meanings. Although translation tools for African languages are less accurate than 60% according to researchers (Emezue & Dossou, 2022). Addressing this challenge necessitates a multifaceted approach. While more extensive training of machine learning algorithms is crucial, it is not the sole solution. Additionally, incorporating linguistic expertise and cultural context into algorithm development, fostering collaborations between technology experts and linguistic scholars, and continuously updating and refining the translation models are all essential strategies to improve the accuracy and effectiveness of translation tools for African languages (Costa-jussà et al., 2022; Ranathunga et al., 2023).

Khan et al. (2020) emphasizes that automated translation is simply not yet at a point where it can produce perfectly accurate translations on a regular basis. Despite dramatic advances in technology over the past decade, progress is still ongoing. As a result, after editing the translated document, the original meaning will no longer be accurate. However, Maučec and Donaj (2019) demonstrated that machine translation is quicker than human translation. A professional translator can translate approximately 2,000 words per day while a machine can produce thousands of words per minute. Although the output is not in its final form right away, it can be useful in certain situations. Even with the addition of a final edit, translating by a machine remains faster than translating by a human. The quality of machine

translation is crucial when it is used for multilingual communication. Machine translation is not only a method of communication in personal or everyday situations, but it is also used in situations of significant importance. Several authors have raised concerns about the significant dangers machine translation mistakes pose in the departments such as medical care, banking industries, and media. It is especially important to avoid misusing machine translation in critical situations (Nekoto et al., 2020).

Chatbots Applications that are specifically created to imitate human conversation and engage with users through messaging or speech interfaces (Kim et al., 2019; Rapp et al., 2021). Chatbots can be used for a variety of purposes, such as e-commerce, banking, finance, and entertainment (Kim et al., 2019). They can also be integrated into messaging apps, websites, and social media platforms to provide instant responses to end-users. Chatbots can be programmed to handle simple tasks, such as content delivering, or complex tasks, such as content delivering and support. They can also learn from their interactions with end-users, improving their responses over time. The use of chatbots is widespread today. Here are a few of the most well-known. Amazon Alexa functions as a voice-activated assistant that possesses the ability to play music, provide answers to queries, control smart home devices, and perform various other tasks and functionalities (Jimenez et al., 2021). Google Assistant is a virtual assistant that was created by the company that uses natural language processing to provide answers, offer advice, and carry out activities (Wang et al., 2022). Microsoft virtual assistant Cortana can assist end-users with things including creating reminders, making appointments, and providing information (Adamopoulou & Moussiades, 2020). Slackbot is a chatbot that is a part of the well-known team communication tool Slack. It is programmed to do activities like organizing meetings, responding to commonly asked queries, and sending reminders (Stoeckli et al., 2020). The GPT-3 chatbot known as (ChatGPT) was created by OpenAI and released on 30 November 2022, is one of the newest in existence. GPT-3 is a deep learning language algorithm used to carry out a variety of language tasks, including translation, summarization, and question-answering, using deep learning to create human-like text in response to prompts (Taecharungroj, 2023).

African types of HLTs: The progress made in language technology tools and systems in Africa is attributable to both finished and in-progress research conducted in the domains of deep learning, humanities, computer science, and big data (Khurana et al., 2022; Nekoto et al., 2020). The development of language technology applications in general is highly dependent on the availability of digital language resources. Therefore, the development of these resources remains one of the main functions of research entities and private organizations involved in advancement of technology.

The African Language Technology Initiative (ALT-i) operates in Nigeria as a research and development agency whose mission is to take African culture into the knowledge age. Among the research and development projects were Microsoft Windows Office, machine translation, corpus development, and

speech recognition. The ALT-i website does not contain any language resources produced by the agency (Arikpo & Dickson, 2018).

Teknobyte, a Kenyan company established nearly two decades ago, has been engaged in language technology research and development, focusing primarily on the development of speech synthesis systems in Swahili (Roux & Ndinga-Koumba-Binza, 2019). In Africa, South Africa has the highest percentage of research and development institutions dedicated to language technologies and resources specifically tailored for African languages. In universities across the country, research is predominantly conducted in the areas of engineering, computer science, and information technology, CSIR Meraka's Human Language Technologies and North-West University's Speech Technology specialize in the development of speech technology (Roux & Ndinga-Koumba-Binza, 2019). CSIR Meraka's HLT group was formally created in 2003. In the developing world, where resources are scarce, speech is quite resource intensive, so these groups have developed creative solutions to problems such as the creation of pronunciation dictionaries and a usable speech corpus. Those teams are also developing speech-based services to enhance access to information in environments where conventional information technology has not yet been adopted - for example, extending telephony to rural areas (Soe et al., 2021).

The University Language Planning and Development Office (ULPDO) at KwaZulu-Natal University has been compiling three types of corpora for the IsiZulu language. The corpora are used exclusively for research and student training, specifically in the fields of lexicography, terminology, computer science, information technology, linguistics and corpus-based translation studies. A monolingual corpus consists of 31 million tokens, a speech corpus consists of 143 hours, and a bilingual corpus consists of 34 000 aligned sentences. The isiZulu Spellchecker has been developed based on the monolingual corpora, while the isiZulu Termbank has been developed using the terms developed for isiZulu (Khumalo, 2017). Among the many HLTs in Africa, the ones listed above are the most common and well known.

2.6 Adoption of HLTs

Many universities have experienced a digital transformation sooner than expected. A growing number of computer labs, along with technologies and the Internet, has sparked interest in higher education institutions. The issues facing universities are to ensure high standards of education, within a relatively fixed budget, while also meeting the expectations of students and society. Studies have shown that, although there is a growing effort in higher institutions to integrate information technology into the curriculum, academics have typically taken longer than expected to adopt technology (Goh & Sigala, 2020). The results of the investigation indicate that barriers to technology in education in Canada are similar to those in Sweden. One of the most notable findings was the issue of institutional unwillingness. Some institutions adopt new ways of teaching and learning with technology, while others resist it. To

gain a comprehensive understanding of how technology can be effectively adopted and implemented for educational purposes in higher education institutions, it is imperative to critically assess previous research on technology adoption (Iglesias-Pradas et al., 2021).

An analysis of the literature revealed a strong orientation toward a perspective focusing on behavioural intentions. Essentially, the idea is that the end-user is aware of the reasons for choosing to adopt technology therefore, adoption can be attributed to personal factors (Granić & Marangunić, 2019). Previous studies have indicated that end-users' intentions to adopt technology are likely to be influenced by their attitude, cognitive, and/or normative assessments of the technology, the social system, the target task, and the context in which it will be used (Rahi & Ghani, 2019).
Kumar et al. (2019) provides an explanation emphasizing the immense value of language technology corpora (big data) and outlines a three-step process. The initial step involves system installation, followed by constructing the data flow. Subsequently, after data collection, it becomes possible to analyze, transform, visualize, and develop machine learning technologies utilizing the corpora. As an alternative, Li (2021) has designed a corpus-based adoption framework. This framework encompasses different sequential steps: including data discovery and implementation. Although most authors follow similar steps, they use different vocabularies.

The South African government has also supported initiatives to promote multilingualism and the advancement of all official languages (Mohlahlo & Ditsele, 2022). The Autshumato Project was initiated in 2007 within the Department of Sports, Arts and Culture. In South Africa, about 30% of the government employees adopted the tool. The tool helps to improve the translation process and provide more accessibility to information for every South African through the development, release, and support of open-source translation technologies. Creating online translation tools offers a pathway to enhance the standing and promote equitable utilization of all South African languages (Skosana & Mlambo, 2021). The study examined the positive and negative aspects of automating machine translations, and among other changes, it recommended adding specialized parallel corpora from a range of contemporary fields for all authorized languages and consulting language experts when preparing test samples to increase the level of adoption and usage of machine translations.

2.7 Benefits of HLTs adoption

The use of HLTs has numerous advantages in a variety of industries. For instance, customer service chatbots driven by NLP methods allow businesses to offer customers effective and individualized support, boosting their overall experience (Patel & Trivedi, 2020). HLT technologies play a pivotal role in enhancing communication by offering valuable resources such as translation, transcription, and speech recognition tools. These tools demonstrate instrumental in facilitating effective communication between individuals, particularly in scenarios where language barriers exist, or individuals face

challenges related to speech or hearing disabilities (Battina & Lakshmisri, 2022). By leveraging HLT technologies, individuals can bridge linguistic gaps and communicate more efficiently, irrespective of their native languages or communication limitations. The deployment of voice recognition technologies in the healthcare industry enables accurate and efficient transcription of medical records, saving time for healthcare workers and enhancing patient care (Milne-Ives et al., 2020). HLT technologies enable more efficient information retrieval from vast amounts of textual data (Kumar et al., 2019). Through techniques such as text mining and information extraction, HLT tools can extract relevant information, identify patterns, and generate valuable insights. This facilitates better decision-making, knowledge discovery, and data-driven research (Li, 2021). These illustrations show the wide range of advantages that using human language technology can have for different areas and companies.

2.8 Benefits of HLTs adoption in education

The adoption of Human Language Technologies (HLT) brings about a myriad of advantages across diverse industries. One prominent area where HLT has showcased its transformative potential is in education. Within this context, HLT have ushered in a new era of learning and communication. In education, personalized learning has gained significant momentum through the implementation of HLT solutions. Adaptive learning platforms, harnessing the power of natural language processing (NLP), have redefined how students acquire knowledge. These platforms intelligently assess individual students' strengths and weaknesses, tailoring educational content customized to suit their particular requirements and rate of learning (Alamri et al., 2021). The result is a more efficient and engaging learning experience, ultimately leading to improved student outcomes.

Moreover, HLT tools have broken down linguistic barriers, enabling global collaboration among students and educators. With features like real-time language translation and pronunciation feedback, language learning has become more accessible and effective (Hou et al., 2019). Students can seamlessly communicate and collaborate with peers from around the world, enriching their cultural and educational experiences. HLT tools have also revolutionized data management and research by enabling efficient information retrieval from vast textual datasets, facilitating data-driven decision-making and knowledge discovery (Olivetti et al., 2020). In essence, Human Language Technologies have demonstrated their versatility and transformative potential across different sectors, including education, where they have redefined personalized learning and global collaboration.

2.9 Challenges of HLT adoption in Education

This section discusses the obstacles related with the integration of Human Language Technology (HLT) within the educational realm. The aim is to provide a comprehensive view of the multifaceted landscape of HLT adoption in education, complementing its benefits which have been covered in section 2.7 and 2.8. Within the field of Natural Language Processing (NLP), several challenges are ever-evolving.

Major challenges arise from the inherent difficulties in accurately analysing and grasping the subtleties of human language, especially in situations with multiple languages or various dialects (Bommasani et al., 2021). Deep learning technologies have made notable advancements in addressing certain challenges related to NLP. However, it is essential to underscore that deep learning, while promising, does not entirely eradicate all issues, especially in African languages. Challenges such as context comprehension, sentiment analysis, and cultural sensitivity continue to be relevant, particularly in educational settings (Baker, 2019; Zhang et al., 2022). One of the complexities inherent in HLT integration in education is the recognition of linguistic variations and their consequences on educational outcomes. Dialects, for example, significantly influence inflections and sentence structures, posing challenges for the automated analysis of student responses (Al-Thanyyan & Azmi, 2023). These variations gain particular significance in multicultural or linguistically diverse educational environments, necessitating careful consideration in the design and deployment of HLT-based educational tools (Al-Thanyyan & Azmi, 2023). A notable drawback of deep learning in the context of HLT adoption in education is its resource-intensive nature, demanding significant computational power and time. Not all educational institutions may have access to these resources, and time constraints pose a major concern. This limitation underscores the practical challenges that institutions may encounter when implementing HLT solutions (Ding et al., 2023).

2.10 Challenges in the adoption of a HLTs

Understanding the challenges that hinder the adoption of human language technologies (HLT) is as essential as comprehending the factors influencing end-user's adoption and usage. These challenges can potentially be transformed into factors encouraging the adoption of HLT. For instance, a recent study conducted in India identified government laws addressing security concerns and inadequate end-user protection as primary reasons for the limited adoption of language systems (Mishra et al., 2021). Similarly, other research has shown that government policies and protocols can hinder the acceptance of HLTs, contributing to the lack of adoption (Ullah et al., 2021). In addition to policy-related challenges, there is a substantial cost associated with HLT adoption, which is a significant hurdle, especially in developing countries (Almaiah et al., 2020). Human Language Technology Infrastructure encompasses both the necessary hardware and software for efficient data transfer and the network components that facilitate such transfers (Ma, 2021). Moreover, the availability of qualified professionals who can design, install, maintain, and repair HLT systems is crucial. In developing regions, such as many African countries, there is a glaring lack of basic infrastructure (Selmi, 2023). This limitation impedes the smooth integration and adoption of technology in these regions, leading to increased costs for accessing language services in recent years. Typically, developing countries rely on what are often referred to as 'internet access point' as sources of internet access. These 'Internet stations' can be found mainly in larger cities across the nation and serve as essential internet access points (Hjort & Poulsen, 2019). While these internet access points are more prevalent in urban areas, their availability

may be limited or absent in rural regions. A multifaceted approach is necessary to overcome these challenges, encompassing policy reform, infrastructure development, and the cultivation of a skilled workforce to drive successful HLT adoption in developing countries.

Human Language Technology Infrastructure is composed of all the hardware and software that are necessary for the efficient and effective transfer of data in order to serve many purposes as well as the components that make up the network systems that facilitate the transfer (Ma, 2021). Likewise, there is a need for skilled professionals to be able to design, install, maintain, and repair systems in the field of HLT. There is a slowdown in the adoption of human language technologies in African regions because there is a lack of basic infrastructure (Joubert et al., 2023). Undoubtedly, developing countries face challenges in terms of infrastructure and networks required for seamless transfer, implementation, and development of information technology. This limitation hampers the smooth integration and adoption of technology in these regions. Thus, the cost of accessing language services has become increasingly expensive in recent years. Usually, developing countries have Internet stations operating as a source of access to the Internet, and these Internet stations can be found mainly in large cities across the nation (Reglitz, 2020).

The limited access to the Internet and WIFI connectivity is one of the primary causes for Ghana's limited Internet usage (Siaw et al., 2020). The majority of people do not own a computer of their own. Therefore, they use public services for accessing the Internet. These services are available in cities that are operated by public companies. There is a low number of individuals with the opportunity to utilize the Internet. According to this information, there are still some areas of Ghana that are not able to access the internet. The challenge stems from the fact that a significant segment of the population lives in remote rural regions. Therefore, the challenge lies in ensuring access to these remote areas and enhancing service delivery for individuals living in these small communities. Mutenyo et al. (2022) found that a relatively small percentage of Ugandans utilize the Internet, primarily due to inadequate computer skills, restricted connectivity, and the absence of personal computers. Additionally, in other East African countries such as Tanzania and Kenya, public internet services are mostly the only way to obtain information and communications on the Internet for information and communication. Maphosa (2021) reports that about 29.1 percent of the households in Zimbabwe have access to the Internet and only 2 percent of their households have a computer. Generally, penetration refers to the number of people in a given population who are able to connect and use the Internet as a result of its availability (Mammadli & Klivak, 2020). Figure 2. 1 presents data on the extent of internet connectivity in different world regions. Internet accessibility rate denotes the proportion of the populace with the capability to use the internet. Notably, Africa exhibits the lowest internet accessibility rate, with only 43.2% of its population having internet connectivity. This is followed by Asia (67.0%), Oceania/Australia (70.1%), Middle East (77.1%), Latin America/Caribbean (80.5%), Europe (89.2%), and North America (93.4%).

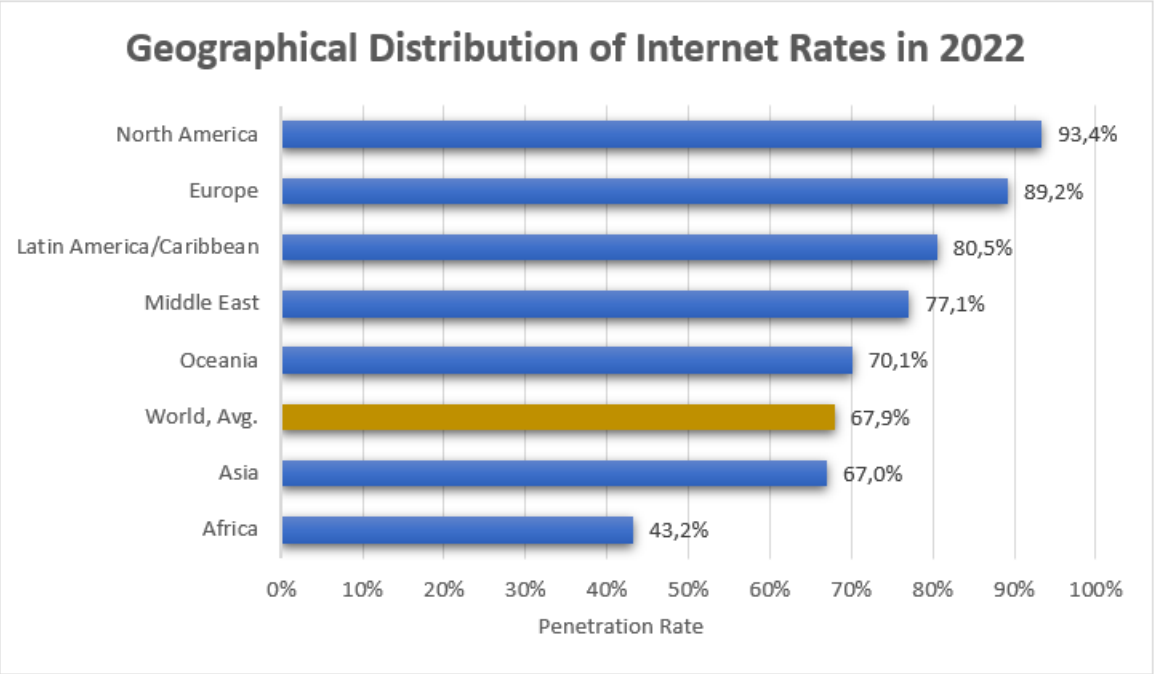


Figure 2. 1: Internet world penetration rate, source: (Stats, 2022)

There is a limited number of HLT professionals who are capable of designing, programming, installing, configuring, and maintaining human language technologies in developing countries. A significant hindrance to the adoption and development of HLT in this region is the lack of qualified and globally recognized HLT professionals. There is an overlap between development skills and development goals, and as a result, both require human skills to be developed. Although there is a growing awareness of the importance of human language technology for enhancement, many underdeveloped countries are lacking enough graduates and technologists in the field of language and technology. University and polytechnic institutions still have restricted availability of advance computing and the connectivity, despite the accessibility of the Internet throughout the world (Granić & Marangunić, 2019).

Based on interviews conducted with educators throughout Mid America, it was concluded that the four major challenges are lack of technology funding, limited sharing of best practices between systems, a lack of technical support personnel, and the need for faculty and staff to be released and trained on technology (Ilomäki & Lakkala, 2018). Among the factors reported by Bao (2020), faculty at Chinese universities face obstacles because of the absence of institutional support, restricted funding, and time constraints for learning and implementing new technologies in their teaching practices. Therefore, it is impossible for those faculty members to incorporate language technology into their teaching practices. Toufaily et al. (2021) conducted an in-depth investigation of 46 members at public and private sectors in blockchain technology adoption. The researchers discovered that factors such as the dependability of technology, the process of learning to use new technologies, uncertainty regarding its value, and

inadequate institutional support played significant roles in influencing the acceptance of a new technology.

The lack of standards and interoperability in the HLT field poses a significant barrier. Without standardized protocols and frameworks, integrating HLT solutions into existing workflows becomes challenging. Different systems may use incompatible data formats, making it difficult to exchange and share data seamlessly across platforms. This lack of interoperability restricts collaboration and knowledge sharing between organizations and inhibits the scalability of HLT solutions. Moreover, the absence of standards hinders the development of consistent evaluation metrics for HLT systems. The lack of universally accepted benchmarks and evaluation criteria makes it challenging to compare and assess the performance of different language technologies accurately. This creates uncertainty and makes it harder for organizations to make informed decisions about adopting specific HLT solutions (Česonis, 2020).

Adopting language technology in education is one of the most challenging and time-consuming tasks in educational technology, which necessitates a deep understanding of how students and instructors think and perceive technology and learning. As Magen-Nagar and Firstater (2019) in their study demonstrated that regarding the integration of technology into the learning and teaching environment, a teacher's pedagogical beliefs play a major role. A conclusion from the study in Malaysia suggests that teachers from language departments who advocate student-centred education approaches are likely to engage in constructivist teaching methods in their classrooms and they are also likely to make use of technology in project-based learning activities such as inquiry-based learning to enhance their own teaching (Benlahcene et al., 2020). Due to the utilization of technology in these tasks, it demands a significant amount of time, which frequently becomes a limitation when it comes to course coverage and the quality of student performance in these courses. Parents, for instance, are more likely to focus on their child's academic achievements than the way knowledge is being passed on from one generation to another. As a result of parents' demands for technology in the classroom, teachers are often left in a state of confusion when it relates to issues relating to the integration of language technology into the classroom (Benlahcene et al., 2020). A significant discovery from the study on Technological, Pedagogical, and Content Knowledge (TPACK) teachers showed that student achievement plays a crucial role in influencing teachers' adoption of language technology in their lesson plans, particularly among those who prioritize learner-centred instruction (Schmid et al., 2021).

Many potential users and stakeholders may have limited exposure to HLT technologies, resulting in a lack of familiarity with their capabilities and applications. As a result, they may not fully comprehend how HLT can enhance their operations or address their specific needs. Misconceptions and misunderstandings about HLT can further impede adoption. Some individuals may hold outdated or

inaccurate beliefs about the effectiveness or limitations of HLT systems. They may view HLT as experimental or unreliable, based on outdated information or experiences with earlier generations of language technologies. These misconceptions create scepticism and resistance towards adopting HLT. Additionally, the technical nature of HLT can contribute to the lack of awareness and understanding. HLT involves complex algorithms, machine learning techniques, and natural language processing, which may be unfamiliar to non-technical users. The terminology and technical jargon associated with HLT can be daunting and create a barrier for individuals who are not well-versed in the field. As a result, they may hesitate to explore HLT solutions or may underestimate their potential benefits (Artola & Rigau, 2022).

Language complexity and diversity pose significant challenges to the adoption of HLT. HLT systems need to be capable of processing and understanding a wide range of languages, dialects, and linguistic variations. Each language has its own unique grammar rules, syntax, vocabulary, and cultural nuances, making it challenging to develop language models and technologies that can accurately capture and interpret the complexities of different languages. Creating robust language models requires extensive linguistic resources, such as annotated data sets, lexicons, and grammatical rules specific to each language. Gathering and curating these resources can be a process that consumes a significant amount of time and labour. Additionally, training language models to effectively handle linguistic variations and dialects adds an extra layer of complexity. This complexity in language processing hampers the development of comprehensive and accurate HLT systems, limiting their widespread adoption (Steve, 2023).

2.11 Statistical estimation of the adoption of HLTs

The HLT Network of SA, the stakeholder's assembly in the field of Human Language Technology (HLT) in the country, conducted a comprehensive technological analysis of the HLT landscape in South Africa. This analysis was sponsored by the Department of Science and Technology (DST) and served as a valuable resource for the community. Various measures were developed as a result of the survey to give a more detailed picture of the status of South African languages in the local HLT context based on the outcome of HLT Network analysis. This score is a summary of the general condition of HLT development for the eleven official South African languages based on a comparison of their HLT language performance scores. Based on this measure, the South African languages can be compared according to the amount, quality, and accessibility of HLT tools, data, modules, and applications within a particular language, as well as the degree to which the results of the HLT program have been developed in South Africa and are available for purchase; see Figure 2. 2 .There seems to be a clear pattern in this data: English (Engl) is the most common language, followed by South African Afrikaans (Afr), followed by isiZulu (Zul), isiXhosa (Xho), Sepedi, Setswana (Nso), and Sesotho (Tsn), mainly

spoken by native speakers and finally, smaller languages such as Tshivenda (Veb), siSwati (Ssw), isiNdebele (Li), and Xitsonga (Nbl) (Calteaux, 2020).

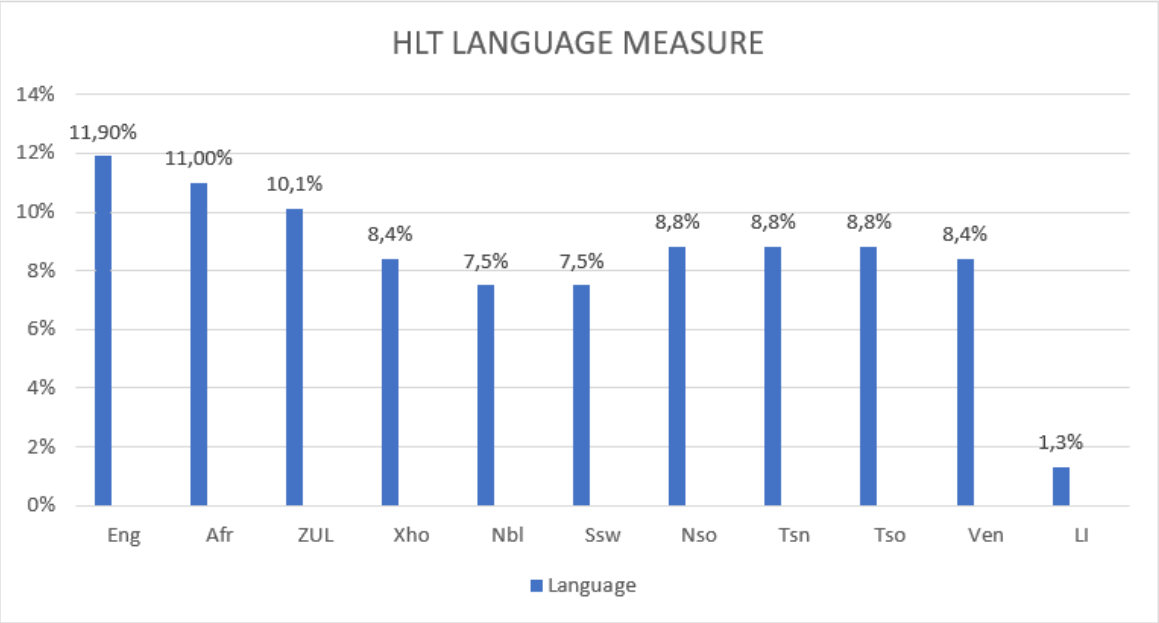


Figure 2. 2: HLT Language measure, source: (Calteaux, 2020).

2.12 Theoretical framework

A variety of factors play a role in the HLT's adoption, as some end-users are very interested in using it while others have difficulty doing so for various reasons. Several studies have examined technology adoption factors (Estriegana et al., 2019; Kamal et al., 2020; Salloum et al., 2019). Learning about these factors can help determine the aspects that perceive end-users to adopt HLTs. Technology adoption is better comprehended by exploring its types, attributes, theories, and key constituents in HLT contexts based on their attributes and types. There are a number of frameworks that have been proposed with different factors to explain technology adoption declining, including but not limited to DOI, TOA, TRA, TAM, and UTAUT.

The Diffusion of Innovation (DOI)

Rogers et al. (2014) explain this theory as the dissemination of innovations through specific channels over an extended period. A DOI theory describes the process by which individuals or groups adopt innovations as well as the factors involved in their decision to do so. Several studies have found that DOI has a strong theoretical basis and the five factors have helped explain some adoption patterns (Scott et al., 2008). A study by Lee and Kozar (2008) examined American computer end-users' anti-spyware adoption using DOI. Nevertheless, Goh and Sigala (2020) points out two drawbacks to DOIs, especially when it comes to innovation in organizations. The initial focus of the framework centres around the attitude and behaviour of the end-user when it comes to adopting innovations. One problem with DOI

that Hassan and Abbas (2019) mentioned was its inability to handle innovation adoption. Thus, the DOI model does not explain IS adoption in organizations well. Warner et al. (2021) says the DOI explains nothing about how an attitude develops, how adoption intentions develop, or how adoption actually happens. However, there are some unique aspects to the pre-adoption and adoption decision stages of adoption. Additionally, scholars have combined DOI with other theories to understand the attitude, intention, and behaviour (Jiang et al., 2021). According to DOI theory, there are a few characteristics that contribute to the diffusion of new technology. Rogers et al. (2019, pp. 415-434) has suggested that "relative advantage, compatibility, complexity, trialability, and observability" of new innovations influence people's attitudes.

Relative Advantage; Rogers et al. (2019, pp. 415-434) defined relative advantage as" the degree to which an innovation is perceived as being better than the idea it supersedes". Elements of relative advantage in innovation incorporate cost-related and social status-driven incentives. Innovators are often driven by social status when adopting innovations. In contrast, the late majority and laggards place less importance on status. Furthermore, Rogers classified innovations into two clear-cut categories: preventive innovations and incremental innovations. A preventive innovation is an idea that individuals adopt to reduce the likelihood of an undesirable future event (Sahin, 2006). The acceptance of preventive innovations is often sluggish, making their potential advantages uncertain. Conversely, incremental innovations yield favourable results within a brief timeframe. When educators encounter new challenges, they are more likely to embrace technology as a solution (Sahin, 2006). If teachers recognize the value of technology in their teaching practices, they will incorporate it. To effectively integrate technology into teacher education programs, faculty members overseeing teacher training should acknowledge the importance of offering valuable learning experiences for both themselves and their students. (Sahin, 2006).

Compatibility is seen as identical to relative advantage in some diffusion research, despite the fact that they have different conceptual approaches. Rogers et al. (2014) noted that "compatibility refers to an innovation's fit with the existing values, past experiences, and needs of potential consumers". The absence of compatibility between technology and the individual's needs may negatively impact the person's use of technology (Ajzen, 2020). A literature review conducted by Granić and Marangunić (2019) notes that every technological advancement impacts academic's perceptions, attitudes, preferences, and ideas regarding education. By aligning technology advancements with end-user expectations, ambiguity will be reduced and the level of adoption will increase. Hence, even naming technology advancements is crucial to compatibility. It should be clear to the end-user what the technology advancement is called.

Complexity; Rogers et al. (2014) characterized complexity in terms of "the degree to which an innovation is perceived as relatively difficult to understand and use". Unlike other factors, Rogers stated that complexity negatively affects adoption levels. A complex innovation will have difficulty in being

adopted, so it is important to minimize its complexity. It might be difficult for academics to integrate technological advancements into their curriculum due to the difficulty of altering their pedagogies Sahin (2006), which might result in a different level of complexity. The delivery of teaching materials might be successful if technology is easy to use (Aldosemani et al., 2019).

Trialability; According to Rogers et al. (2014), "trialability is the degree to which an innovation may be experimented with on a limited basis". Also, trialability has a positive relationship with adoption levels. The adoption of a new technology is more likely when it is implemented more frequently or widely. In turn, end-users who adopt the innovation may improve it. The adoption of the innovation may be sped up through enhanced reinvention. Early adopters tend to place greater importance on the trialability attribute of innovations compared to later adopters (Burghard & Dütschke, 2019).

Observability; A final attribute of innovation is observability. Rogers et al. (2014) described observability as "the degree to which the results of an innovation are visible to others". Technology adoption and diffusion are largely motivated by role models (Toufaily et al., 2021). An innovation's observability is positively correlated with its adoption rate, as well as its relative advantage, compatibility, and trialability.

The overall conclusion of Rogers et al. (2014) is that Technologies that possess higher relative advantage, compatibility, simplicity, trialability, and observability characteristics have a greater likelihood of being accepted easily and more rapidly. These favourable attributes increase the potential for successful adoption of such technologies. Nevertheless, research has demonstrated that all of these variables have a great impact in impacting the likelihood of participants accepting new technology into their teaching practices. (Chao, 2019).

Technology, Organization, and Environment Framework

Technology-organization-environment (TOE) is a conceptual structure introduced by Tornatzky and Fleischer in The Processes of Technological Innovation (Baker, 2012). Several situations have been examined using the TOE framework, including studies related to business (Jere & Ngidi, 2020). There have been several studies that demonstrate the validity of the TOE framework in clarifying and measuring willingness to adopt new technologies (Jere & Ngidi, 2020). Based on the TOE framework, a company's decision to adopt and embrace a new technology can be influenced by three variables. This framework posits that three factors are important for technological innovation to occur: technology, structural, and environmental factors (Al Hadwer et al., 2021).

*Technological Contex*t, Innovation traits are widely examined in the literature on the adoption of new technologies. According to Almaiah and Almulhem (2018), technologies are adopted based on their qualities as perceived by end-users. Adoption is believed to be influenced by five factors: "relative advantage, compatibility, complexity, observability, and trialability. The Rogers' factors have been used

as a theoretical framework in several studies on technology adoption" (Almaiah & Almulhem, 2018). According to Ho et al. (2020), ten factors were analysed and synthesized, including technological' five factors, were often mentioned. Consistently, innovation behaviours showed consistent relationships with compatibility, relative advantage, and complexity among the identified factors. However, the relative advantage is the only factor that has been continuously recognized as a significant adoption factor, and as the driving force behind IT, especially in small businesses. One of the critical components contributing to the adoption of EDI in the first application was the relative advantage it offered (Singh & Mansotra, 2019). A technology context applies to both internal and external technologies, as well as equipment and processes. Additionally, this context discusses the use of old and new technologies by businesses that are deemed suitable.

Organizational context: Organizational factors are factors that distinguish a business, such as the size of the business, its financial resources, its IT knowledge, and the support of the top management, as well as its communication channels and choice-making procedures (Hanelt et al., 2021). Zhou et al. (2020) outline that "an organization's organizational context influences the adoption of technology, as well as its implementation". Top managers either impede or promote organizational change (Sun et al., 2018). Consequently, the organization's top management holds the authority to determine which IT systems can be adopted within the organization. Moreover, top management offers funding for IT system adoption, thereby playing an important role in IT system adoption. An organization's scope and size are important factors in determining whether it adopts technology (Sun et al., 2018).

Environmental context: A perspective on the environment includes organizational sectors, technology vendors, and environmental rules (Antoni et al., 2020). Research has demonstrated that organizations operating within burgeoning industries are inclined to embrace technology at a faster pace compared to those in established or declining sectors (Markard, 2020). Industries that are growing quickly invest in technology to increase output and lower labour costs, particularly if paying them is expensive. Keeping up with the competition requires businesses to adopt new technology (Mathivanan et al., 2021). Furthermore, government agencies determine if an organization can use a particular technology to comply with certain requirements. Organizations engage with other businesses, families, industries, and governments, which can influence the use of new ICT. The adoption of ICTs can be impacted by elements such as individuals, government, IT experts, and the competitive environment (Singh et al., 2019).

Theory of Reasoned Action (TRA)

Theory of Reasoned Action is a conceptual framework introduced by Fishbein (1979), offers a framework for comprehending the connection between beliefs, attitudes, and the desired objectives. It suggests that behavioural intention, which corresponds to the Theory of Reasoned Action (Ajzen, 2020). plays a crucial role in influencing one's behaviour (Fishbein, 1979). Fishbein proposed that behavioural intentions are influenced by two elements: attitude and subjective norm. Attitude toward behaviour

refers to an individual's anticipation of the positive or negative emotions they will experience while performing the intended action, while subjective norm pertains to how an individual interprets the societal pressure and burden associated with engaging in the targeted activities(Asadi et al., 2021).

Technology Acceptance Model (TAM)

In 1989, David Bagozzi introduced his Technology Acceptance Model (TAM) Theory (Chuttur, 2009). The theory, which originated from Fishbein and Ajzen (2011) Theory of Reasoned Action (TRA), was designed to assess the comprehension and acceptance of novel technologies. The underlying principle of this theory says that in the context of technology acceptance, behaviour is not solely determined by general attitudes towards behaviours but is instead influenced by individual perceptions (Chuttur, 2009). A TAM is designed to provide insight to developers, administrators, and practitioners of steps to take before deploying technologies. Several procedures were performed in order to achieve the purpose of the model (Chuttur, 2009). Davis' work has been shown by Qader et al. (2022) that TAM is one of the simplest and parsimonious methods of investigating technology adoption. The TAM (Technology Acceptance Model) utilizes two factors, namely Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), to assess the user's attitude towards the use of information and communication technology (ICT).

- *Perceived usefulness (PU)* is "the degree to which a person believes that using a particular system would enhance his or her job performance" (Lanlan et al., 2019). Generally, people tend to use technology to accomplish their tasks that they think will help them.

- *Perceived ease of use (PEOU)* as "the degree to which a person believes that using a particular system would be free of effort" (Lanlan et al., 2019).

The key difference between TAM and TRA is that TAM assumes that individual behaviour determines the actual use of a system. In contrast to the Theory of Reasoned Action, which proposes that behaviour is directly influenced by attitudes and subjective norms, the Technology Acceptance Model (TAM) elucidates that behaviours are interdependently influenced by perceived usefulness and attitude. In TAM, perceived usefulness and attitude towards use interact with each other to shape the behaviour of individuals towards adopting and using technology (Alshammari & Rosli, 2020).

The Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT examines the introduction, diffusion, and acceptance of technology and develops a theory understanding of their acceptance (Ammenwerth, 2019). The framework considers a number of frameworks and theories to identify intention (age, gender, voluntarily, and experience) based on variables (effort expectation, performance expectation, facilitating conditions, and social influence) that influence adoption and use (Williams et al., 2015). In response to the technology adoption, several

theoretical frameworks have been developed. A number of components are included in these frameworks, and they help identify how technology adoption will take place. To determine the characteristics of technology adoption for this research, the research will apply the model provided by Venkatesh et al. (2003) to determine the characteristics of technology adoption. While the model serves as a valuable tool for measuring the acceptance of technology, it also considers the social aspect of technology adoption and its utility for end-users. These measurements of technology adoption are closely linked. UTAUT is an outcome of the comprehensive evaluation and integration of eight technology models. It offers insights into the key determinants that influence the acceptance and subsequent utilization of technology by individuals. According to this theoretical model, technology adoption is determined by what end-users think of in terms of performance expectations, effort expectations, and facilitating factors considering age, gender, the voluntariness of use, and experience, which influences behavioural intention to adopt technology (Ayaz & Yanartaş, 2020). The study is guided by theory. As Abou Elassad et al. (2020) state, a theoretical framework mainly outlines the plan for studying how variables interact. Approaches like TAM, TAM2, and the Theory of Planned Behaviour (TPB) could have been viable options for this study. However, given that their elements have already been consolidated into (UTAUT, opting for UTAUT is more fitting for analysing the acceptance and utilization of technology in this particular context. The variables within this model align well with the research questions, as elaborated below. It is essential to investigate the adoption of ITB in diverse environments.

Performance expectancy "the degree to which the end-user expects that using the system will help him or she attain gains in job performance (Venkatesh et al., 2003). The term performance expectancy was coined as the result of the combination of five factors that contributed to the creation of the concept of perceived ease of use (technology acceptance model), external motivation (motivational model), job fit (personal computer utilization model), relative advantage (innovation diffusion theory) as well as outcome expectancy (social cognition theory) (Venkatesh et al., 2003)". In this study, performance expectancy refers to the anticipated improvement in performance that an individual believes they can attain by utilizing a specific technology. It reflects the perceived benefits and advantages that a person expects to experience when they engage with that technology. Additionally, performance expectations have been reported to be influencing factors for the adoption and use of information technology. According to Billaudeau et al. (2022), a study was conducted in order to investigate the factors that are associated with secondary school teachers' satisfaction with e-learning when it comes to the education process and the efficacy of e-learning. Thus, as a potential determinant of teacher satisfaction in the workplace, several factors have been identified, including the characteristics associated with the performance expectancy, those associated with the organization, and those associated with the e-learning system (Billaudeau et al., 2022). Numerous studies have shown that end-user's performance expectations play an influential role in determining whether or not they will use technology in the long

run (Alam et al., 2020; Cao & Niu, 2019; Darmansyah et al., 2020; Gursoy et al., 2019; Muangmee et al., 2021; Tam et al., 2020). In a study by Nami (2020), it was determined that if end-users perceive the benefits of mobile language technology to be high, the use of the technology is likely to continue to grow in popularity. A number of benefits can be gained for students who use this mobile language technology, such as saving time when consulting with their lecturers, accessing information more easily, and gaining academic support as well. According to Siripongdee et al. (2020), educational technology can be used to facilitate personnel in monitoring the effectiveness of end-users since it provides them with a wide variety of information about the end-user's performance at any given time. A study Aguilera-Hermida (2020) highlighted that an individual's long-term proficiency in employing technology is primarily impacted by their ability to perceive the performance of the technology over an extended duration. As a result, if end-users perceive that the technology is beneficial to them, then the technology will be more likely to be used consistently by them. This is because they will be encouraged to do so.

Effort expectancy "the degree of ease associated with the use of the system (Venkatesh et al., 2003)". A key factor associated with the behavioural intention of end-users has been established as the degree of simplicity linked to the utilization of a technology and it has been consistently viewed as a crucial variables of the end-user's behavioural intention (Venkatesh et al., 2003). Numerous outputs have provided substantial evidence suggesting that the user-friendliness of technology plays a crucial role in its adoption. This is because when technology is perceived as effortless and user-friendly, it increases the likelihood of its adoption by reducing the effort required to utilize it effectively (Al-Maroof et al., 2020; Alam et al., 2020). Based on the results of an analysis carried out by Liu et al. (2022), it can be concluded that end-users are more likely to choose simple technologies which are more efficient than those which are more difficult to use, which are more likely to be preferred by end-users than those that are more complicated. Researchers who have conducted previous research have indicated that effort expectancy in terms of being a factor of behavioural intention is not as critical as performance expectancy in terms of being a factor of behavioural intention (Rahi & Ghani, 2019). This is because effort expectancy has a smaller effect on post-adoption usage than performance expectancy, whereas performance expectancy does not. There has also been evidence to suggest that end-users are more likely to use technology if the software is easy to use, according to empirical studies. Based on the results of a survey that was conducted among university students in the United States, Atas and Çelik (2019) carried out a research study to investigate the behaviour of young users in relation to the utilization of mobile technology. The findings of the study indicated that the perception of effort required, or effort expectancy, had a significant impact in predicting the adoption of mobile technology among the participants. As time progresses and technology becomes less complicated, it is expected that individuals are more inclined to become skilled in utilizing the technology. Portz et al. (2019) states that technologies are effortless to use if end-users are able to access information easily, are able to

produce the output needed from that technology, and are able to check the delivery status of the output when it is delivered. A considerable body of research has consistently demonstrated that the ease of use of a technology has a strong influence on the end-user's intention to utilize it more frequently. These studies consistently indicate that when a technology is perceived as easy to use, it positively impacts the end-user's intention to engage with it on a regular basis (Al Shamsi et al., 2022; Eraslan Yalcin & Kutlu, 2019; Ramadhan et al., 2022; Shuhaiber & Mashal, 2019).

Social influence "the degree to which an individual perceives that important others believe that he or she should use the new system" (Venkatesh et al., 2003, pp. 7205-7224). A substitute word for social influence is sometimes known as to as peer group pressure, which refers to the pressure that is applied to an individual to follow and adhere to a specific society of people, resulting in the person engaging in a specific manner of conduct (N. Singh et al., 2020; Wolske et al., 2020). The concept of social influence in the acceptance of technology has been strongly related to the social concept of comparison and the research that has been conducted about the peer pressure on individuals (S. Singh et al., 2020). Because of this, people tend to behave in accordance with a particular group, constantly comparing what they do to the behaviour of others who are important to them. Social influence plays a significant role in integrating technology into the organizational context (Haseeb et al., 2019).

According to the studies, decision-making takes place in group discussions where peers are easily convinced by each other (Dubey et al., 2019). According to Alotumi (2022) in his study on the acceptance of technology, social influence have critical role in influencing end-users' behavioural intentions when it comes to determining their behaviour. As a further confirmation of these findings, Hooda et al. (2022) found that social influence plays an important role in determining how technology is adopted by Malaysian end-users. According to Humida et al. (2022), behavioural intentions to use the system may increase among individuals who have a desire for social acceptance (Humida et al., 2022).

The use of social influence as a stimulant of electronic library usage behaviours has been validated by Kunst et al. (2022) as well. Many studies have furthered our understanding of social influence in behavioural intention research over the years, which has led to a more pluralistic understanding of social influence (Subchi et al., 2022; Zheng et al., 2022). A study conducted by Veenstra and Lodder (2022), for instance, found that group-level determinants such as group norms and identity play an important role in influencing behavioural intention at the group level. Several studies have been conducted in which behavioural intention decisions are applied to the level of a group as a way of accounting for social dynamics at the group level (Saprikis et al., 2022; Shao et al., 2022).

Facilitating conditions "The degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system" (Venkatesh et al., 2003, pp. 7205-7224). Other technology adoption studies define facilitating conditions in terms of a system's use in relation to an

organization's support. There are several conditions that play part in the achievement of this setup, such as technical assistance, training, policies to encourage usage, and barriers to accessibility. It is essential that organizations create an environment that is conducive to the adoption and successful use of technology by their end-users. The provision of sufficient resources and support to enable end-users in utilizing technology is commonly referred to as facilitating conditions. When end-users face challenges such as lack of assistance, incomplete information, and insufficient support, their adoption and use of technology may be impeded or resisted (Park & Zhang, 2022).

Venkatesh et al. (2003) highlighted the significance of technological infrastructure and support, underscoring that people tend to adopt a new technology more readily when they have convenient access to necessary hardware, software, and technical assistance. The presence of these necessary resources and support greatly enhances the likelihood of successful adoption and usage of the technology. Organizational policies and procedures are another critical aspect of facilitating conditions. Naujokaitiene et al. (2015) highlighted the role of organizational support, stating that when organizations provide clear guidelines and policies that encourage technology acceptance, individuals are more inclined to adopt the technology. Another crucial assisting factor has been discovered being supportive leadership. Venkatesh et al. (2003) claim that leaders who actively advocate for the benefits of technology adoption and provide consistent support create an environment conducive to the easy adoption and utilization of technology by individuals. By championing technology, these leaders inspire and motivate their teams, instilling confidence and reducing resistance to change. Numerous research, like Tayal et al. (2018) showing that transformational leadership positively influenced technology acceptance and usage behaviour, support this conclusion.

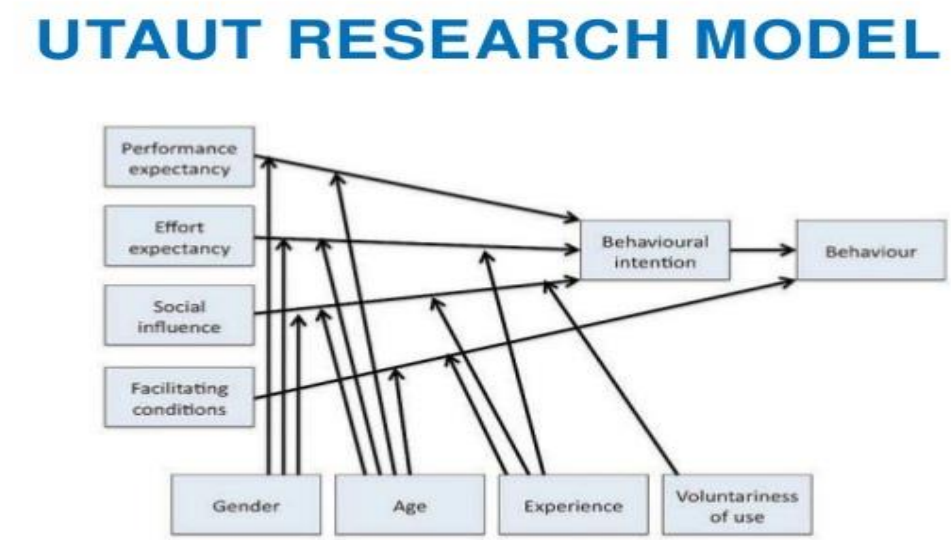


Figure 2. 3 UTAUT Diagram, (Williams et al., 2015)

Venkatesh et al. (2003, pp. 7205-7224) proposed that "performance expectancy, effort expectancy, and social influence contribute to the formation of behavioural intention, which, in turn, influences usage behaviour. Additionally, facilitating conditions play a role in determining the actual usage behaviour. Age, experience, voluntariness, and gender are suggested to moderate the impact of these main concepts on behaviour and intention". This model was developed by synthesizing and integrating concepts from previous technology usage theories employed by earlier researchers.

An UTAUT framework has been incorporated into a number of studies. A variety of results have been identified when it comes to checking performance expectancy, effort expectancy, social influence, and facilitating conditions.

2.13 Application of UTAUT in human language technology (HLTs) adoption studies

Papagiannidis (2023) investigated elements that motivate end-users to adopt big data. A study was conducted with a sample size of 570 end-users, where a researcher utilized the Unified Theory of Acceptance and Use of Technology (UTAUT) framework to investigate the factors influencing the adoption of big data among end-users. In the study, social influence and facilitating conditions influenced end-users' intention to big data. Moon et al. (2020) utilized a large-scale survey questionnaire administered to a diverse sample in Austria, employing a cross-sectional approach. The findings revealed that the performance expectancy of mobile applications significantly influenced their adoption. The study also identified various obstacles and barriers hindering the adoption of mobile applications, including factors related to human behaviour, limited technological availability, cultural

influences, and social concerns. Additionally, prior research has consistently demonstrated a strong association between individuals' intention to use technology and their actual usage behaviour.

According to Soetan et al. (2020) analysis of Nigeria's context, performance and social influence are the strongest predictors of the intention among students to use online spellcheckers for educational purposes. In addition, another study by Oladeji (2019) indicated that several factors act as motivators for Nigeria's youth to adopt online spellcheckers. These factors include the perceived benefits or results of using the spellcheckers, expectations of improved performance, social expectations or influences, facilitating conditions that enable easy access and use, the overall ease of using the spellcheckers, end-user satisfaction with their functionality, and the affordability of these tools. These factors collectively contribute to the motivation and adoption of online spellcheckers among Nigeria's youth.

Tao et al. (2020) examined the adoption of mobile language applications by scholars using the UTAUT. A framework was implemented to investigate the variables that contribute to the adoption of mobile applications including UTAUT factors as well as TAM factors. It was found that performance expectancy, followed by facilitating conditions are the most influential in the adoption of HLTs.
An extended UTAUT framework was employed by Abbad (2021) to examined variables that effect e-learning system adoption and acceptance. 400 internet end-users aged 18-45 were examined. There were 400 participants who used android applications and 50 who used iOS applications to access e-dictionaries. The results indicated the great increase in the intention to use e-dictionary mobile applications. The study revealed that fear of technology and concerns related to sharing personal information were identified as significant factors contributing to the insufficient of accepting of e-learning. According to the study of Houmache et al. (2022) e-dictionary applications are mostly used by young adults while older adults still prefer hard copies of dictionaries.

2.14 Conceptual framework based on UTAUT model

The UTAUT model has consistently demonstrated its effectiveness and resilience in various research studies, exemplified by investigations including (Almaiah et al., 2019; Chao, 2019), Hence, it was employed in this study to gauge the acceptance of technology. The utilization of the UTAUT framework aimed to highlight the key adoption variables that influence the acceptance and usage of technology by end-users. UTAUT offers major advantages for this study because of its high level of reliability and the fact that it explained 70% of intentions to accept IT, compared with other frameworks that explained roughly 55% (Jaradat et al., 2020). The UTAUT model encompasses various influential factors that impact the acceptance of technology, such as performance expectancy, effort expectancy, social influence, and facilitating conditions. However, it is crucial to state that in the specific study investigating the perceptions of using IsiZulu Termbank technology at UKZN, the researcher did not include three moderating variables age, voluntariness of use, and gender as part of the framework. This

decision was made based on previous research indicating that these factors may not consistently influence attitudes, intentions, or usage behaviours toward technology in language settings (Palau-Saumell et al., 2019). By eliminating these variables, the researcher aimed to minimize potential sources of noise or confounding factors and focus on the core constructs of the UTAUT model that have demonstrated more consistent and robust relationships with technology adoption. The study sample (students and staff members) provided a specific context that warranted a more targeted investigation into the primary determinants of ITB adoption. By narrowing the scope of research, the researcher aimed to provide a more focused analysis of UTAUT factors. It is essential to note that excluding gender, age, and voluntariness does not negate their potential importance in other contexts or research studies (Nguyen & Chu, 2021). However, employing this methodology tailored to the study's particular objectives and scope empowers the researcher to attain a detailed comprehension of the crucial variables that drive the adoption of ITB and their implications for university students and staff members. In the University of KwaZulu-Natal (UKZN) context, there exists an absence of research examining end-users' perceptions regarding the utilization of Human Language Technologies (HLT) for enhancing language usage in educational settings. To address this research gap, a model was developed to gain insights into the adoption of HLT. This model was constructed with reference to the Unified Theory of Acceptance and Use of Technology (UTAUT) and tailored to align with four primary research objectives. Subsequently, four specific research inquiries were formulated and integrated into the model, as illustrated in Figure 2. 4. These questions served as a guide in designing the research questionnaire.

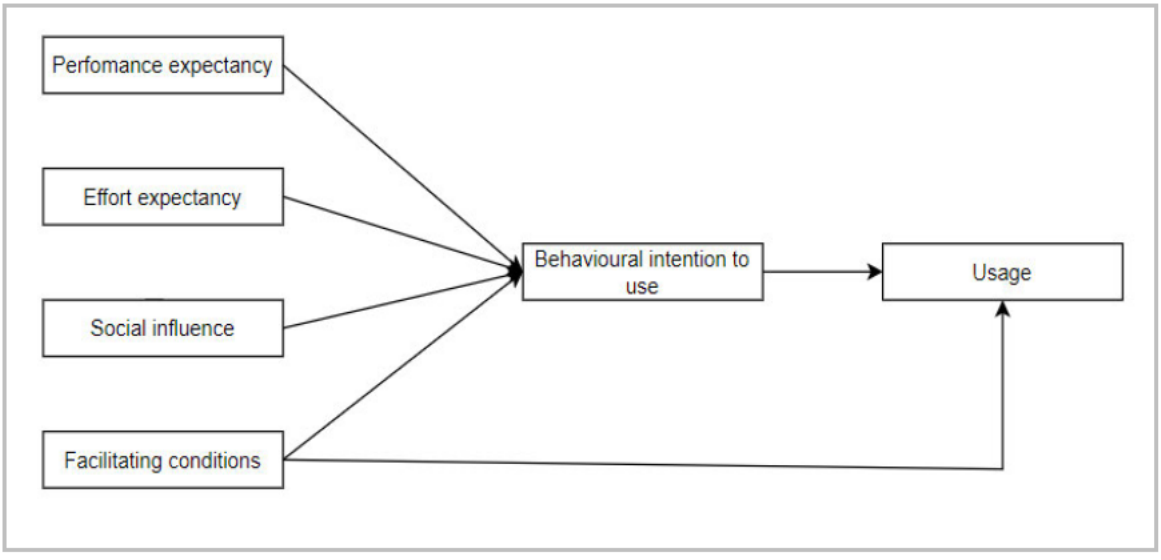


Figure 2. 4 Model utilized for the study

Source: Researcher's own planning

2.15 Conclusion

Findings from national and international studies on HLTs used in development are presented in this chapter. This study analysed the various ICT-based initiatives in South Africa from a global, national, and provincial level, bringing together the fields of language technology and human language technologies. Based on the findings from the preceding chapter, deficiencies and gaps in the existing literature were identified. This study sought to address and bridge these gaps by conducting further research and providing new insights and contributions to the field. General developments in human language technologies were discussed in this chapter. The study examined how human language technologies are adopted. This chapter proceeds to explore the factors that exert an influence on the adoption of technology.

CHAPTER THREE: METHODOLOGY

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

The research methodology serves as a framework for your research, and this chapter discusses the process of data handling, including the sampling of data from a larger population at UKZN and other aspects associated with the methods that the researcher went about the study. The chosen methods aid in determining the type of data that will be collected to effectively address the research problem at hand (Pandey & Pandey, 2021). The research methodology serves as a guiding framework for researchers, providing comprehension guidelines to define and analyse data, thus evaluating the overall accuracy and reliability of a study. In this section, the author elucidates the research technique used in this paper in depth. This comprises summarizing the characteristics of the population under examination, detailing the sample processes used, and specifying the target demographic of study. A detailed description will be provided, covering the tools employed, the techniques for gathering data and the approaches used for data interpretation. This comprehensive overview aims to ensure transparency and rigor in assessing the study's validity and precision.

To investigate the problem as stated in the chapter one, the following research questions and corresponding objectives were developed based on the UTAUT framework.

Research Questions

1. How does performance expectancy affect behavioural intention to use the ITB?
2. To what extent does effort expectancy influence behavioural intention to use ITB?
3. How does social influence affect behavioural intention to use ITB?
4. What are the facilitating conditions that affect usage?
5. What are the challenges end-users experienced when adopting ITB?

Research Objectives

1. To investigate the effect of performance expectancy on the behavioural intention to use the ITB.
2. To determine the extent that effort expectancy influences the behavioural intention to use ITB.
3. To assess the effect of social influence on the behavioural intention to use ITB.
4. To investigate the facilitating conditions that affect usage.
5. To understand the challenges experienced by end-users in the adoption of ITB.

3.2 Research design and Methodology

In order to clarify any confusion that might arise regarding the use of concepts, methodology and design in the study, and to determine which category of research this study belongs to, it is first important to explain the two concepts, research design, and methodology.

3.2.1 Research design

Researchers are driven by theories and hypotheses that guide their studies. The research design represents the relationship between theories and hypotheses (Varpio et al., 2020). Anderson et al. (2019) support this statement, stating that research design gives guidance in gathering and analysing information. A study design referred to a framework or strategy that informs the researcher where to focus and how to approach the study. In addition, it involves the strategies and instruments used for data gathering, analysis, and presentation, to ensure a seamless progression of the study and address the research questions accurately (Bloomfield & Fisher, 2019). As a result, the researcher suggested and identified the appropriate statistical methods that could be applied to analyse the data. Additionally, to specify a model for testing the validity and significance of the statistical relationships.

A study can be structured based on two distinct approaches to research design. These approaches encompass exploratory and descriptive research design, with the latter being predominantly recognized as descriptive research design (Doyle et al., 2020). In an exploratory research design, researchers attempt to learn more about the subject matter under investigation by exploring the subject deeply. Alternatively, the utilization of a descriptive research design is prevalent when researchers seek to shed light on the process and underlying factors contributing to the manifestation of a particular phenomenon. This approach focuses on providing a detailed account and understanding of the observed occurrence. This approach relies on a model variable to describe and understand the phenomenon in question (Mõttus et al., 2020). In other studies, a hybrid approach is used, which combines both research design (Mõttus et al., 2020). As the objective of this research is to test and elucidate the correlation within factors based on hypotheses regarding how factors are linking, it utilizes a descriptive research design. As per the findings of Assadpour et al. (2022), the analysis can be seen as an onion. When gathering information, it is important to use multiple layers and methods carefully. In collaboration with the research onion framework, a comprehensive explanation was provided regarding the gathering and examination of data, with due attention given to the respective aspects. The onion is categorized as follows: philosophies, methods, strategies, choices, time horizons, methods, and processes.

3.2.2 Methodology

In a nutshell, the methodology describes how data analysis should take place. It includes specific methods for addressing research questions. The broad field of procedures includes procedures such as information gathering, participants, instruments utilized, and data analysis (Sileyew, 2019a). The

methodology delineates the logic and the step-by-step systematic processes executed within a research project, customarily crafted to acquire data pertinent to the research inquiries in focus. Thus, methodology is defined as a set of general guidelines with which specific strategies can be developed for addressing study problems within the limitations of a specific train of thought. The definition of a methodology is not a formula but rather an arrangement of practices (Harris et al., 2019).

3.3 The research processes

A research process is a strategy for achieving study objectives (Mac Naughton & Rolfe, 2020). To carry out this research, the researcher employed "research onion" process as a guideline. Research Onion is a method that was developed by Saunders et al. The Research Onion, developed by Saunders et al. (2007), encompasses a range of options and methodologies that must be adhered to when undertaking a research endeavour. It provides guidance on the choices and strategies required to effectively carry out the research process. Figure 3. 1 illustrates the different stages and processes that can be selected by the researcher.

The research process onion (Saunders *et al*., 2003:83)

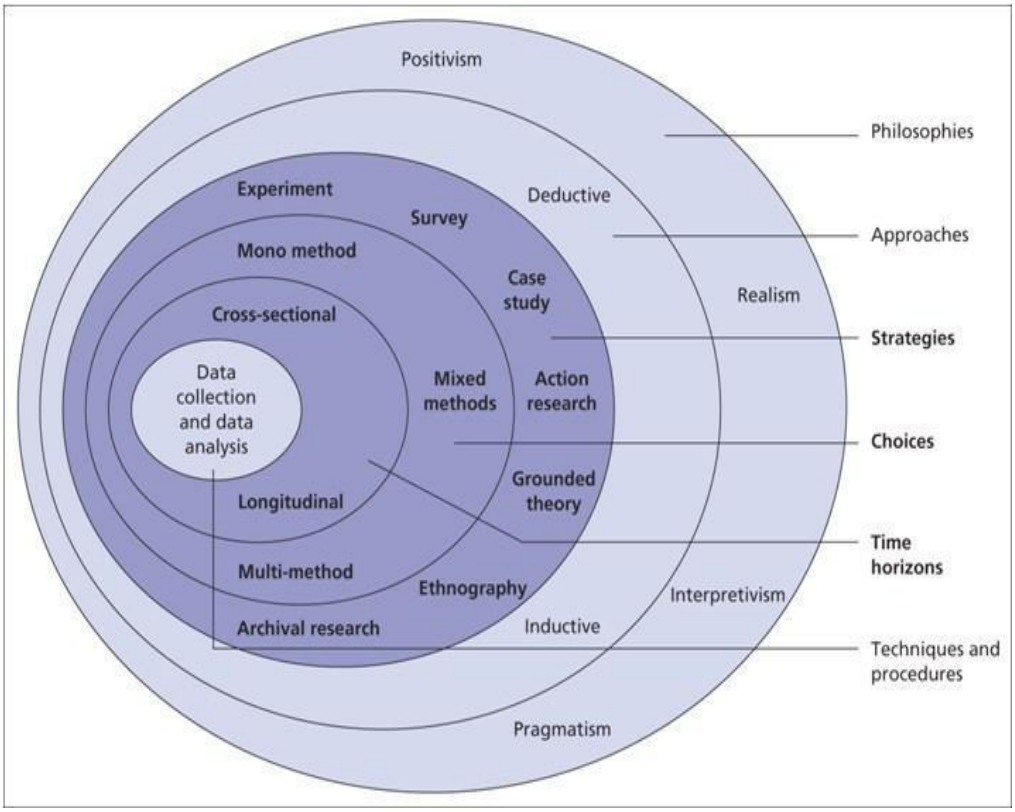


Figure 3. 1 The research process onion (Assadpour et al., 2022)

The provided figure in this research depicts the research onion, which serves as a key component of research methodology employed. This model showcases the different stages and philosophies involved in the research steps. At the core of the model are the data gathering and analysis stages, which form the central elements of research procedures. The model presents strategy to conduct research by systematically peeling away layers from the outermost to the innermost, while elucidating the methods and techniques for data collection and analysis necessary to address the study inquiries.

3.3.1 Research Philosophy

Research philosophy can be characterized as a collection of convictions and presumptions concerning the advancement and expansion of knowledge (Melnikovas, 2018). Research paradigms may be classified into four types, including positivism, realism, interpretivism, and pragmatism, but all can be important in any study (Romani et al., 2018).

Positivism, as described by Assadpour et al. (2022), aligns with the philosophical stance of natural scientists. It involves working within the realm of observable social reality to generate generalizations that resemble laws. In the positivist paradigm, research is carried out without the researcher's subjective influence, and the outcomes should be replicable by others under similar conditions. This paradigm predominantly employs quantitative methods like surveys and experiments, emphasizing the researcher's detachment from the subject of study (Assadpour et al., 2022). In the positivist approach, the researcher maintains objectivity and derives conclusions based on verifiable facts and observations.

Realism, as articulated by Assadpour et al. (2022), is primarily concerned with elucidating the connections between our observations and experiences and the underlying structures of reality that influence these observable phenomena. This epistemological perspective shares several traits with positivism, including the application of a scientific methodology in research development. In the realist paradigm, researchers strive to mitigate biases and errors, maintaining objectivity throughout the study. Additionally, realist researchers make use of historical knowledge, drawing upon various methods to enhance their investigations (Assadpour et al., 2022). It's important to note that realism is characterized by its inherent value-laden nature.

Pragmatism, as delineated by Assadpour et al. (2022), posits that concepts hold relevance only when they facilitate practical action. Pragmatic research commences with a specific problem and endeavors to furnish actionable solutions that can be implemented in practical scenarios. This philosophical standpoint straddles both subjectivity and objectivity, navigating between realities and values. Pragmatism employs a diverse array of methods to unearth practical problem-solving approaches (Assadpour et al., 2022). Pragmatist researchers acknowledge the multitude of ways in which the social

world can be interpreted, emphasizing the importance of selecting the most appropriate and pertinent method for a given situation.

Interpretivism, on the other hand, is rooted in the endeavour to decipher individuals and their myriad circumstances within the broader context of their social lives, as articulated by (Assadpour et al., 2022). This paradigm is primarily concerned with understanding people and their diverse situations. Unlike positivism and realism, interpretivism delves into the exploration of multiple meanings and narratives. Researchers adopting an interpretive approach are not detached observers; instead, they actively engage with the subject matter to gain a comprehensive understanding of reality, introducing an element of subjectivity (Assadpour et al., 2022).

This study fits the positivist paradigm well. This study employed the positivist paradigm to investigate the viewpoints of end-users regarding the acceptance of ITB. Positivism is a method that is based on assumptions that follow a certain pattern, methods, procedures, and standards. In this method, rules must be created that apply to the population. In these rules, the methods of recording and measuring data are described (Asher & Popper, 2019). It is well known that positivist approaches use quantitative methods, such as structured questionnaires and statistical analysis, which is what was used in this study (Asher & Popper, 2019). Therefore, the orientation of philosophy requires research to employ a quantitative approach where the researcher is limited to the collection and interpretation of data. This will lead to the statistical analysis of data. The researcher's objective of addressing the research questions aligns with the use of positivism as an appropriate approach for this study. The implications of positivism are closely aligned with the scientific method. In this study, questionnaire data was analysed using the Statistical Package for the Social Sciences (SPSS) software.

3.3.2 Research Approaches

The research approach within the onion process is categorized into both deductive and inductive approaches. In a deductive method, concepts and thoughts are identified from literature, and they are verified through data in order to reach a specific conclusion (Opie, 2019). The inductive approach, on the other hand, involves gathering information, developing a theory based on data analysis and validating it (Opie, 2019). The goals of the study were successfully achieved by utilizing an instrument (questionnaire) comprising agree or disagree type questions, which facilitated the collection of data. It was clear from the research design that the current study took a descriptive approach, which implied a deductive approach and allowed the researcher to select a theory (UTAUT), form hypothesis that were tested.

3.3.3 Research Strategies

Clark and Causer (2020, pp. 7205-7224) define a research strategy as "the procedures or techniques the researcher intends to use to align the study to the overall research plan". Different strategies have been defined in the onion process, these include experiment, survey, and case studies. Considering all options carefully, the researcher chose to use the survey strategy. In survey strategy, the instruments that can be applied can be either a questionnaire or an interview either structured or unstructured. In this research, the researcher opted for the survey methodology to acquire data due to its efficacy and adaptability in systematically collecting information from a substantial number of participants. The survey gave the researcher the opportunity to choose standardized items of measurement and response choices, which decreased error variance and increased the reliability of the results. The research was carried out using a questionnaire survey as the study plan. As a result, a large population of data was gathered quickly and efficiently.

3.3.4 Research Choice

In the next layer of the method there is a choice that the researcher can make when planning a study, either by using a mono- or mixed-method approach. Presented below Figure 3. ***2*** is a visual representation of how the 2 methods can be compared.

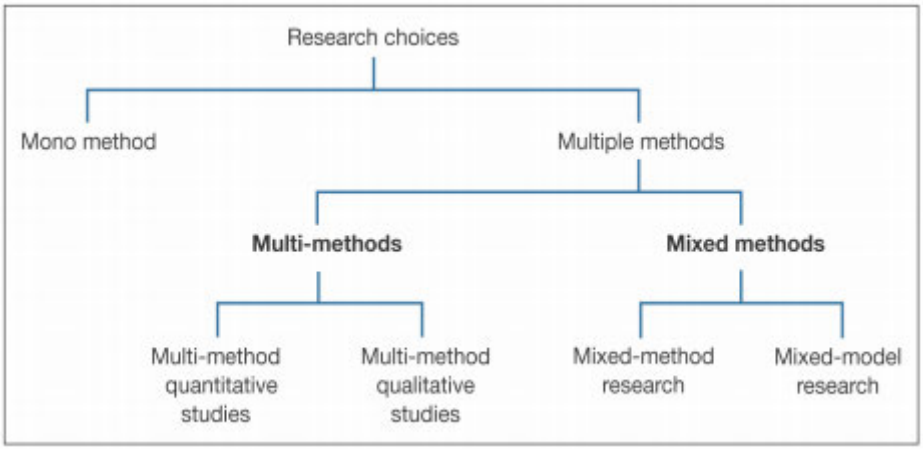


Figure 3. 2 Research Choice, (Ganesha & Aithal, 2022)

In a mono-method study, the investigator utilizes a solitary data collection approach, which may encompass either quantitative methods (such as surveys and statistical analysis) or qualitative techniques (like interviews and the analysis of narrative content) (Sileyew, 2019b). In contrast, multiple methods design involves the use of various data collection techniques (Sileyew, 2019b). It's crucial to recognize the differences between multi-method research, which includes a variety of qualitative and quantitative approaches, and mixed methods research, which combines both qualitative and quantitative methods (Ganesha & Aithal, 2022). In this study, data were collected using a questionnaire, representing

a mono-method quantitative design. This method permitted the researcher to focus on a specific research question with reduced potential for confusion, as complexities that may arise from using multiple methods were minimized. Furthermore, opting for a mono-method quantitative design in data collection helped mitigate the influence of covariates on the study's outcomes. The researcher took several measures to address potential disadvantages of mono-method. The questionnaire was carefully designed, with precise and relevant questions crafted to address the research problem effectively. Additionally, steps were taken to improve the accuracy of the data gathering process, including piloting of questionnaire and implementing data quality checks. The researcher aimed to maximize the strengths of the mono-method approach while minimizing its potential drawbacks (Wellman et al., 2023).

3.3.5 Research Time horizon

Opting for a cross-sectional time horizon for this research was a well-considered decision driven by a combination of factors. While research can be classified into cross-sectional and longitudinal based on time horizons (Ganesha & Aithal, 2022), the unique circumstances surrounding this investigation played a pivotal role in opting for a cross-sectional approach. One of the primary drivers was the necessity to adhere to a specific timeline due to external constraints, including grant funding cycles, project deadlines, and resource availability. Given these limitations, conducting a longitudinal study, which typically requires an extended timeframe and sustained participant engagement, was not a viable option. Additionally, the research objectives and questions were well-suited for a cross-sectional design, which aimed to capture a 'snapshot' of the phenomenon at a particular moment. This approach not only aligned with the immediate research goals but also ensured efficient data collection and analysis within the stipulated timeframe.

3.3.6 Research Method

Methods of research are classified in the literature as quantitative, qualitative, or blended methods. To carry out the study, the researcher needed to decide between a quantitative, blended and a qualitative strategy. Quantitative method was employed in the current study. The utilization of a quantitative approach proved beneficial in enhancing the comprehension of ITB adoption. The conceptual framework underpinning this study aligns with standardized questionnaire items designed to serve as reliable indicators for measuring technology adoption. Hence, the study's objectives are accomplished through the utilization of quantitative methods (Melnikovas, 2018). The quantitative methods included variables such as sample size, information gathering, sampling and collection methods, data management, and analysing processes (Sileyew, 2019a).

Sampling process

The sampling process can be categorized into two main classifications: probability sampling and non-probability sampling. A random selection process is often a feature of probability sampling, and this method is commonly linked to surveys and experimental research strategies (Smith & Dawber, 2019). In probability sampling, sample respondents are randomly chosen to minimize bias within the selected sample, ensuring that all respondents have an equal opportunity to participate (Oribhabor & Anyanwu, 2019). The option of sampling in this research was influenced by the study design and its specific practical considerations. The participants, including both students and staff members, were distributed across all five campuses and attended lectures at various times. Given the logistical complexity and resource constraints associated with attempting probability sampling under these circumstances, non-probability sampling emerged as the more practical choice. However, it is important to acknowledge that the use of non-probability sampling may have certain limitations in terms of representativeness, which could impact the generalizability of the study's findings. While the use of non-probability sampling acknowledges certain limitations in terms of representativeness, efforts were made to enhance the accuracy and consistency of the study's findings. The research design carefully considered the specific population under investigation and sought to ensure that the sample adequately represented the diversity within that population. Additionally, the research used well-established and thorough methods for gathering and analysing data to ensure the study's results are reliable, accurate, and trustworthy. While the findings may have a context-specific focus, they are valuable for gaining insights into the targeted population's perceptions and experiences within the study's unique setting. These considerations were integral in mitigating potential limitations related to non-probability sampling and enhancing the applicability of the study's results within its defined scope.

Study site and Setting

The site refers to the physical location where the research was conducted, representing the actual place where the study took place. It typically involves a specific geographical area or a physical facility where the data collection or observations were carried out. On the other hand, the setting refers to the specific environment or context within the site where the data collection occurred. This study was conducted across multiple campuses of UKZN, encompassing Howard College, Westville, Edgewood, Nelson Mandela Medical School, and Pietermaritzburg campuses. Because UKZN is the only institution in South Africa with this technology, UKZN was an ideal site for this study. ITB is familiar to all 5 campuses at UKZN since the university has this technology. End-users who have previously accessed the ITB provided more accurate data to the researcher. It is not sufficient to collect data from institutions where less than 10% of end-users are familiar with ITB because this does not provide an understanding about the adoption of ITB (Faloye et al., 2020).

Target population

A target population is “a group of individuals to which the researcher is interested in generalizing conclusions and usually have varying characteristics which are known as the theoretical population” (Mishra, Pandey, Singh, Gupta, et al., 2019, p. 67). The target population is drawn from the people who meet the defined definition of the target population (Bloomfield & Fisher, 2019). The target population selection requirements for this study, ITB end-user must be a UKZN students or staff members. Thus, the target population consisted of UKZN members only.

In more detail, the target population involved students (Honours, Masters, and PhD candidates), as well as staff members in the disciplines below. The reason for choosing these disciplines is because a preliminary study carried out revealed that out of all UKZN disciplines in the study location, the below disciplines have a large number of isiZulu terms developed and stored in ITB and therefore should be actively using the ITB. The figures found on the school's web page indicated that the chosen 13 disciplines have a total of about 1406 end-users (1201 students and 205 staff members). According to the statistics indicated in the university website,

- Law consists of 110 students and 40 staff members,
- Linguistics has 22 students and 4 staff members,
- Anatomy have 89 students and 8 staff members,
- Agriculture have 76 students and 20 staff members,
- Information Technology has 80 students and 23 staff members,
- Criminology has 197 students and 08 staff members,
- Architecture have 69 students and 11 staff members,
- Computer Science has 38 students and 11 staff members,
- Environmental Science has 37 students and 08 staff members,
- Nursing has 94 students and 14 staff members,
- Physics has 59 students and 16 staff members,
- Psychology has 233 students and 30 staff members,
- Social work has 97 students and 12 staff members.

There are 1201 students and 205 staff members.

Sample size

According to Ackerman et al. (2021), The size of the population is determined by the overall figure of end-users within the target population. In this study, the population size is derived from the data collected from the aforementioned disciplines. To determine an appropriate sample size, a sample size calculator was utilized based on the information acquired. This calculator takes into account several

factors, including the preferred confidence level, margin of error, and population variability, influence the sample size determination. By inputting these parameters into the sample size calculator, researchers can estimate the optimal sample size needed to ensure statistical reliability and representativeness of the findings. This approach helps to strike a balance between obtaining a sufficiently large sample for robust analysis while considering practical constraints such as time, resources, and feasibility of data collection. Additionally, Krejcie and Morgan's (1970) table has been used to support this calculation. The target population obtained was 1201 for students and 204 for staff members. Utilizing a calculator configured with a 5% error margin, a 95% confidence level, and assuming a response distribution of 50%, the study determined sample sizes of 290 students and 134 staff members.

3.3.7 Data collection method

Research instrument adopted in the study

Several channels can be used to collect data, including paper questionnaires, email questionnaires, postal mail, questionnaires, and phone surveys (Carpino et al., 2019). The questionnaire is the instrument that suited well in the current situation of preventing in-contact meetings due to covid-19 rules. A questionnaire is a study tool made up of a list of structured and unstructured questions designed to collect answers from participants in a reliable way (Sharma & Kumar, 2022). Structured questionnaire gives participants a list of options from which to pick, prohibiting them from responding to the questions in their own terms. In contrast, an unstructured questionnaire gives participants the freedom to reply to the questions in their own terms.

This instrument was used for the gathering of data since the research used a quantitative approach method. This instrument uses sample questions that are answered by respondents. The instrument selected was effective as it was not expensive or time-consuming. It was not time-consuming for the participants as the time of completion was between 10-15 minutes. Another advantage of the questionnaire was that it collected information from a large number of participants.

Questionnaire design

Einola and Alvesson (2021) found that poorly designed questionnaires can lead to respondents mistakenly omitting questions or misunderstanding them. Some common errors include:

- Listing questions in the order they were developed, which can force respondents to switch back and forth to answer similar questions in different parts of the questionnaire.
- Placing sensitive questions in a way that makes respondents uncomfortable answering them.
- Folding the questionnaire, which can confuse respondents and lead them to skip questions.
- Using different design styles such as fonts, shading, bolding, and italics in the same questionnaire.

- Reducing the font size to fit more questions on a page.

Zhou et al. (2022) argue that aesthetic issues such as font styles and paper color should be considered alongside the content of the questionnaire. Siraj-Blatchford (2020) found that structured questionnaires are ideal for large-scale data collection. The researcher in this study used a structured questionnaire with scaled items for choices. Siraj-Blatchford (2020) explain that scales are useful because they can accurately measure different viewpoints by ranking them using multiple levels. In simpler terms, the researcher used a well-designed questionnaire with scaled questions to collect information from a substantial number of individuals. This type of questionnaire is ideal for this situation because it is easy to understand and complete, and the outcomes can be readily analysed.

Measures

The researcher in this study used a five-point Likert-type scale to measure the variables of interest. The researcher employed a 5-point Likert-type gauge, extending from 'Strongly Agree' to 'Strongly Disagree,' as the selected assessment tool. This decision was based on several considerations. Firstly, a 5-point Likert scale offers a well-balanced array of response choices, enabling participants to convey their degree of concurrence or opposition regarding statements in a clear and straightforward manner (Deochand et al., 2020). Secondly, the use of this scale aligns with common practice in our research field, facilitating comparability with previous studies (Alarcon & Lee, 2022). Thirdly, it strikes a balance between granularity and simplicity, making it user-friendly and reducing the likelihood of respondent confusion (Alarcon & Lee, 2022). Overall, the 5-point Likert scale in section B and C was selected to effectively capture participant attitudes and opinions with precision and clarity.

Questionnaire development

A questionnaire was developed as a tool for collecting data, playing a crucial role in investigating the research problem at hand. The questionnaire's design was derived from the UTAUT framework. Information for this research were collected by the implementation of a structured questionnaire. The questionnaire consisted of instructions and an overview of the study, along with considerations for ethical issues. The initial section of the questionnaire featured an informed consent, providing individuals with the choice to participate or decline involvement in the study. The questions were crafted and presented in a clear and straightforward manner. Attention was given to the font type and size to ensure readability, while the wording and clarity of the questions were carefully considered by the researcher. The questionnaire had the following layout.

Section A: The term demographics alludes to specific attributes of a population. Examples of demographic attributes incorporate age, race, sex, ethnicity, religion, and training (Bloomfield & Fisher, 2019). Demographic data provides insight into the characteristics of a group of people and is essential

for ensuring that a specific study represents the entire population for research purposes. Demographic factors are independent factors by definition since they cannot be changed.

Section A of the research consists of five demographic questions. The section consisted of questions such as student/staff, gender, age, discipline, and experience using the ITB. The participants were also given different answers to choose from and had to choose only one answer from the given options. These questions were helpful for the research because the researcher found it easy to structure a solid result based on the age, experience, and gender of the targeted population. Additionally, the questionnaire made it simple for the researcher to automatically distinguish between students and employees. Furthermore, the researcher attained a more profound understanding of the factors and dynamics that impact the adoption of ITB applications within the specific population being studied.

Section B: After structuring demographic questions and determining the conceptual framework, the researcher formed the suitable questions that will assist in answering and supporting the framework that was chosen to analyse the data.

Different constructs are defined and each has a task within the framework. The UTAUT framework has four different constructs, namely; performance expectancy, effort expectancy, social influence, and facilitating conditions (Palau-Saumell et al., 2019). All these constructs were used to shape the data that needs to be collected.

The first data collected was data about performance expectancy. Three items of measurements were created to collect this data. The second construct was about effort expectancy. Three items of measurement were created for data collection. The third construct in UTAUT is social influence and the data for this construct was collected by using two items of measurement. Two items of measurements were included for social influence in this questionnaire to maintain focus on key constructs and to ensure a concise and efficient data collection process. This decision aims to prevent respondent fatigue, maintain the validity and reliability of measurements. While it's acknowledged that having a larger number of questions can enhance statistical robustness, the choice of two questions for social influence was made based on previous research Granić (2022b) and construct validity assessments, which indicated that these two well-constructed questions effectively capture the essential aspects of the social influence construct. This information was also gathered through a questionnaire. The following construct in UTAUT was about facilitating conditions. A total of four items of measurement were used for the collection of this data. The attitude towards using ITB questions was assessed. Three items of measurement were asked about the attitude towards adopting the tool. There were three items of measurement regarding behavioural intention to use ITB in the last set of questions.

Section C: This section sought to discover difficulties end-users experience with ITB. Respondents were asked to provide information on the barriers they encounter when using ITB at university.

Questions were rated on a Likert scale ranging from 1 to 5, where 1 signifies “strongly disagree" and 5 indicating "strongly agree".

Testing the questionnaire

Pilot studies are helpful to establish whether participants comprehend the questions and to test for errors. Clark and Watson (2019) recommends that the testing phase of the questionnaire helps identify whether the questions measure what they are intended to measure. The survey was tested on five end-users from UKZN (study population). Small-scale piloting is suggested for feasibility, comfort, and cost-effectiveness (Barter et al., 2022). The general population who took an interest in a pilot study was typical of the people from whom the fundamental investigation expected to gather information. After the respondents wrapped up finishing the pre-testing instrument, they were requested to give their remarks or valuable feedback on wording and sequence, repetition, absent and confusing questions. These remarks were used to enhance the transparency of the instrument, regarding the questions, and design before the main collection started (Harris et al., 2019).

The aim of this activity was to assess and evaluate the following:

- The average response time was estimated by the researcher to be between 10 and 15 minutes. All responders completed the questionnaire in within 10 minutes.
- The appropriateness of the wording. The responders said the questions were simple to understand but there were grammatical and spelling errors identified. In order to fix the questionnaire's grammatical and spelling problems, the language editor was of great assistance.
- The questions' applicability to the aims and questions of the study. The respondents (experienced researcher) in this instance thought the study questions and goals were aligned with the questions being asked.

Upon completion of the testing and pilot study phases, the questionnaire went through an edition in which all identified errors were fixed. Both grammar and spelling errors were corrected at this stage as suggested by the language editor. Statistical recommendations were also incorporated.
The outcomes of the pilot study was not included into the primary findings of the research, as it served primarily as a means of validating and identifying mistakes in the research instrument.

Administration of the questionnaire

To accumulate an ample amount of quantitative data for this research, a survey methodology was employed. This study employed questionnaires as the principal method for data acquisition. A list of email addresses from the registrar was used to send questionnaires to potential participants in the chosen population. Consequently, the author rapidly collected data from a substantial number of end-users. Consequently, there was no cost associated with the data collection process. Approximately 5-7 minutes

were needed to complete the questionnaire. There was no prize given to the participants. The entire questionnaire distribution and return process took four weeks (one month). The first two weeks were set aside for questionnaire distribution, while the latter two weeks were reserved for follow-up. To prevent pressuring the respondents, a maximum of three weeks was set for them to return the surveys. The participant responses were collected and securely stored in a database hosted under the researcher's school account. Access to this database was restricted to the researcher and supervisors, and the university's cloud security system was implemented to maintain data confidentiality.

3.3.8 Data Analysis

Other UTAUT researchers have typically employed a range of statistical tools and methods, such as Structural Equation Modelling (SEM), Confirmatory Factor Analysis (CFA), Path Analysis, and various other analytical techniques (Arif et al., 2020; Sangeeta & Tandon, 2021). These choices are driven by the need to investigate the intricate relationships between UTAUT constructs and to explore the underlying mechanisms of technology acceptance and use. However, in this study, the researcher opted for a more tailored set of statistical methods, which included descriptive analysis, reliability analysis, validity assessments, regression analysis, and exploratory analysis. This choice was primarily guided by the specific research objectives and data characteristics of the study. The research aimed to comprehensively describe the fundamental characteristics of the data, evaluate the reliability and validity of measurement instruments, explore initial patterns and relationships, regarding technology adoption factors. The decision to not incorporate SEM or CFA, which are more complex techniques, was justified by the scope and complexity of the research questions. These advanced methods can be resource-intensive and may require specialized expertise in statistical modelling. In this study, the selected statistical tools were deemed not only appropriate but also pragmatic, given the research goals and available resources. They allowed researcher to effectively address the research objectives while aligning with the unique context and constraints of study.

In quantitative data analysis, the researcher was tasked with converting unprocessed numerical data into meaningful insights by employing a balanced and critical thinking approach. This involved calculating the frequencies of different factors and examining the differences between these factors. After gathering, the coding of all the data on the survey was done by assigning numbers to the appropriate responses demonstrated in all segments of the questionnaire. The use of different levels and stages of analysis was applied to the data for a fair and careful decision. The utilized analyses encompassed reliability and validity assessments, descriptive analysis, validity checks, correlation analysis, regression analysis, and exploratory factor analysis.

Descriptive analysis: The data gathered was subjected to analysis using the Statistical Package for the Social Sciences (SPSS) system, specifically utilizing version 28. Descriptive measurements, such as frequencies and graphs at a level of significance. Descriptive statistics were utilized as a part of this

examination to summarize the information gathered with the questionnaires. Descriptive statistics were employed to examine the data results based on factors such as age, gender, and experience, as these variables were encompassed within the UTAUT framework. Therefore, descriptive statistics were used to analyse and interpret the information provided by this framework. Also, One-sample t-tests were employed in this study to check significance. The selection of the one-sample t-test was based on its capability to ascertain if there exists a significant difference between the sample mean and a predefined population mean (in this study, 3, where neutral was the designated mean). This test is particularly useful when assessing whether a sample, such as the one in this study, differs significantly from a population in terms of a specific parameter, such as the mean Likert score for a particular variable. By employing the one-sample t-test, the researcher thoroughly evaluated the significance of the findings, thus facilitating the derivation of meaningful conclusions regarding the observed differences.

Reliability analysis: To assess the reliability of the gathered data in this research, SPSS software was employed. After coding the survey responses, the data obtained from the questionnaires underwent analysis using the Cronbach's Alpha coefficient. The purpose of this analysis was to assess the internal consistency reliability of the questionnaire items. To determine the acceptable scale of reliability, a threshold of 0.7 was utilized as a benchmark. The Cronbach's Alpha coefficient furnishes a measure of the interrelation among the items in the questionnaire, reflecting the level of consistency in participants' responses. By applying this statistical analysis, researchers can determine the reliability of the questionnaire and ensure that the items are measuring the intended constructs accurately and consistently.

Validity: The researcher has also examined the validity of the research. The validity analysis involves determining whether the research finding is based on the data as expected (Fisher & Bloomfield, 2019). This study used questionnaires, and the questions were validated by ensuring a careful selection of questions and the use of them. The instrument's validity was further substantiated through the employment of exploratory factor analysis. The feedback from the pilot test also helped to improve the instrument's readability and standards.

Correlation analysis: To ascertain the connection between the components of the UTAUT framework, namely performance, effort, social influence, and behavioural intention, a correlation test was conducted. The choice of the Pearson correlation test was made with careful consideration of its suitability for the study's objectives. One advantage of the Pearson correlation test is its capability to measure linear associations between variables, which aligns with our research aim to assess linear relationships. Additionally, the Pearson correlation is widely recognized and utilized in research, which enhances the comparability of our findings with existing literature (Armstrong, 2019). However, it's important to acknowledge that the Pearson correlation test has certain limitations. One limitation is its

sensitivity to outliers, meaning that extreme data points can disproportionately influence the calculated correlation coefficient (Mishra, Pandey, Singh, Keshri, et al., 2019). In this study, the researcher was aware of this limitation and took measures to identify and address potential outliers in the dataset. Furthermore, the Pearson correlation assumes a linear relationship between variables. While this is suitable for research questions, it's important to recognize that if the relationship between variables is not linear, the Pearson correlation may not accurately represent the true association (Mishra, Pandey, Singh, Keshri, et al., 2019). In this study, potential outliers were identified using SPSS by performing outlier analysis. Specifically, the researcher utilized SPSS's built-in functions and statistical tests (mean, mode, and standard deviation) to flag data points that deviated significantly from the central tendency of the variables in question. Once identified, outliers were carefully examined and assessed for their validity. Any outliers that were found to be erroneous or extreme but accurate data points were retained in the analysis after verification. Outliers that were considered influential or problematic for the correlation analysis were subjected to sensitivity tests and robustness checks. These checks included conducting the correlation analysis with and without the outliers to assess their impact on the calculated correlation coefficients. By employing these measures in SPSS, the researcher ensured that the influence of outliers on the correlation analysis was appropriately managed and accounted for. These steps were taken to enhance the reliability and validity of correlation analysis.

Regression analysis: After conducting the correlation analysis, the researcher proceeded with regression analysis. A correlation model is used when predicting a variable's value based on another variable's value (Gunst & Mason, 2018). The researcher utilized regression analysis to explore how performance expectancy, effort expectancy, and social influence towards ITB impact the intention to use ITB. The relationships between the variables were examined and analysed using multiple linear regression models. Multiple linear regression analysis was considered the most suitable choice for analysing the data due to its objective of identifying multiple factors that impact the intention to accept ITB. Multiple linear regression analysis was considered for this test due to its reliability and capability to analyse all types of sample sizes of the data.

Exploratory factor analysis: The chosen method was employed to validate the existing factors within the UTAUT framework. Exploratory factor analysis, conducted utilizing SPSS, was employed to validate the research instrument and streamline the survey by examining the interrelatedness of different questions. Factors that demonstrated validity were retained and incorporated into the framework, while those that did not satisfy the validity criteria were omitted.

3.4 Ethical Clearance

Every formal research project is subject to ethical requirements. For example, researchers must present their findings clearly and with integrity. Researchers should ensure that the participants' rights are not violated and that they do not experience humiliation or other harm. In this study, the researcher sought Ethical Clearance (EC) from the UKZN Ethics Committee and diligently adhered to all the guidelines and regulations set forth by UKZN. Appendix C contains a letter from the Ethics Commission with the protocol reference number (HSSREC/00003756/2022). The dissertation does not disclose any personally identifiable information. A safeguarded environment will be used to store the questionnaires, and after 5 years, they will be discarded.

3.5 Conclusion

The intent of the chapter was to accomplish its objectives through a descriptive design and by using a quantitative approach. The sampling and research instruments were described along with the data collection process. A data analysis procedure was explained, indicating the statistical testing used. A validity and reliability assessment were performed, and ethical considerations were adhered to. The next chapter offers a presentation and examination of obtained results.

CHAPTER FOUR: ANALYSIS AND DISCUSSIONS

4.1 Introduction

As described in the chapter preceding this one, the aim of this research is to examine the perception of end-users to adopt ITB based on the following study questions:

- How does performance expectancy affect behavioural intention to use the ITB?
- To what extent does effort expectancy influence behavioural intention to use ITB?
- How does social influence affect behavioural intention to use ITB?
- What are the facilitating conditions that affect usage?
- What are the challenges end-users experienced when adopting ITB?

Chapter 2 of the study delves into the analysis of research's findings, considering the research questions within the context of the UTAUT model. The chapter begins by providing a detailed description of the data, along with its presentation and resulting outcomes. Subsequently, the findings and discussions are presented in a logical order, following a chronological sequence that effectively addresses the research questions.

4.2 Statistical tests

The data underwent analysis through the following statistical tests:

- Consistency and reliability: A Cronbach alpha reliability test was conducted to determine whether the respondents' responses were internally consistent.
- Normality Test: To assess the data's normality, SPSS was utilized to execute the Kolmogorov-Smirnov test.
- Sampling adequacy: The investigator utilized the Kaiser-Meyer-Olkin (KMO) and Bartlett's tests to assess the suitability of the sample for factor analysis. Descriptive statistics: Measures such as frequencies were utilized to provide a comprehensive summary of the dataset.
- Descriptive statistics: one-sample t-tests were conducted to assess whether the sample mean significantly differed from a specified population mean, allowing for a thorough examination of potential differences within the data.

The data for this research was divided into two parts, namely, the data gathered from students and the data gathered from staff members. The two data sets were analysed separately throughout the analysis chapter in order to gain insight into students' understanding of ITB adoption as well as to gain a better understanding of the perspective of staff members on the adoption of ITB.

4.3 Response rate

To maximize the response rate, the questionnaire survey was performed over the course of four weeks. All questionnaires were designed to be mandatory, ensuring that participants were required to complete all sections before submission. The voluntary nature of participation and the ease of accessing the questionnaire contributed to a higher level of success than initially anticipated. The measurement items within the UTAUT framework were assigned numerical codes ranging from 1 to 5, with 1 denoting "Strongly Disagree" and 5 representing "Strongly Agree." This coding system allowed participants to rate how strongly they agreed or disagreed with each item on a rating measurement of 1 to 5. After thorough data cleaning, the cleaned dataset was uploaded into SPSS version 28 for further examination. A total of 424 questionnaires were given among the research sample population, consisting of 290 questionnaires for students and 134 for staff members. The researcher received 284 responses from students and 123 responses from staff members, resulting in an overall response rate of 95%. In this study, the response rate was higher among students (97.9%), than staff members (91.7%).

4.4 Analyses of Student Responses

4.4.1 Consistency and reliability

The survey questionnaire was subjected to a reliability test in order to ensure the data was valid, reliable, and accurate. On each of the questionnaire sections (representing the constructs used in the study to understand the phenomenon at hand) except for the first on demographics, Cronbach's alpha was employed as a scale to calculate reliability for factors.

To meet the criteria for reliability, research instruments need to attain a minimum cronbach's alpha coefficient equal to or greater than 0.7 (Al-Blaihed et al., 2020). The Cronbach's alpha coefficient obtained using SPSS version 28 varied between 0.70 and 0.87, which falls within an acceptable range. In particular, for the student group as a whole in this study, the Cronbach's alpha value was 0.91, denoting a robust level of internal consistency and a high degree of correlation among the variables measured. These results imply that the variables are well-aligned and demonstrate robust internal reliability. The reliability test results of each UTAUT construct (section B) and challenges (section C) are summarised in Table 4.1, including the number of items of measurement for each construct. A detailed analysis of Cronbach's alpha for each construct is presented in Table 4.1. Based on the outcomes, it can be concluded that the items and responses in the questionnaire exhibit consistency and reliability.

Table 4.1: Consistency and reliability test for students' data

Constructs	Number of items	Cronbach's alpha (α)
Performance Expectancy (PE)	3	0.843
Effort Expectancy (EE)	3	0.860
Social influence (SI)	2	0.875
Facilitating conditions (FC)	4	0.708
Behavioral intention (BI)	3	0.828
Overall Cronbach's alpha (α)	**15**	**0.918**

4.4.2 Student normality tests

The assessment of data normality is crucial in determining the appropriate statistical tests to be applied. Methods like the Kolmogorov-Smirnov and Shapiro-Wilk tests can be used to assess the data's distribution. If the data exhibit a normal distribution, parametric tests like analysis of variance (ANOVA) and t-tests are suitable. On the other hand, non-parametric tests like Spearman's rho, Chi-square tests, Kruskal-Wallis tests, and Mann-Whitney U tests are recommended for data that do not conform to a normal distribution (Mishra et al., 2019). In this research, the normality of the data was evaluated through the Kolmogorov-Smirnov test in the SPSS software. Testing for data normality is crucial because it guides the selection of appropriate statistical tests. Even when utilizing convenience sampling, which may not yield a perfectly representative sample, checking the normality of the data is crucial. This practice ensures the use of suitable statistical methods and upholds the transparency and rigor of the analysis. The general hypotheses tested for normality are as follows:

H0: The variables demonstrate a normal distribution.
H1: The variables being examined deviate from a normal distribution.
(*Where H0 represents the null hypothesis and H1 represents the alternative hypothesis)*

"It is necessary to obtain a significant p value greater than 0.05 for determining if a dataset is normally distributed. A significant value less than 0.05 indicates that the data is not normally distributed" (Andrade, 2019, pp. 210-215). In this study, the normality test conducted on all variables in the student data set yielded significant values of less than 0.05. These results, as depicted in Table 4.2, indicate that the null hypothesis (H0) can be rejected, this implies that the datasets employed in this study do not adhere to a normal distribution. Consequently, it is advisable to perform non-parametric statistical tests on the data sets. An analysis of Spearman's rho test data was conducted in this study.

Table 4.2: Normality test for students

Tests of Normality

	Kolmogorov-Smirnov[a]		
Perfomance1	.282	284	.000
Perfomance2	.266	284	.000
Perfomance3	.255	284	.000
Effort1	.243	284	.000
Effort2	.280	284	.000
Effort3	.298	284	.000
Social1	.219	284	.000
Social2	.209	284	.000
Facilitating1	.272	284	.000
Facilitating2	.242	284	.000
Facilitating3	.196	284	.000
Facilitating4	.236	284	.000
Attitude1	.188	284	.000
Attitude2	.279	284	.000
Attitude3	.247	284	.000
Behavior1	.264	284	.000
Behavior2	.252	284	.000
Behavior3	.273	284	.000

a. Lilliefors Significance Correction

4.4.3 Descriptive Analysis of the data

Descriptive analysis offers a valuable advantage by presenting readers with a concise overview of the participants' background characteristics and fundamental information about the ITB. This summary is intended to give the reader a thorough knowledge of the important characteristics and aspects about the participants and the ITB under examination. Detailed information regarding the participants' gender, age, discipline(s) and experience with ITB understanding is provided in this analysis. Appendix A offers a comprehensive summary of the descriptive analysis conducted on the variables. It presents key statistical measures such as the “mean, mode, median, standard deviation, and variance”(McGrath et al., 2020, pp. 2520-2537). These measures provide valuable insights into the central tendency, variability, and distribution of the variables, enhancing the reader's understanding of the data. The standard deviation for data sets is within one standard deviation, showing that they are not widely dispersed.

Gender

The results shown in Table 4.3 presented that 157 of respondents were female, 105 were male, and 22 did not wish to disclose their gender. It can therefore be observed from the table that, in this study, more female students responded to the questionnaire than other categories.

Table 4.3: Student gender

Valid	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**	**Frequency**
	Female	157	55.3%	55.3%	55.3%
	Male	105	37.0%	37.0%	92.3%
	Prefer not to say	22	7.7%	7.7%	100.0%
	Total	**284**	**100.0%**	**100.0%**	

Age

The bulk of participants (95) were aged 24 to 37 years, followed by 85 between 28-31 years, then 79 between 20-23 years. Over 32-year-olds comprised only 25 of the population. (see Table 4.4 below)

Table 4.4: Student age

Valid	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**	**Frequency**
	20-23	79	27.8%	27.8%	27.8%
	24-27	95	33.5%	33.5%	61.3%
	28-31	85	29.9%	29.9%	91.2%
	Above 32	25	8.8%	8.8%	100.0%
	Total	**284**	**100.0%**	**100.0%**	

Experiences on the use of ITB

The researcher examined the duration of students' experience with ITB. The findings indicated that among the respondents, 49 individuals had never utilized ITB before, 77 had less than one year of experience, 99 had a duration of 2 to 3 years, 40 reported 4 to 6 years of experience, and 19 participants had 7 years of experience or more. Table 4.5 indicating that the majority of respondents (99 respondents) possessed a range of 2 to 3 years of experience.

Table 4.5: Student experience on the use of ITB

Valid	**Number of years**	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
	Never used before	49	17.3%	17.3%	17.3%
	Below 1	77	27.1%	27.1%	44.4%
	2-3	99	34.9%	34.9%	79.2%
	4-6	40	14.1%	14.1%	93.3%
	Above 7	19	6.7%	6.7%	100.0%
	Total	**284**	**100.0%**	**100.0%**	

Disciplines

The study involved students from 13 different disciplines that have terms related to the subject in ITB technology. In reaction to the results of this survey, the largest portion (74 individuals) of respondents originated from the field of Psychology, with just six (the smallest number) being from the field of Computer Science.

(see Figure 4. 1 below)

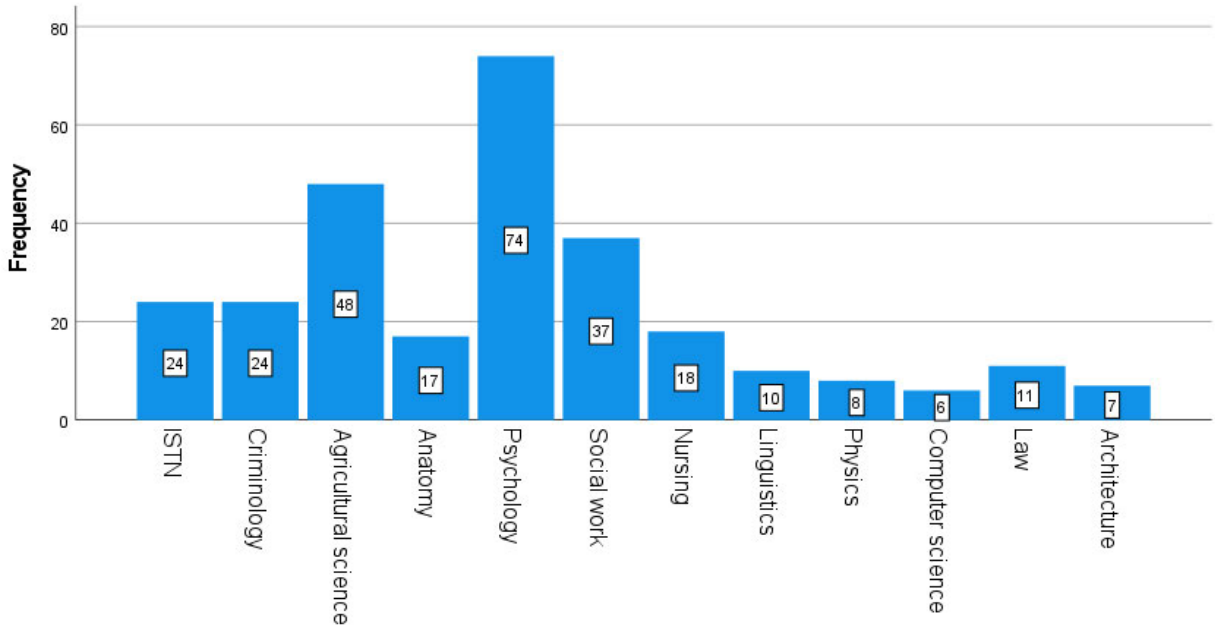


Figure 4. 1 Student Disciplines

4.4.4 Inferential Statistics of the Student data – Relationships among the constructs

4.4.4.1 Analyses of sampling adequacy for students

Before proceeding with factor analysis, it is essential to evaluate the appropriateness of the data. In this research, the suitability of the student data was assessed through two tests: the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test. The KMO test helps determine the proportion of common variance among variables, with a recommended threshold of 0.7 or higher. On the other hand, the Bartlett's test examines the significance of the correlation matrix, with a significance value of less than 0.05 indicating a significant relationship among variables (Bhatnagar et al., 2021).

Based on the findings presented in Table **4.6**, the KMO test result for the student data was 0.919, indicating an acceptable level of sampling adequacy. Furthermore, Bartlett's test yielded a statistically significant result with a p-value below 0.05, suggesting a noteworthy correlation among the variables. These results suggest that the data used in this study are suitable for conducting factor analysis. (see Table 4.6 below).

Table 4.6: Adequacy for students

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**.919**
Bartlett's Test of Sphericity	Approx. Chi-Square	4076.128
	Df	231
	Sig.	.000

4.4.4.2 Relationship among the independent constructs and Behavioral intention

Alignment of research instruments with the UTAUT model

The selection and validation of measurement items related to IsiZulu Termbank (ITB) within the scope of this study were undertaken with meticulous care to establish their direct relevance to the study's overarching aim. Given the study's unique focus on HLT adoption in a multilingual educational context, a nuanced approach was necessary. Firstly, these measurement items were strategically tailored to align with the study's specific objectives, which revolved around understanding the perceptions and intentions of end-users toward ITB in language education. This alignment ensured that the items addressed the distinct facets of ITB adoption pertinent to the study's context. Additionally, a comprehensive literature review served as the foundation, illuminating the need for customization beyond the broader elements of the Unified Theory of Acceptance and Use of Technology (UTAUT). Additionally, pilot testing provided essential feedback for enhancing item clarity and relevance. Face and content validity assessments ensured that the items resonated with the study's unique context. Lastly, empirical techniques, including exploratory factor analysis, substantiated the construct validity of these items. In essence, the measurement items employed in this study were not only conceptually grounded but also contextually validated, ensuring their capacity to effectively probe the specific nuances of ITB adoption within a multilingual educational environment in alignment with the study's aim. Since the study is grounded in the UTAUT framework, it incorporates the constructs of performance expectancy, effort expectancy, social influences, and facilitating conditions. The research questions are aligned to the aforementioned constructs. Figure 4. 2 presents the items used to measure each of the constructs in the study, namely performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC). The table also includes the challenges experienced by the participants. These components were assessed and scrutinized to gauge their impact on the intention to use ITB.

Constructs	Items of measurement
Performance expectancy	PE1 I find the ITB easy to operate. PE2. I find the ITB friendly to use. PE3. Using the ITB would enhance my productivity at school.
Effort expectancy	EE1. I find it easy to use ITB to accomplish what I want. EE2. The ITB will not take time to use it. EE3. The ITB is not complicated.
Social influences	SI1. People who are important to me think that I should use the ITB. SI2. People who influence my behaviour think that I should use ITB.
Facilitating conditions	FC1. I have the necessary resources (laptop, phone) to use ITB. FC2. Help is readily available to support my usage of the ITB. FC3. Practical trainings are provided for ITB. FC4. ITB updates are compatible with my internet and network.
Behavioral intentions	BI1. I intend to use ITB in the future. BI2. I will always try to use ITB in my daily activities. BI3. I plan to inform my schoolmates to use ITB.
Challenges	CH1.Internet is always available for me to use ITB in the institution premises. CH2.Technical Gadgets (Smartphone, Laptop, Tablets) are available for me to use ITB CH3.Workshops and research symposiums that addresses ITB challenges and opportunities are available. CH4.When I attend workshops and research symposiums about ITB, my expectations are met.

Figure 4. 2 Items of measurement

To gain insight and address the research question of the study, the first three research questions were specifically investigating behavioural intention to use of ITB. The PE, EE, and SI, were tested against BI to use ITB. The first three research questions were evaluated using correlation tests, followed by regression analysis. The fourth research question specifically aimed to gain insights into the facilitating conditions influencing end-users' access to ITB. The forth research question was achieved by investigating the necessary resources that end-users have or not have to access the ITB. Bar graphs were utilized to display the findings on the facilitating factors, which are presented in the sections that follow. Additionally, the fifth question examined the difficulties encountered by the end-users while using ITB, and its results are also presented using a bar graph.

Correlations between PE, EE, and SI with the dependent variable BI

To operationalize the concept of the BI of technology, the UTAUT framework has been utilized. UTAUT framework considers PE, EE, SI, and FC with moderate variables consisting of age, experience and gender in adopting the ITB as the independent variables. BI serves as the dependent variable. The model provides an excellent insight into the likelihood of introducing new technologies successfully, as Venkatesh (2003) points out. In order to determine the existence of independent variables and their possible effects on BI, Spearman's rho correlation is computed for students' data. Spearman's correlation calculates the relationship between two factors to find out how one factor changes when the other changes (Schober et al., 2018).

Results below Table 4.7, the associations among the variables in the UTAUT model were evaluated using Spearman's rho test, chosen because of the absence of a normal distribution in the data. Spearman's rho is a non-parametric test suitable for non-normally distributed data. The correlation analysis revealed positive associations between the variables. In greater detail, positive correlations were observed regarding the relationships of performance expectancy (PE) with behavioural intention (BI), effort expectancy (EE) with BI, and social influence (SI) with BI. These variables, serving as independent variables, exhibited positive relationships with the dependent variable BI. The strongest are SI and BI, followed by PE and BI, the third strongest is EE and BI. The outcomes of this study are similar with prior studies that used the UTAUT paradigm for technology (Hu et al., 2020). All of the relationships revealed in the tests were statistically significant with p-values below 0.01.

Table 4.7: Correlation of UTAUT for students

Correlations						
			BI	PE	EE	SI
Spearman's rho	BI	Correlation Coefficient	1.000	**.530****	**.479****	**.583****
		Sig. (2-tailed)	.	<,001	<,001	<,001
		N	284	284	284	284
	PE	Correlation Coefficient	**.530****	1.000	.699**	.331**
		Sig. (2-tailed)	<,001	.	<,001	<,001
		N	284	284	284	284
	EE	Correlation Coefficient	**.479****	.699**	1.000	.347**
		Sig. (2-tailed)	<,001	<,001	.	<,001
		N	284	284	284	284
	SI	Correlation Coefficient	**.583****	.331**	.347**	1.000
		Sig. (2-tailed)	<,001	<,001	<,001	.
		N	284	284	284	284
**. Observed correlation is statistically considerable at the 0.01 level (2-tailed).						

- A correlation between PE and BI is moderately positive (r=0.530; p<0.001). Performance expectancy has a favourable impact on an end-user's intention to accept ITB.

- The correlation of EE with BI demonstrates a moderately positive association (r=0.479; p<0.001). The ease of use and the effort needed to use ITB influence one's intention to adopt ITB.

- The correlation between SI and BI is moderate ($r=0.538$; $p<0.001$). Based on this statistic, it appears that the end-user's intention to adopt ITB is positively influenced by the social influences of important people in the environment.

Regressions between PE, EE, SI, with the outcome variable BI

To delve deeper into evaluating the predictive relationship, a multiple linear regression model was employed. The independent variables were performance expectancy (PE), effort expectancy (EE), and social influence (SI), while the dependent variable was behavioural intention (BI) in adopting ITB. The utilization of multiple regression was based on the presence of multiple independent variables in the analysis (Moorthy et al., 2019). This study utilized regression test to predict the BI variable using PE, EE, and SI. To test PE, EE, and SI (independent variables) multiple linear regression model was run to predict BI (dependent variable) for the adoption of ITB among students. The findings of this analysis are displayed in below. Based on the Model Summary as well as ANOVA outcomes of the analysis used to test regression in Figure 4. 3, the overall model demonstrated statistical significance in predicting the behavioural intention to adopt ITB, with an R-square value of 0.508 and an F-value of 96.542 at a significance level of $p < 0.05$.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.713[a]	**.508**	.503	.561
a. Predictors: (Constant), SI, PE, EE				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	91.121	3	30.374	**96.542**	**<,001**[b]
	Residual	88.093	280	.315		
	Total	179.214	283			
a. Dependent Variable: BI						
b. Predictors: (Constant), SI, PE, EE						

Coefficients[a]						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	.600	.203		2.949	.003
	PE	**.335**	.073	.287	4.580	**<,001**
	EE	**.163**	.068	.153	2.395	**.017**
	SI	**.368**	.039	.433	9.339	**<,001**
a. Dependent Variable: BI						

Figure 4. 3 Regression for students

Figure 4. 3 above shows the estimates regression weights, and the results are as follows:

- The regression analysis reveals a significant positive relationship regarding performance expectancy (PE) and behavioral intention (BI), evidenced by a regression estimate of 0.335 and a p-value below the significance level of 0.05.

- The analysis demonstrates a substantial positive association concerning effort expectancy (EE) and behavioral intention (BI), supported by a regression estimate of 0.163 and a p-value below 0.05.

- Social influence (SI) also exhibits a significant positive impact on behavioural intention (BI), as shown by a regression estimate of 0.368 and a p-value below the threshold of 0.05.

4.4.4.3 Exploring Facilitating Conditions that affect usage

A total of four items of measurement were used to measure the facilitating conditions that affect the use of ITB. In UTAUT, facilitating conditions (FC) refer to a person's perception of the availability of the required organizational and technical infrastructure in order to deploy the intended technology (Raza et al., 2021). In this study, facilitating conditions are those variables that impact to the use of ITB technology. The FC evaluate the students' perceptions on whether they believed they had access to the necessary resources (laptops, phones, and computers), assistance or support, practical training, and network compatibility for adopting and using ITB in school activities with the goal of improving academic performance and strengthening research using the isiZulu language.

Graphical representation of respondents' perceptions for facilitating conditions

Item of measurement 01: I Have the necessary resources (laptop, phone) to use ITB.

Based on the results on Figure 4. 4 students agreed that they possess appropriate resources for accessing the ITB, such as a laptop, a phone, and a computer. Based on the survey findings, a considerable number of individuals (140) expressed agreement, while 95 individuals strongly agreed, that they possess the necessary resources for using ITB. Thus, there was a notable consensus among the participants regarding the availability of required resources. A total of 12 respondents indicated they did not believe they had the necessary resources, however. ITB was neutrally viewed by 36 respondents, provided resources were available. According to the findings of the survey, the vast majority (140) of respondents thought they possessed the requisite resources to use ITB.

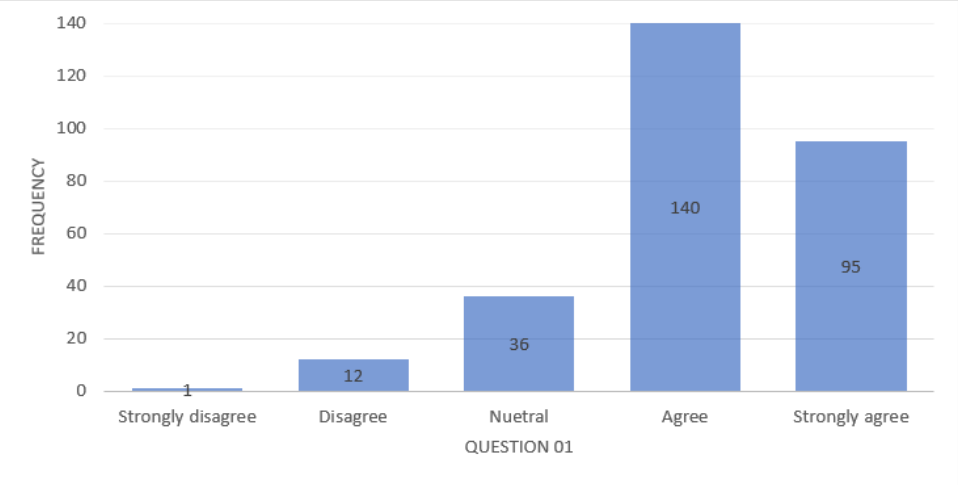
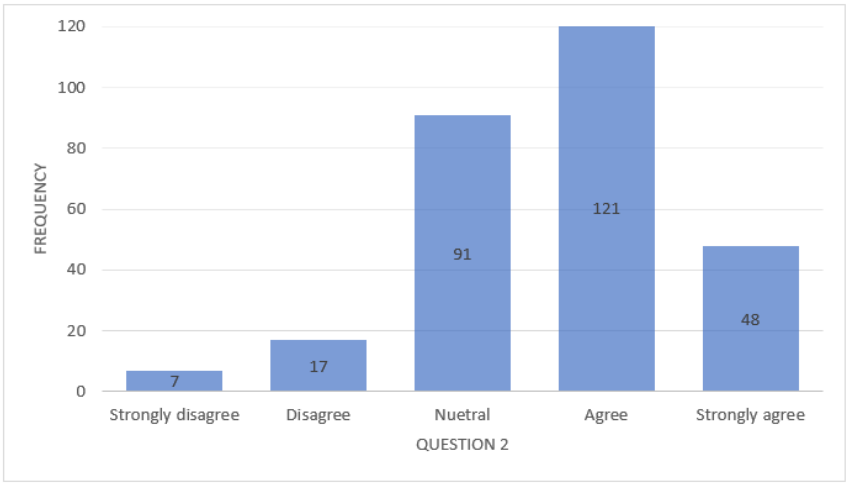


Figure 4. 4 Students responding to Item of measurement 1: Internet is always available for me to use ITB in the institution premises.

Item of measurement 02: Help is readily available to support my usage of the ITB.

The results on Figure 4. 5 indicate that students agree that support is available for the use of the ITB. ITB support was agreed upon by 121 respondents, and 48 responded that they strongly agreed. Accordingly, respondents were highly satisfied with ITB support. Despite that, 17 respondents said they did not believe support was available when using ITB. 91 respondents viewed ITB neutrally. Many respondents to the survey believed that ITB support is always available, drawing from the survey findings.



.

Figure 4. 5 Students responding to item of measurement 2: Help is readily available to support my usage of the ITB.

Item of measurement 03: Practical trainings are provided for ITB.

According to the results presented in Figure 4. 6, a significant number of students (101) expressed a neutral stance regarding the provision of practical training for using the ITB. There were 60 students who did not agree that practical training is provided. 36 students strongly disagreed with this statement. In spite of this, 69 students agreed that trainings are provided. This notion was strongly supported by 18 students.

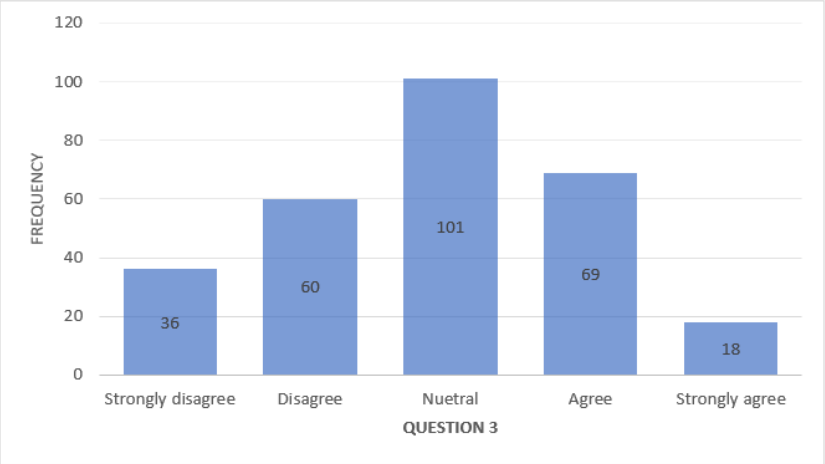


Figure 4. 6 Student responding to item of measurement 3: Practical trainings are provided for ITB.

Item of measurement 04: ITB updates are compatible with my internet and network.

As shown in the results Figure 4. 7, 115 students agreed that ITB updates are compatible with their network and internet to use ITB. In addition, 51 students strongly agreed with this statement. There were 20 students who did not agree with this statement. In spite of this, 87 students were neutral with this notion.

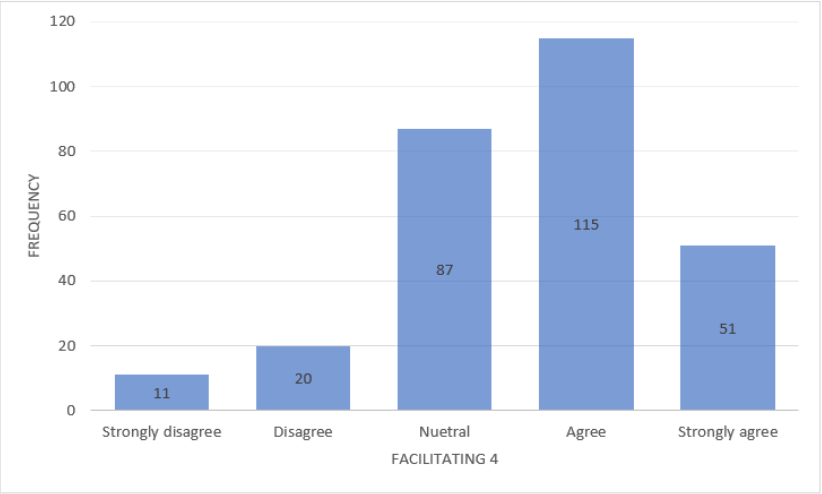


Figure 4. 7 Students responding to item of measurement 4: ITB updates are compatible with my internet and network.

Correlation Analysis of Facilitating Conditions Among Students

A correlation test was performed to check the connections concerning facilitating conditions and students' behavioral intentions related to ITB adoption. This analysis aimed to investigate whether factors like having the necessary resources or access to support influenced how students felt about using ITB. It's important to note that facilitating conditions were examined separately because they encompass various aspects of ITB use, including behavioral intention and usage. This approach allowed the researchers to understand how each of these factors affected students' intentions to use ITB, providing insights into what matters most to them.

Table 4.8: Correlation between BI and FC for students

Correlations				
			BI	FC
Spearman's rho	BI	Correlation Coefficient	1.000	.636**
		Sig. (2-tailed)	.	<,001
		N	284	284
	FC	Correlation Coefficient	.636**	1.000
		Sig. (2-tailed)	<,001	.
		N	284	284
**. Correlation is significant at the 0.01 level (2-tailed).				

The correlation coefficient (Spearman's rho) between Behavioral Intentions (BI) and Facilitating Conditions (FC) is 0.636, which is a substantial and robust positive correlation. The p-value associated with this correlation is less than 0.001 ($p < 0.001$), signifying strong statistical significance.

4.4.4.4 Challenges Experienced by students

In order to assess the challenges faced by students to adopt and use ITB four items of measurements were used in this study. In this study challenges are components that affect the adoption of ITB technology. The main portion of this section was to identify and scrutinize the difficulties encountered by end-users during the adoption of ITB. Four items of measurement were asked about the availability of the internet, technical gadgets, availability of platforms such as symposiums, workshops, and conferences that allow students to address ITB issues and the satisfaction of students when they attend platforms that address them. The responses for students are as follows:

Challenge 1: Internet is always available for me to use ITB in the institution premises.

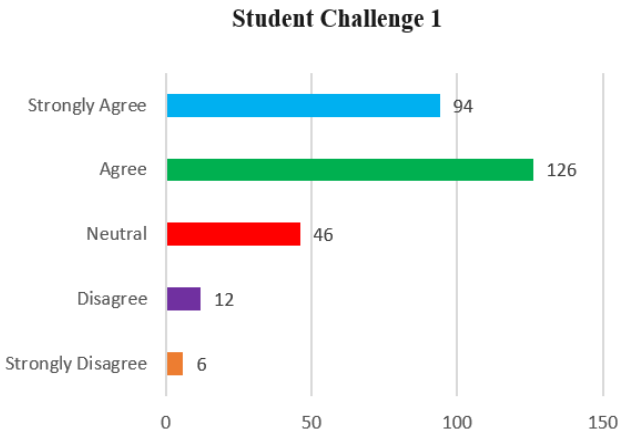


Figure 4. 8 Challenge 1 presentation for students

Challenge 2: Technical Gadgets (Smartphone, Laptop, Tablets) are available for me to use ITB.

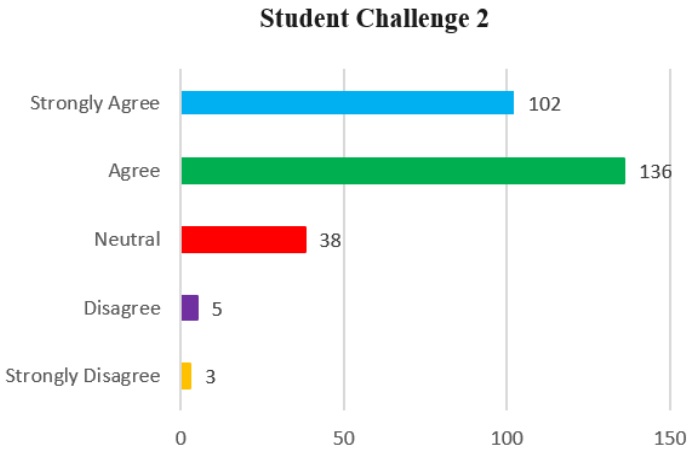


Figure 4. 9 Challenge 2 presentation for students

Challenge 3: Workshops and research symposiums that address ITB challenges and opportunities are available.

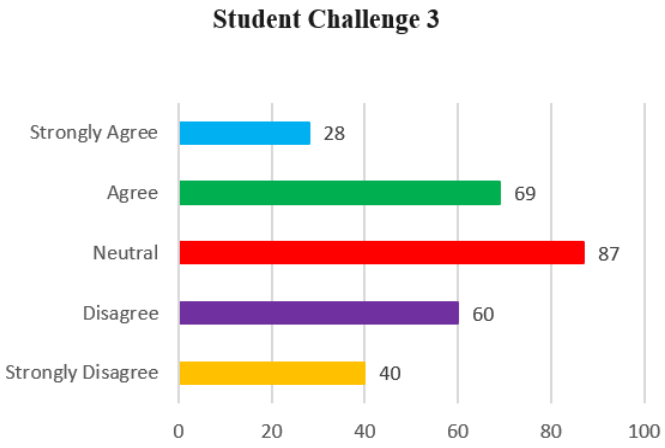


Figure 4. 10 Challenge 3 presentation for students

Challenge 4: When I attend workshops and research symposiums about ITB, my expectations are met.

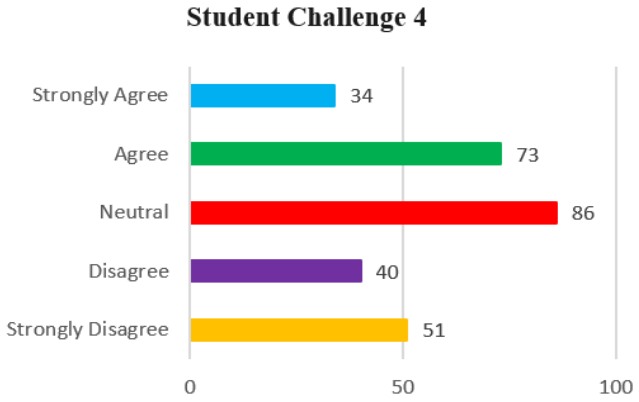


Figure 4. 11 Challenge 4 presentation for students

According to the research results, one can infer that the majority of students encounter no issues when accessing the ITB through the network. Furthermore, the students indicated that they possessed the necessary technical devices to access and use the ITB, such as laptops and phones. According to the results of the challenges for students, the ITB issues are often not clearly addressed during workshops and symposiums, which presents a challenge. Students also indicated that when they attended symposiums and workshops where they were expected to address a number of issues and challenges, some of the expectations are not met or they are partially addressed.

Testing the mean values for student challenges

After the graphical presentation of students' challenges, as illustrated through the bar graphs above, the significance of the results obtained warranted a rigorous evaluation. A one-sample t-test was utilized and executed. One sample t-test is a statistical method designed to assess the importance of discerning variances between a sample's average value and a recognized or theoretically expected population mean (Takiar, 2023). The bar graph initially provided a visual depiction of student responses to various challenges related to ITB adoption, offering an initial overview. However, to ascertain the statistical significance of these responses, a more in-depth analysis was imperative. The one-sample t-test was chosen for its suitability in comparing the mean Likert scale scores for each challenge against a predetermined test value, in this case, an average mean of 3 representing the neutral point on the Likert scale. The choice of using a mean value of 3 as a reference point in the analysis was deliberate and meaningful. In the context of the Likert scale used for data collection, a mean of 3 corresponds to the midpoint, often considered a 'neutral' or 'neither agree nor disagree' position. By selecting this midpoint as the test value, the analysis aimed to assess whether students' perceptions of ITB adoption deviated significantly from a neutral stance. In other words, it sought to determine whether students, on average, showed a clear inclination toward agreement or disagreement with the challenges presented. This choice allowed for a clear and interpretable assessment of the degree of agreement or disagreement and provided valuable insights into the direction and significance of students' perceptions. This statistical approach allowed for precise quantitative assessment, facilitating insights into the extent to which students' perceptions significantly deviated from the neutral midpoint. The t-test, well-suited to the research question at hand, enabled robust inferences and complemented the visual representation of the data, thus enhancing the depth and credibility of the research findings.

Table 4.9: One-Sample tests for student challenges

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Challenge1	284	4.02	.924	.055
Challenge2	284	4.16	.797	.047
Challenge3	284	2.95	1.189	.071
Challenge4	284	3.00	1.265	.075

One-Sample Test

	Test Value = 3						
			Significance			95% Confidence Interval of the Difference	
	t	df	One-Sided p	Two-Sided p	Mean Difference	Lower	Upper
Challenge1	18.614	283	<,001	<,001	1.021	.91	1.13
Challenge2	24.488	283	<,001	<,001	1.158	1.07	1.25
Challenge3	-.748	283	.227	.455	-.053	-.19	.09
Challenge4	-.047	283	.481	.963	-.004	-.15	.14

In the analysis of student perceptions regarding the challenges associated with ITB adoption, the research employed one-sample t-tests to rigorously assess the significance of these perceptions. Each challenge's Likert scale mean score and corresponding standard deviation were computed for clarity, and the results provided valuable insights into the extent of agreement or disagreement among students with respect to each challenge.

Challenge 1 ("*Internet Availability*"): The mean Likert score for Challenge 1, which addressed the availability of the internet for ITB use on institution premises, was 4.02. This score was significantly higher than the neutral point of 3. The one-sample t-test showed a highly significant difference ($t = 18.614$, $p < 0.001$), indicating a substantial agreement among students. The mean difference of 1.021 units above neutrality emphasizes the consensus on the consistent availability of the internet, highlighting its importance and effectiveness in facilitating ITB adoption.

Challenge 2 ("*Technical Gadgets Availability*"): Similarly, Challenge 2, which assessed the availability of technical gadgets for ITB use, received a mean score of 4.16, significantly higher than the neutral point. The one-sample t-test revealed a highly significant difference ($t = 24.488$, $p < 0.001$), with a mean difference of 1.158 units above neutrality. This result underscores a strong consensus among students,

emphasizing the significance of readily available technical gadgets, such as smartphones, laptops, and tablets, in promoting ITB adoption.

Challenge 3 ("*Workshops and Research Symposiums Availability*"): In contrast, Challenge 3, which explored the availability of workshops and research symposiums addressing ITB challenges and opportunities, exhibited a mean score of 2.95, indicating a response closer to the neutral point. The one-sample t-test did not find a statistically significant difference from the test value of 3 ($t = -0.748$, $p = 0.227$). This suggests that students' perceptions were not significantly different from neutrality regarding the availability of such events. While there may be variation in opinions, this challenge did not elicit a clear trend of agreement or disagreement.

Challenge 4 ("Expectations Met at Workshops and Symposiums"): Challenge 4, which gauged whether students' expectations were met when attending workshops and research symposiums about ITB, displayed a mean score of 3.00, also close to the neutral point. The one-sample t-test showed that there was no statistically significant distinction from the reference value of 3 ($t = -0.047$, $p = 0.481$). Similar to Challenge 3, this result suggests that students' perceptions of Challenge 4 were not significantly different from neutrality, indicating a balanced response.

4.5 Analyses of Staff Responses

4.5.1 Staff members consistency and reliability

As the Cronbach alpha in student consistency and reliability has been discussed in more depth. To gauge the consistency and reliability of the data gathered from staff members, a reliability analysis was conducted. The Cronbach's alpha values, ranging from 0.71 to 0.87, were obtained through the use of SPSS version 28. These values indicate acceptable levels of internal consistency and reliability for the staff members' data in this research. The outcomes of this research show that Cronbach's alpha coefficient for staff members is 0.91, an excellent number which indicates that the observed variables are well-matched, have good internal consistency, and are highly correlated. In sections B and C, the results of the reliability tests for each UTAUT contract are summarized in Table 4.10 below. In addition, the number of items used to quantify each item of measurement as well as Cronbach's alpha are included. A detailed analysis of Cronbach's alpha for staff members is presented in As per the findings, the items and responses within the questionnaire demonstrate consistency and reliability.

Table 4.10. As per the findings, the items and responses within the questionnaire demonstrate consistency and reliability.

Table 4.10: Test reliability of UTAUT constructs for staff data

Constructs	Number of items	Cronbach's alpha (α)
Performance Expectancy (PE)	3	0.831
Effort Expectancy (EE)	3	0.767
Social influence (SI)	2	0.866
Facilitating conditions (FC)	4	0.714
Behavioral intention to Use ITB(BI)	3	0.879
Overall Cronbach's alpha (α)	**15**	**0.919**

4.5.2 Staff members normality tests

To assess the normality of the staff members' data, a Kolmogorov-Smirnov test was conducted using SPSS. The purpose of this analysis was to investigate whether the data adhered to a normal distribution. The following hypotheses were employed to assess normality:

H0: The variables demonstrate a normal distribution.

H1: The variables being examined deviate from a normal distribution.

(Where H0 represents the null hypothesis and H1 represents the alternative hypothesis. Please see results in Table 4.11)

Significance levels of less than 0.05 were observed for all variables in the staff data set based on the normality test. As depicted in Table 4.11, the data sets used in this research were found to deviate from a normal distribution. Consequently, the null hypothesis (Ho) was rejected. Given the non-normal distribution of the data, non-parametric statistical tests, specifically the Spearman's rho test, were employed for data analysis in this study.

Table 4.11: Normality test for staff members

Tests of Normality

	Kolmogorov-Smirnov[a]		
Perfomance1	.264	123	.000
Perfomance2	.236	123	.000
Perfomance3	.199	123	.000
Effort1	.214	123	.000
Effort2	.266	123	.000
Effort3	.293	123	.000
Social1	.226	123	.000
Social2	.205	123	.000
Facilitating1	.299	123	.000
Facilitating2	.243	123	.000
Facilitating3	.167	123	.000
Facilitating4	.218	123	.000
Attitude1	.180	123	.000
Attitude2	.283	123	.000
Attitude3	.236	123	.000
Behavior1	.258	123	.000
Behavior2	.223	123	.000
Behavior3	.255	123	.000

a. Lilliefors Significance Correction

4.5.3 Descriptive statistics of the data

The descriptive analysis offers comprehensive insights into various aspects of the staff members, including their genders, ages, disciplines, and experiences with understanding ITBs. Appendix B presents a summary of the descriptive analysis for staff members, including metrics such as mean, mode, median, standard deviation, and variance. The data sets exhibit a standard deviation within one standard deviation, suggesting a relatively low degree of dispersion.

Gender

It is evident from the Table 4.12 that 60 of the respondents were females, 58 were male, and 5 did not disclose their gender. Thus, it is evident from the table that more staff member females responded to the questionnaire in this study than in other categories.

Table 4.12: staff members' gender

Valid	Frequency	Percent	Valid Percent	Cumulative Percent	Frequency
	Female	60	48.8%	48.8%	48.8%
	Male	58	47.2%	47.2%	95.9%
	Prefer not to say	5	4.1%	4.1%	100.0%
	Total	**123**	**100.0%**	**100.0%**	

Age

Regarding the age distribution among staff members, the largest group of participants (43 individuals) fell between the ages of 28 and 31 years old. This was followed by 38 participants who were over the age of 32 years, and 28 participants between the ages of 24 and 27 years old. There were only 14 of the population between 20 and 23. (see Table 4.13 below)

Table 4.13: Staff members' age

Valid	Frequency	Percent	Valid Percent	Cumulative Percent	Frequency
	20-23	14	11.4%	11.4%	11.4%
	24-27	28	22.8%	22.8%	34.1%
	28-31	43	35.0%	35.0%	69.1%
	Above 32	38	30.9%	30.9%	100.0%
	Total	**123**	**100.0%**	**100.0%**	

Experiences on the use of ITB

The study determined the years of experience of staff members. Among the respondents, 18 had never used ITB before, 26 had less than one year of experience, 31 had two to three years of experience, 28 had four to six years of experience, and 20 had seven or more years of experience. As seen in the Table 4.14, the majority of respondents 31 had 2 and 3 years of experience.

Table 4.14: Staff members experience on the use of ITB

Valid	Number of years	Frequency	Percent	Valid Percent	Cumulative Percent
	Never used before	18	14.6%	14.6%	14.6%
	Below 1	26	21.1%	21.1%	35.8%
	2-3	31	25.9%	25.9%	61.0%
	4-6	28	22.8%	22.8%	83.7%
	Above 7	20	16.3%	16.3%	100.0%
	Total	**123**	**100.0%**	**100.0%**	

Disciplines

The study involved staff members from 13 different disciplines that included terms related to ITB. The research revealed that 19 staff members who answered were from the field of psychology (majority), while only 3 staff members came from the physics discipline (least). (*see* Figure 4. 12 *below*).

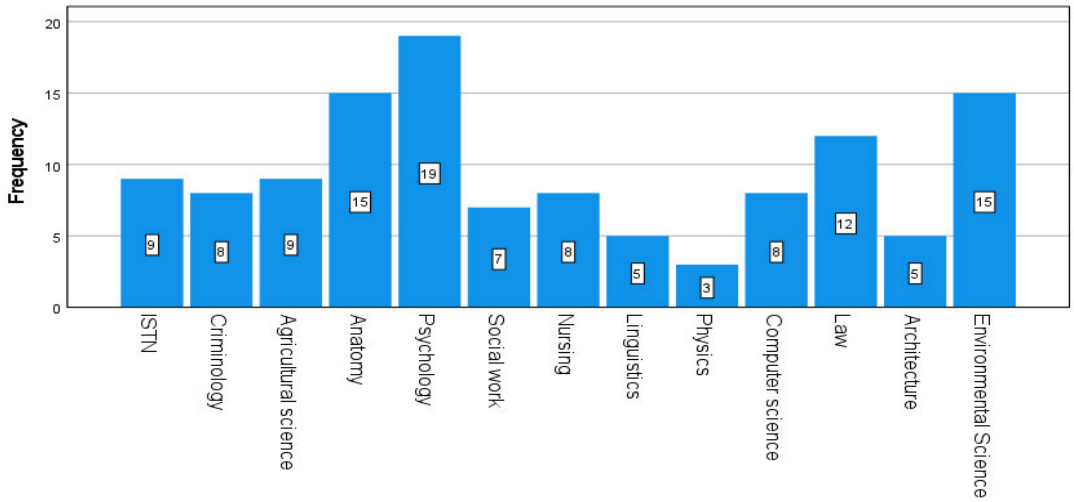


Figure 4. 12 Disciplines of staff members

4.5.4 Inferential Statistics of the Staff members data – Relationships among the constructs

4.5.4.1 Analyses of sampling adequacy for staff members

Before conducting the analysis, it is crucial to ensure the adequacy of the data. To evaluate the suitability of the staff member data for analysis, two tests were utilized: the Kaiser-Meyer-Olkin (KMO) test and the Bartlett's test. The KMO test assesses the extent of shared variance among variables, with values exceeding 0.7 indicating good adequacy. Conversely, Bartlett's test scrutinizes the null hypothesis that the correlation matrix is an identity matrix, and a p-value below 0.05 is considered significant, signifying data adequacy. The KMO test result for this staff member dataset was 0.909, which is deemed acceptable, and Bartlett's test indicates that the data exhibit significant correlations with a p-value below 0.05 *(*see Table **4.15** below)

Table 4.15: KMO and Bartlett's test for staff members

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.909
Bartlett's Test of Sphericity	Approx. Chi-Square	1879.473
	Df	231
	Sig.	<,001

4.5.4.2 Relationship among the independent constructs and Behavioral intention

Correlations between PE, EE, and SI with the dependent variable BI

The UTAUT framework was employed in this research to measure individuals' behavioural intentions towards technology. The framework comprises independent variables: performance expectation (PE), effort expectation (EE), social influences (SI), and facilitating conditions (FC). The dependent variable is behavioural intention (BI) which indicates the likelihood of engaging in a particular behaviour. To assess the relationship between the independent variables and BI, Spearman's rho correlation was calculated. Spearman's correlation aids in assessing the degree to which alterations in one constructs are linked to modifications in another variable (Schober et al., 2018).

Based on the findings below, there is a moderate level of correlation observed. It is evident that a positive relationship exists between these variables, which aligns with similar studies utilizing the UTAUT to analyse technology acceptance. Notably, PE stands out as the most influential predictor of BI when compared to other factors. Furthermore, the results indicate a consensus among PE, effort EE, and SI in relation to BI. The strongest correlation is found between PE and BI, followed by EE and BI, while the association between SI and BI is relatively weaker.

Table 4.16: Correlation of UTAUT framework for staff members

Correlations						
			BI	PE	EE	SC
Spearman's rho	BI	Correlation Coefficient	1.000	.593**	.563**	.459**
		Sig. (2-tailed)	.	<,001	<,001	<,001
		N	123	123	123	123
	PE	Correlation Coefficient	.593**	1.000	.756**	.420**
		Sig. (2-tailed)	<,001	.	<,001	<,001
		N	123	123	123	123
	EE	Correlation Coefficient	.563**	.756**	1.000	.405**
		Sig. (2-tailed)	<,001	<,001	.	<,001
		N	123	123	123	123
	SC	Correlation Coefficient	.459**	.420**	.405**	1.000
		Sig. (2-tailed)	<,001	<,001	<,001	.
		N	123	123	123	123
**. Correlation is significant at the 0.01 level (2-tailed).						

- A moderate positive correlation is evident between PE and BI ($r=0.593$; $p<0.001$), signifying that the extent of performance expectation (PE) notably impacts end-users' intention to persist in using the ITB.

- The correlation between EE and BI is moderately positive ($r=0.563$; $p<0.001$). This suggests that the effort expectation (EE) associated with using the ITB has a significant impact on the end-users' intention to adopt it.

- SI and BI show a moderate correlation ($r=0.459$; $p<0.001$). This shows that the social influences (SI) from important individuals in the end-users' environment have a noteworthy effect on their intention to adopt the ITB.

Regressions between PE, EE, SI, with the outcome variable BI

PE, EE, and SI (independent variables) were tested for their ability to predict BI (dependent variable) to adopt ITB through a multiple linear regression model. As there are multiple independent variables, multiple regression was adopted (Moorthy et al., 2019). The dependent variable, BI, represents the variable of interest that we want to predict or explain. The independent variables (PE, EE, and SI) were used as predictors to estimate the values of the dependent variable BI using the multiple regression analysis technique. Regressions are computed for staff members to determine whether independent variables influence BI.

In a multiple regression analysis, multiple independent variables can be used to explain different attributes of the dependent variable. As a component of the examination, a multiple linear regression model was employed to explore the degree to which the predictor variables (PE, EE, and SI) can predict the dependent variable (BI) in the context of staff members' adoption of ITB. Based on the summary of the model and the analysis of variance, the overall regression model showed a statistically a significant determinant of the intention to adopt ITB, with an F-value of 39.301 at a significance level of $p < 0.05$. The coefficient of determination (R-square) for the model was 0.498, indicating that roughly 49.8% of the variance in the dependent variable can be accounted for by the independent variables (refer to Figure 4. 13).

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.705[a]	**.498**	.485	.616
a. Predictors: (Constant), SC, PE, EE				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44.676	3	14.892	**39.301**	**<,001[b]**
	Residual	45.092	119	.379		
	Total	89.769	122			
a. Dependent Variable: BI						
b. Predictors: (Constant), SC, PE, EE						

Coefficients[a]						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	.304	.346		.881	.380
	PE	**.435**	.116	.370	3.732	**<,001**
	EE	**.305**	.125	.243	2.435	**.016**
	SC	**.198**	.066	.221	2.997	**.003**
a. Dependent Variable: BI						

Figure 4. 13 Regression for staff members

The Figure 4. 13 presented displays the estimated regression weights, and the outcomes are outlined below:

- The regression analysis revealed that there is a significant relationship between performance expectancy (PE) and behavioral intention (BI), with a regression estimate of 0.535 ($p < 0.05$).
- Similarly, there is a significant relationship between effort expectancy (EE) and BI, with a regression estimate of 0.305 ($p < 0.05$).
- Furthermore, the regression test revealed a significant association concerning social influence (SI) and BI, with a regression estimate of 0.198 ($p < 0.05$).

4.5.4.3 Exploring Facilitating conditions that affect usage

There was a total of four items of measurement asked of the respondents regarding the facilitating conditions that affect the use of ITB. According to this study, facilitating conditions refer to factors that facilitate the use of ITB technology. The purpose of this section was to assess the staff members' perception of having access to essential resources such as laptops, phones, and computers, as well as receiving assistance or support, practical training, and network compatibility. These factors were evaluated in relation to their ability to adopt and utilize ITB for school activities aimed at improving academic performance and research in the isiZulu language.

Graphical representation of respondents' perceptions

Item of measurement *01: I Have the necessary resources (laptop, phone) to use ITB.*

In accordance with the results Figure 4. 14, staff members believe they possess the appropriate resources to access the ITB, such as a laptop, a phone, or a computer. According to the survey, 50 respondents believed that they had the required resources to use ITB, while 58 strongly agreed. Accordingly, respondents agreed regarding the resources that were required. In the event that resources were available, 15 respondents viewed ITB neutrally. There were no respondents who disagreed with this conclusion, in light of the survey findings.

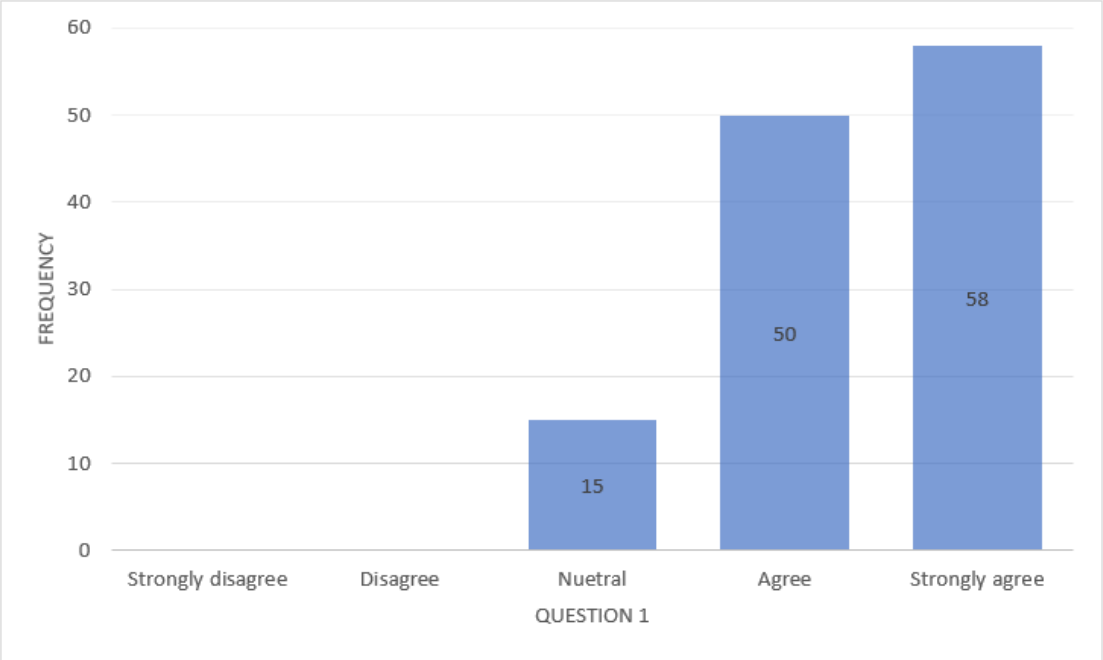


Figure 4. 14 Staff members responding to item of measurement 1: Have the necessary resources (laptop, phone) to use ITB

Item of measurement *02: Help is readily available to support my usage of the ITB.*

The results on Figure 4. 15 indicate that staff members agreed that support is available for the use of the ITB. ITB support was agreed by 52 respondents, and 25 responded that they strongly agree. Accordingly, respondents were highly satisfied with ITB support. Despite that, there were 9 respondents who said they didn't believe support was available when using ITB. 35 respondents viewed ITB neutrally. Many respondents to the survey believed that ITB support is always available, in light of the survey findings.

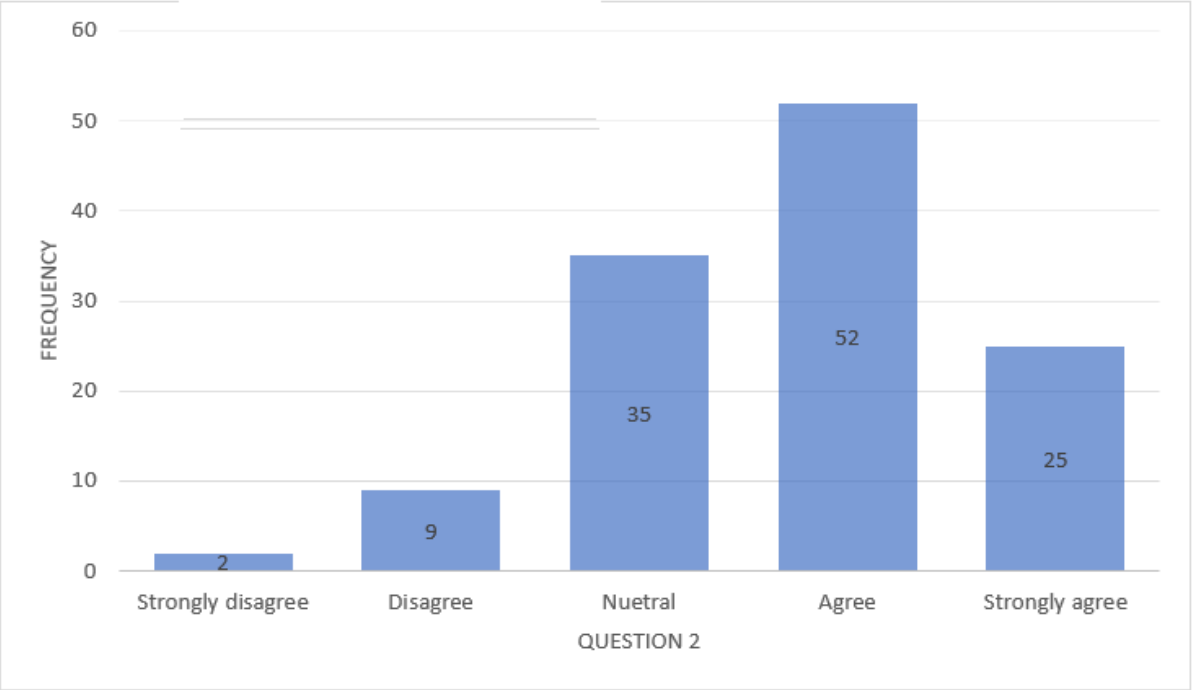


Figure 4. 15 Staff members responding to item of measurement 2: Help is readily available to support my usage of the ITB

Item of measurement *03: Practical trainings are provided for ITB.*

In Results According to the findings presented in Figure 4. 16, it was observed that 40 staff members expressed a neutral stance regarding the availability of practical training for the use of ITB. 25 staff members disagreed with the provision of practical training. This statement was strongly disagreed with by 11 staff members. Despite this, 33 staff members agreed that training is provided. There were 14 staff members who strongly supported this notion.

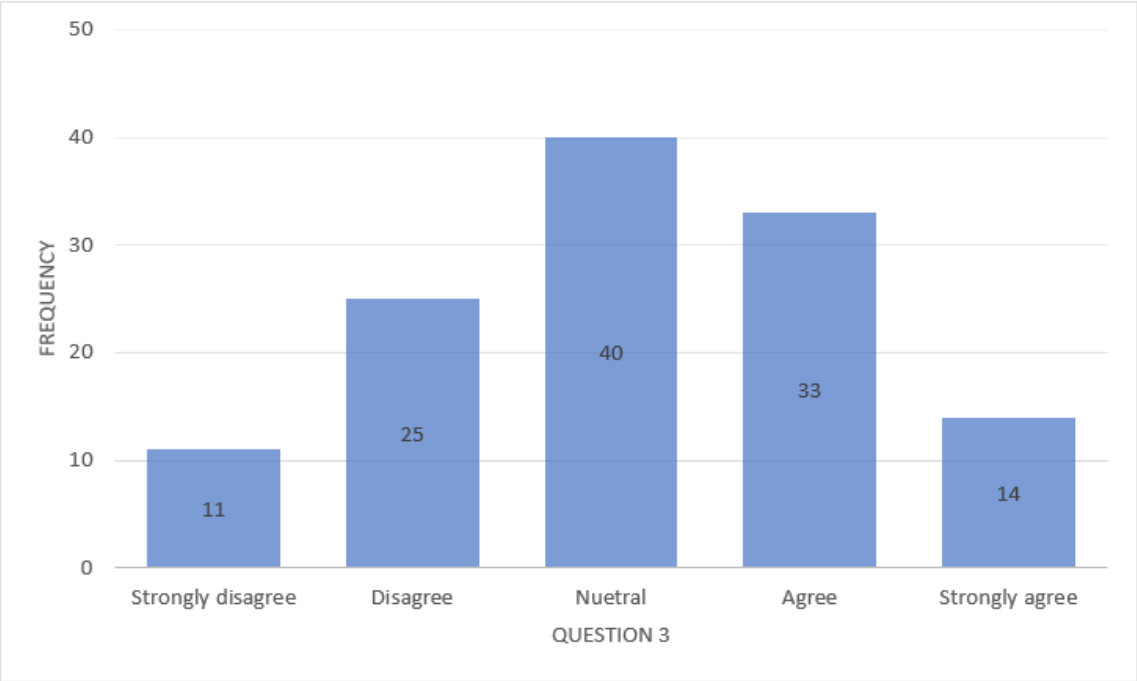


Figure 4. 16 Staff members responding to item of measurement 3: Practical trainings are provided for ITB.

Item of measurement *04: ITB updates are compatible with my internet and network.*

According to the results Figure 4. 17 46 staff members agree that ITB updates are compatible with their network and internet connection. This statement was strongly supported by 30 staff members. There were 25 staff members who disagreed with this statement. However, 35 of the students were neutral on this issue.

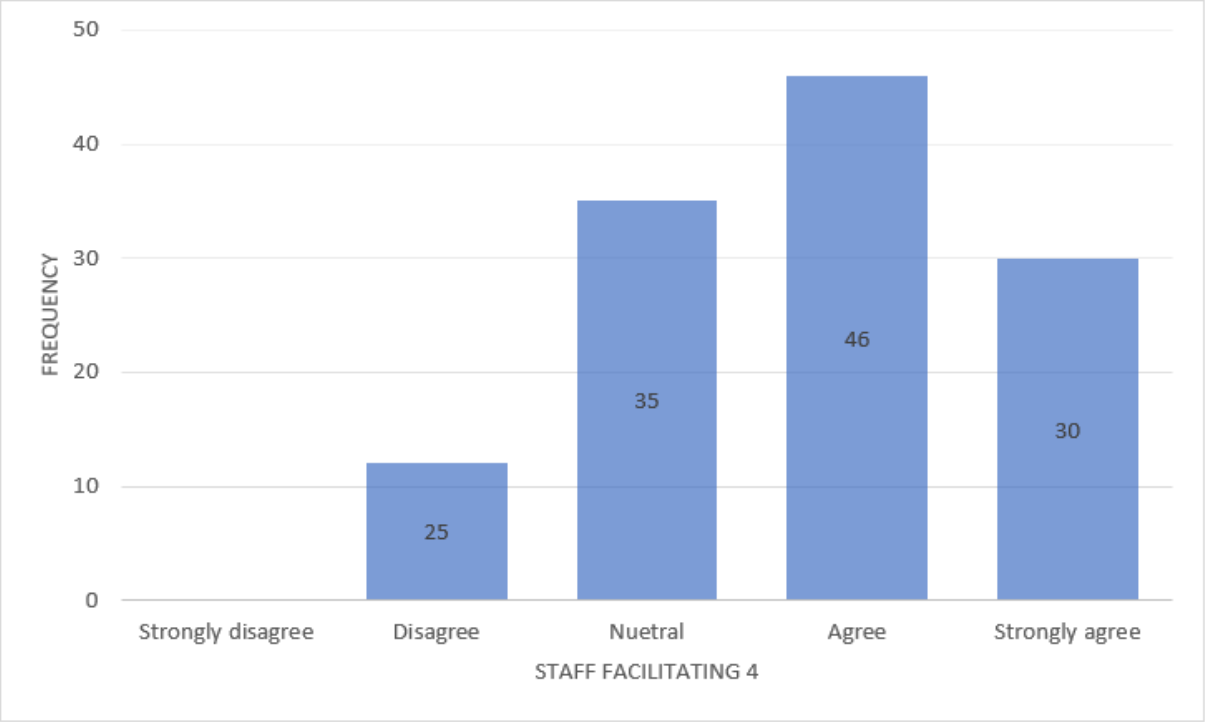


Figure 4. 17 staff members response to item of measurement 4: ITB updates are compatible with my internet and network.

Correlation Analysis of Facilitating Conditions Among Staff members

A correlation test was performed to investigate the connections between facilitating conditions and staff members' behavioral intentions related to ITB adoption. This analysis aimed to investigate whether factors like having the necessary resources or access to support influenced how staff members felt about using ITB.

Table 4.17: Correlation between BI and FC for staff members

Correlations			
		BI	FC
BI	Pearson Correlation	1	.635**
	Sig. (2-tailed)		<,001
	N	123	123
FC	Pearson Correlation	.635**	1
	Sig. (2-tailed)	<,001	
	N	123	123
**. Correlation is significant at the 0.01 level (2-tailed).			

The correlation analysis between Behavioral Intentions (BI) and Facilitating Conditions (FC) reveals a strong and statistically significant positive relationship. The Pearson Correlation for Behavioral Intentions (BI) and Facilitating Conditions (FC) shows a strong positive correlation with a coefficient of 0.635. The associated p-value with this correlation is less than 0.001 ($p < 0.001$), signifying strong statistical significance.

4.5.4.4 Challenges experience by staff members

In order to assess the challenges faced by end-users to adopt and use ITB four items of measurements were used in this study. In this study challenges are components that affect the adoption of ITB technology. The primary objective of this section was to assess the obstacles faced by staff members when adopting ITB. Four questions were asked about the availability of the internet, technical gadgets, availability of platforms such as symposiums, workshops, and conferences that allow end-users to address ITB issues and the satisfaction of end-users when they attend platforms that address them. The respondent for staff members is as follows:

Graphical representation of respondents' perceptions for staff members' challenges

Challenge 1: Internet is always available for me to use ITB in the institution premises.

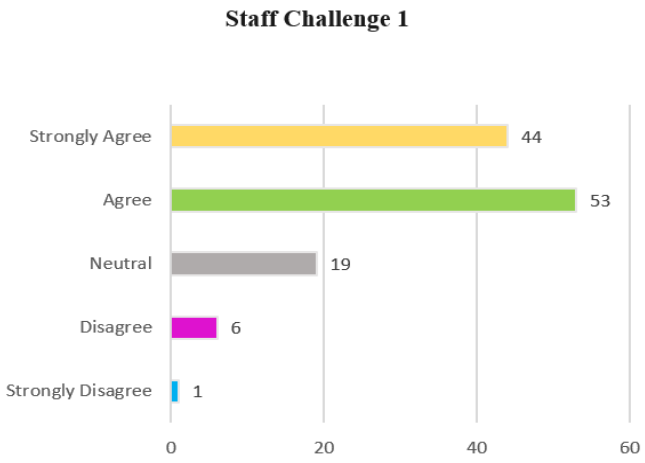


Figure 4. 18 Challenge 1 presentation for staff members

Challenge 2: Technical Gadgets (Smartphone, Laptop, Tablets) are available for me to use ITB.

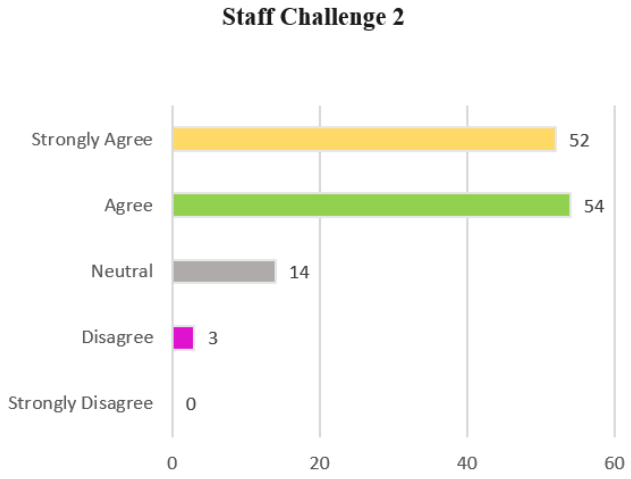


Figure 4. 19 Challenge 2 presentation for staff members

Challenge 3: Workshops and research symposiums that addresses ITB challenges and opportunities are available.

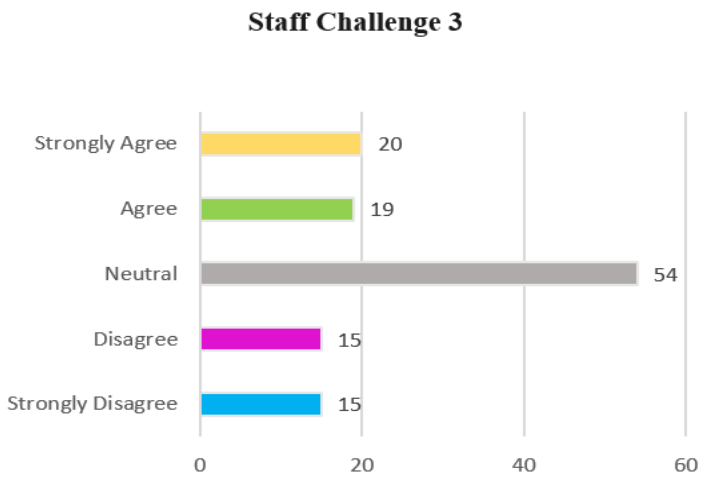


Figure 4. 20 Challenge 3 presentation for staff members

Challenge 4: When I attend workshops and research symposiums about ITB, my expectations are met.

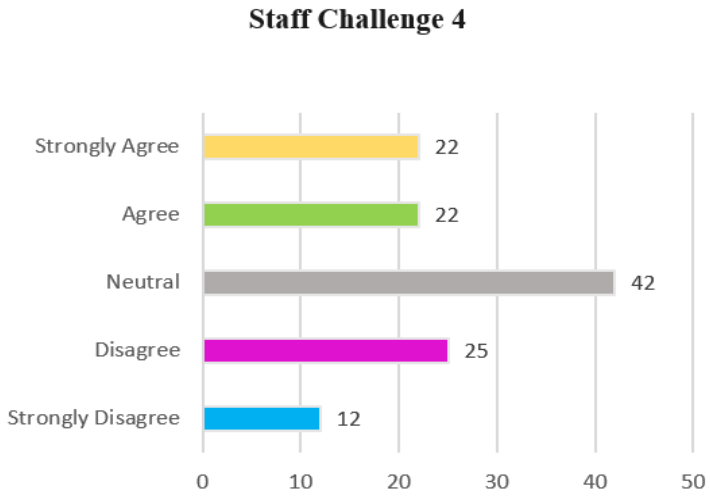


Figure 4. 21 Challenge 4 presentation for staff members

Based on the study's four questions, most end-users are able to access the ITB via the internet without any problems. Moreover, staff members reported having access to and use of the ITB using laptops and phones. During workshops and symposiums, ITB issues are often not clearly addressed, which presents a challenge for staff members. It has also been reported by staff members that some expectations are not met or are partially met when they attend symposiums and workshops.

Testing the mean values for staff members challenges

After the visual representation of challenges experienced by staff members, as depicted through bar graphs, the importance of the findings prompted a thorough examination. To achieve this, a one-sample t-test, a statistical technique designed to evaluate the significance of differences between a sample mean was employed. Initially, the bar graphs provided a visual summary of staff members' responses to various challenges associated with ITB adoption, offering an initial glimpse of the situation. However, for a comprehensive understanding of the statistical significance of these responses, a more detailed analysis was necessary. The selection of one-sample t-test was selected based on its suitability in comparing the mean Likert scale scores for each challenge against a predetermined reference value. In this context, the chosen reference was an average mean of 3, representing the neutral point on the Likert scale. This statistical method facilitated a precise quantitative evaluation, providing insights into the degree to which staff members' perceptions significantly deviated from the neutral midpoint. The utilization of the t-test, tailored to the research question, enabled robust conclusions and augmented the comprehensiveness and reliability of the research findings.

Table 4.18: One-sample test for staff members challenges

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Challenge1	123	4.08	.883	.080
Challenge2	123	4.26	.756	.068
Challenge3	123	3.11	1.189	.107
Challenge4	123	3.14	1.217	.110

One-Sample Test

	Test Value = 3						
			Significance			95% Confidence Interval of the Difference	
	t	df	One-Sided p	Two-Sided p	Mean Difference	Lower	Upper
Challenge1	13.577	122	<,001	<,001	1.081	.92	1.24
Challenge2	18.494	122	<,001	<,001	1.260	1.13	1.40
Challenge3	1.062	122	.145	.290	.114	-.10	.33
Challenge4	1.260	122	.105	.210	.138	-.08	.36

Staff members' perceptions of the challenges associated with ITB adoption were examined through one-sample t-tests. The calculated mean Likert scores and corresponding standard deviations provided valuable insights into the degree of agreement or disagreement among staff members regarding each challenge.

Challenge 1 ("Internet Availability"): For Challenge 1, which focused on the availability of the internet for ITB use within the institution premises, the mean Likert score was 4.08. This score was significantly higher than the neutral point of 3, as indicated by the one-sample t-test ($t = 13.577$, $p < 0.001$). The result showed a notable consensus among staff members, with a mean difference of 1.081 units above neutrality. It suggests that staff members strongly agreed with the consistent availability of internet access, highlighting its importance in facilitating ITB adoption.

Challenge 2 ("Technical Gadgets Availability"): Similarly, Challenge 2, which explored the availability of technical gadgets for ITB use, yielded a mean score of 4.26, significantly higher than the neutral point. The one-sample t-test showed a highly significant difference ($t = 18.494$, $p < 0.001$), with a mean difference of 1.260 units above neutrality. This outcome underlines a strong consensus among staff members, emphasizing the significance of ready access to technical gadgets in promoting ITB adoption.

Challenge 3 ("Availability of Workshops and Research Symposiums"): Turning to Challenge 3, which examined the availability of workshops and research symposiums addressing ITB challenges and opportunities, staff members' mean score was 3.11, closer to the neutral point. The one-sample t-test did not yield a statistically significant difference from the test value of 3 ($t = 1.062$, $p = 0.145$), suggesting that staff members' perceptions were not significantly different from neutrality regarding the availability of such events. This result indicates a mixed or varied response among staff members.

Challenge 4 ("Expectations Met at Workshops and Symposiums"): Challenge 4, which inquired about whether staff members' expectations were met when attending workshops and research symposiums on ITB, displayed a mean score of 3.14, also close to the neutral point. The one-sample t-test indicated no statistically significant difference from the test value of 3 ($t = 1.260$, $p = 0.105$). Like Challenge 3, this result suggests that staff members' perceptions of Challenge 4 were not significantly different from neutrality, implying a balanced response.

4.6 Comparison between student vs Staff members

In this section, the study undertakes a comparative analysis between two key groups of the participants (students and staff members). Previous sections (section 4.4 and section 4.5) have explored the individual perceptions and experiences related to ITB. However, the objective of this section is to uncover distinctions and commonalities in viewpoints between these two distinct groups. The aim is to directly compare how students and staff members perceive various facets of ITB adoption, including performance, effort, social influence, and facilitating conditions. This comparative analysis contributes to a deeper understanding of ITB dynamics within the institution and provides a foundation for informed decision-making and tailored strategies to enhance ITB adoption for both students and staff members.

Comparing correlation results and their impact on ITB adoption: Student vs Staff members

In this comparative analysis, the researcher examines and contrasts the correlation results between students and staff members in the context of adopting ITB. Specifically, the study assesses the relationships between independent variables (Performance Expectation - PE, Effort Expectation - EE, and Social Influence - SI) and the dependent variable (Behavioural Intention - BI) within the Unified Theory of Acceptance and Use of Technology (UTAUT) framework for both groups.

Performance Expectation (PE): For both students and staff members, the correlation analysis reveals a moderately positive relationship between PE and BI. Among students, this correlation stands at $r = 0.530$ ($p < 0.001$), indicating that students' perception of enhanced performance expectancy positively influences their behavioural intention to adopt ITB. Similarly, among staff members, the correlation is stronger at $r = 0.593$ ($p < 0.001$), emphasizing the substantial impact of performance expectation on their intention to continue using ITB. This similarity suggests that irrespective of the group, individuals are more inclined to adopt ITB when they expect improved performance.

Effort Expectation (EE): The analysis also demonstrates a moderately positive correlation between EE and BI for both students and staff members. Among students, this correlation is $r = 0.479$ ($p < 0.001$), suggesting that students' perceptions of ease of use and the effort required positively affect their intention to use ITB. Staff members show a similar pattern with a correlation of $r = 0.563$ ($p < 0.001$), indicating that their intention to adopt ITB is significantly influenced by the effort expectation associated with its use. This finding highlights the universality of the impact of effort expectation on ITB adoption.

Social Influence (SI): The analysis reveals moderate positive correlations between SI and BI for both students and staff members. Among students, this correlation is $r = 0.538$ ($p < 0.001$), illustrating that social influences from important individuals positively impact their intention to adopt ITB. Staff members exhibit a comparable correlation at $r = 0.459$ ($p < 0.001$), emphasizing that social influences within their work environment significantly affect their intention to adopt ITB. This consistency underscores the role of social influence as a driving factor in ITB adoption, irrespective of whether one is a student or a staff member.

The comparative analysis of correlation results between students and staff members within the UTAUT framework underscores several key points. First, there is a notable similarity in the patterns of correlation between the groups, indicating that the factors influencing ITB adoption, such as performance expectation, effort expectation, and social influence, exhibit comparable effects on both students and staff members. Second, the stronger correlations observed among staff members suggest that these factors may hold even greater significance within a professional context.

Comparing regression results and their impact on ITB adoption: Student vs Staff members

In comparing the results of the multiple linear regression analyses conducted for students and staff members, notable insights emerge regarding the factors influencing their behavioural intentions (BI) to adopt ITB.

Performance Expectancy (PE): The examination of Performance Expectancy (PE) as a predictor of Behavioural Intention (BI) to adopt Information Technology-Based (ITB) solutions reveals both commonalities and distinctions between students and staff members. For students, the analysis establishes a significant positive connection between PE and BI, supported by a regression estimate of 0.335 ($p < 0.05$). This finding signifies that as students perceive higher performance expectations associated with ITB adoption, their intention to embrace ITB increases. Staff members similarly exhibit a significant positive relationship between PE and BI, with a higher regression estimate of 0.535 ($p < 0.05$). This suggests that staff members who perceive elevated performance expectations regarding ITB adoption are more inclined to express a positive intention to adopt ITB. In this regard, both students and staff members emphasize the significance of performance expectations in predicting ITB adoption intentions, although staff members appear to attribute slightly greater importance to this factor, potentially influenced by their distinct professional context.

Effort Expectancy (EE): Effort Expectancy (EE) emerges as another construct where both students and staff members share common ground in their predictors of BI. For students, the analysis demonstrates a significant positive association between EE and BI, with a regression estimate of 0.163 ($p < 0.05$). This implies that when students find ITB usage easy and less effortful, it positively influences their intention to adopt ITB. Likewise, staff members show a significant positive association between EE and BI, with a regression estimate of 0.305 ($p < 0.05$). Staff members who find ITB usage less effortful tend to have a stronger intention to adopt ITB. Here, both groups concur that ease of use and reduced effort are pivotal factors influencing ITB adoption intentions, with staff members placing slightly more emphasis on this aspect, potentially shaped by their professional responsibilities.

Social Influence (SI): The analysis of Social Influence (SI) as a predictor of BI highlights shared perspectives and subtle differences between students and staff members. For students, SI exerts a substantial positive impact on BI, with a regression estimate of 0.368 ($p < 0.05$). This indicates that the influence of important individuals in students' social environment plays a critical role in shaping their intention to adopt ITB. In the case of staff members, SI maintains a significant relationship with BI, with a regression estimate of 0.198 ($p < 0.05$). This suggests that the influence of important individuals in staff members' professional environments positively affects their intention to adopt ITB. Both students and staff members thus acknowledge the significance of social influence in predicting ITB adoption intentions, with students attributing slightly more influence to this factor.

This comparative analysis of regression results for students and staff members underscores the commonalities and distinctions in their predictors of ITB adoption intentions across the constructs of Performance Expectancy (PE), Effort Expectancy (EE), and Social Influence (SI). While shared perspectives exist, the variations in the strength of these relationships emphasize the importance of context-specific strategies for promoting ITB adoption. Students and staff members alike place substantial importance on these constructs, yet their distinct contexts, whether educational or professional, contribute to nuanced differences in their predictive power.

Comparing facilitating Conditions and their impact on ITB adoption: Student vs Staff members

In this section, the analysis focuses on the influence of facilitating conditions on ITB adoption among students and staff members. These conditions encompass aspects such as resource availability, support accessibility, training provision, and update compatibility. This comparative examination sheds light on the readiness of both groups to embrace ITB in their specific contexts.

Having the Necessary Resources (Laptop, Phone) to Use ITB: A majority of students (140 agreed, 95 strongly agreed) believed they had the necessary resources for ITB usage. A total of 12 respondents showed that they did not have the necessary resources. Similarly, staff members also perceived they had the required resources, with 50 agreeing and 58 strongly agreeing.

Help Is Readily Available to Support ITB Usage: Students expressed a high level of agreement with ITB support, with 121 agreeing and 48 strongly agreeing. Only 17 respondents disagreed. Staff members also agreed with ITB support, as indicated by 52 agreeing and 25 strongly agreeing.

Practical Trainings Are Provided for ITB: Among students, there was a diverse response regarding the provision of practical training. 69 students agreed, while 60 disagreed. Staff members also had mixed opinions on practical training, with 33 agreeing and 11 strongly agreeing, but 25 disagreed.

ITB Updates Are Compatible with Internet and Network: A majority of students (115 agreed, 51 strongly agreed) believed ITB updates were compatible with their internet and network. Staff members also perceived compatibility, with 46 agreeing and 30 strongly agreeing.

Correlation Analysis of Facilitating Conditions: The correlation between Behavioural Intentions (BI) and Facilitating Conditions (FC) for students is strong ($r = 0.636$, $p < 0.001$), indicating a positive relationship converning the perception of facilitating conditions and behavioural intentions related to ITB adoption. The correlation between BI and FC for staff members is also strong ($r = 0.635$, $p < 0.001$), showing a similar positive relationship between these variables.

Comparison: The comparisons between students and staff members indicate a high level of agreement on several aspects of facilitating conditions. Both groups perceive they have the necessary resources and ITB support. However, there are some differences in perceptions of practical training, with students showing more diversity in responses. Regarding compatibility with ITB updates, both students and staff members generally agree. In terms of the correlation between facilitating conditions and behavioural intentions, both students and staff members exhibit strong, positive relationships. These findings suggest that the perception of facilitating conditions significantly influences the intention to adopt ITB for both groups.

Comparing challenges and their impact on ITB adoption: Student vs Staff members

Using one-sample t-tests, the mean Likert scores for both groups were rigorously assessed against the neutral point of 3. The results unveiled distinct patterns in their perceptions. For students, Challenges 1 and 2 garnered significant consensuses, with mean Likert scores of 4.02 and 4.16, respectively, both significantly higher than the neutral point ($t = 18.614$, $p < 0.001$, and $t = 24.488$, $p < 0.001$, respectively). This indicates a prevailing agreement among students regarding the availability of internet access and technical gadgets for ITB adoption. In contrast, staff members, while leaning towards agreement, displayed somewhat lower mean scores for Challenges 1 ($M = 4.08$) and 2 ($M = 4.26$), with similar significance ($t = 13.577$, $p < 0.001$, and $t = 18.494$, $p < 0.001$, respectively). Challenges 3 and 4, focusing on the availability of workshops and research symposiums and meeting expectations at such events, yielded mixed responses. Students' mean scores for these challenges ($M = 2.95$ and $M = 3.00$) did not significantly differ from the neutral point ($t = -0.748$, $p = 0.227$, and $t = -0.047$, $p = 0.481$, respectively). Staff members' mean scores for these challenges ($M = 3.11$ and $M = 3.14$) were similarly non-significant ($t = 1.062$, $p = 0.145$, and $t = 1.260$, $p = 0.105$, respectively). These findings underscore the nuanced differences in perceptions between the two groups, emphasizing the importance of tailoring ITB strategies to accommodate these variations

4.7 Chapter summary

This chapter provides an comprehensive analysis and discussion for students and staff members, shedding light on their perceptions of ITB adoption. The chapter unfolds across three main sections, each tailored to specific aspects of the study. The first section delivers a descriptive overview, encompassing participants' demographics, including gender, age, experience, and disciplinary backgrounds. The distribution of participants' ITB usage experience is visually portrayed, encapsulating data from both students and staff. The second section delves into the heart of the study, exploring correlations and regressions among the UTAUT framework constructs. Notably, this analysis reveals the varying impact of factors on ITB adoption; social influence emerges as a pivotal factor for students, while performance expectation takes precedence for staff members. Facilitating conditions influencing

ITB usage are also thoroughly examined, with graphical representations and correlation analysis aiding in the illustration of these findings, catering to both student and staff perspectives. The third section is dedicated to a comprehensive exploration of the challenges faced by end-users during ITB adoption. Four specific questions were addressed, with results presented through various visual aids, such as graphs and pie charts, offering an in-depth understanding of these challenges. Furthermore, the significance of the results was further assessed through t-test analysis. In addition to this, a comparative analysis between students and staff members in relation to ITB adoption was conducted, unveiling valuable insights into the variations between the two groups. In the following chapter, a comprehensive discussion of the results will be presented, addressing the research questions and providing profound insights into the perceptions and challenges surrounding ITB adoption among students and staff members.

CHAPTER FIVE: SUMMARIES, RECOMMENDATIONS, AND CONCLUSIONS

5.1 Introduction

Based on the findings from the previous chapter, this chapter presents answers to critical questions, recommendations, and a conclusion.

5.2 Answers to critical Questions of the study for Students

How does performance expectancy affect behavioural intention to use the ITB?

This study thoroughly explored the impact of students' performance expectations regarding ITB adoption, culminating in a comprehensive analysis presented in Chapter 4. The research findings unequivocally establish that performance expectancy plays a pivotal role in shaping students' behavioural intentions concerning the adoption of ITB technology. Statistical comparisons revealed that students consistently emphasize the importance of performance expectations in predicting ITB adoption intentions, with a mean regression estimate of 0.335 ($p < 0.05$). The study's results strongly suggest that students harbour the expectation that ITB technology will significantly enhance their academic achievements. Specifically, they anticipate that its use will bolster academic productivity, facilitate the creation of high-quality isiZulu content, and ultimately lead to increased academic output. This aligns with prior research, such as the study by Soetan et al. (2020), which also identified a moderate yet substantial association between performance expectancy and behavioural intention toward the adoption of language technologies. Additionally, the comparative analysis conducted in this study further highlights the significance of performance expectancy. While both students and staff members emphasize the importance of performance expectations, staff members appear to place slightly greater importance on this factor. This nuanced difference underscores the need for context-specific strategies when promoting ITB adoption among these distinct user groups. Furthermore, within the UTAUT framework, performance expectancy emerges as the second most influential predictor of behavioural intention for students, following social influences. This is reaffirmed by the outcomes of the regression test presented earlier in this chapter, where performance expectancy demonstrated a regression estimate of 0.335 ($p < 0.05$). These statistical findings robustly support the notion that performance expectancy significantly influences students' behavioural intentions regarding ITB technology adoption. In line with Aguilera-Hermida (2020) assertion that the sustained use of technology hinges on the enduring perception of its performance, the study's results underscore the pivotal role of performance expectancy. When end-users perceive ITB technology as beneficial and conducive to their academic success, they are more inclined to consistently engage with it. This study's findings and comparative analysis provide substantial empirical support for the critical importance of performance expectancy in fostering sustained ITB adoption among students.

To what extent does effort expectancy influence behavioural intention to use ITB?

This study meticulously examined the influence of effort expectancy on behavioural intention concerning the adoption of ITB solutions among students within educational institution. The investigation revealed multifaceted insights into students' perceptions and experiences, augmented by a comparative analysis between students and staff members. The findings validate the significant and positive impact of effort expectancy on students' behavioural intention to embrace ITB. The ITB emerged as a user-friendly, comprehensible, and accessible tool, facilitating a swift learning curve. Even for those starting from scratch, acquiring proficiency posed minimal challenges. Students expressed confidence in their technological competence, believing it was sufficient for proficient ITB utilization. These observations align with the statistical analyses conducted, which consistently underscored the pivotal role of effort expectancy. Correlation analyses revealed robust positive relationships between effort expectancy and behavioural intention, with a correlation coefficient of $r = 0.479$ ($p < 0.001$). This outcome is reaffirmed through the multiple linear regression analysis, further affirming that students who perceived ITB usage as effortless exhibited a significantly higher intention to adopt ITB. However, it's essential to contextualize these findings within the broader framework of ITB adoption. While effort expectancy undoubtedly exerted a substantial influence, other factors such as social influence and performance expectancy also contributed to shaping students' intentions to adopt ITB. Moreover, a comparative analysis between students and staff members illuminated detailed differences in their perceptions. Both groups shared the perception that ITB was easy to use and user-friendly. However, students appeared to have a higher diversity of responses regarding practical training. This comparison underscores the need for tailored ITB adoption strategies that cater to the specific needs and experiences of each group. The positive influence of effort expectancy on behavioural intention towards ITB adoption is a well-supported finding within the study, validated by both statistical analyses and comparative insights. It serves as a critical pointer for educational institutions and technology developers, emphasizing the importance of designing user-friendly and accessible ITB solutions to enhance adoption. Effort expectancy matters, but it's important to combine it with strategies that take into account the various aspects of ITB adoption, including social influence and performance expectancy Lin et al. (2022).

How does social influence affect behavioural intention to use ITB?

The findings revealed a compelling and statistically significant agreement among students regarding the importance of social influence in shaping their behavioural intentions. It was evident that students are greatly influenced by those who hold significance in their lives. This influence extended beyond the confines of the educational institution. Within the scope of our study, students expressed that various key figures played pivotal roles in influencing their decision to adopt ITB. These influencers encompassed lecturers, peers, family members, and friends. Their combined influence was substantial in driving the adoption of ITB technology among students. The comparative analysis between students

and staff members further highlighted the universal role of social influence. Both groups exhibited strong agreement on the importance of social influence in shaping their behavioural intentions. This finding suggests that irrespective of one's role within the institution, the opinions, recommendations, and encouragement of individuals who hold significance in their lives carry substantial weight in influencing their decisions regarding ITB adoption. Moreover, statistical analyses, particularly the correlation and regression analyses, reinforced the prominent role of social influence in shaping behavioural intentions for both students. The results of our correlation analysis demonstrated a strong positive association between social influence and behavioural intentions among students, which was consistent with the staff members' responses. Furthermore, regression analysis highlighted that among the dimensions of the Unified Theory of Acceptance and Use of Technology (UTAUT), social influence emerged as the most influential element in predicting behavioural intentions for students. This was also confirmed in the previous studies where it was found that youth are generally more influenced by their peers than any other segment of society, which is not surprising (Sitar-Tăut, 2021). This consistency underscores the critical role of social influence as a determining factor in behavioural intentions, regardless of one's position within the institution. The investigation and comparative analysis confirm that social influence plays a central and consistent role in shaping behavioural intentions to use ITB technology for both students and staff members. The opinions and support of influential individuals, whether they be lecturers, peers, family members, or friends, hold significant sway in the decision-making process across both groups. Therefore, strategies aimed at promoting ITB adoption should consider and leverage the multifaceted nature of social influence as a key driver of behavioural intentions, with a clear understanding that this influence transcends roles within the institution.

What are the facilitating conditions that affect usage?

The research delved into the facilitating conditions that influence the utilization of ITB for delivering high-quality isiZulu language content. These facilitating conditions encompassed various aspects, including internet accessibility, the affordability of technical resources, the availability of support during ITB usage, the provision of practical training for ITB utilization, and the compatibility of ITB updates with existing technological devices. The survey findings revealed that students consider all of these conditions crucial for effective ITB utilization. While a significant portion of students already possesses the necessary technical resources, such as laptops, tablets, and phones, there's a prevalent belief among them that additional practical training could further enhance their ITB utilization. Moreover, students expressed the expectation that ITB updates should seamlessly align with their existing technological tools, such as laptops and phones. These findings underscore the importance of these facilitating conditions in enabling the effective use of ITB, which subsequently influences their decision to adopt and employ this technology. The correlation analysis conducted in this study further solidified the significance of facilitating conditions. Specifically, the correlation coefficient (Spearman's rho) between Behavioural Intentions (BI) and Facilitating Conditions (FC) was found to

be 0.636, signifying a substantial and robust positive correlation. This strong correlation suggests that facilitating conditions play a pivotal role in shaping students' intentions to use ITB effectively. It's important to note that the absence of these enabling conditions can hinder the acceptance and usage of ITB. To address this, it is highly recommended that comprehensive training programs be implemented for students. These programs would equip students with the necessary skills and knowledge to maximize their utilization of ITB resources, aligning with their expectations and enhancing their ITB adoption.

What are the challenges end-users experienced when adopting ITB?

In this study, four critical challenges were examined to assess the experiences of students in adopting and using ITB. These challenges encompassed the availability of the internet, access to technical gadgets, the presence of platforms like workshops and symposiums addressing ITB issues, and student satisfaction when attending these platforms. The results of this research paint a comprehensive picture of students' experiences and perceptions regarding ITB adoption. Firstly, the findings indicate that students generally encounter no significant issues when accessing the ITB via the internet. They reported a high level of consistency in the availability of the internet for ITB use within institutional premises, with a mean 4.02. This score was significantly higher than the neutral point of 3, highlighting a robust consensus among students regarding the reliability of internet access. This underscores the critical role of consistent internet availability in facilitating ITB adoption. Secondly, students indicated that they possess the necessary technical devices, such as laptops and smartphones, to access and utilize the ITB effectively. The mean Likert score for this challenge was 4.16, again significantly higher than the neutral point. This result underscores a strong consensus among students regarding the availability of technical gadgets, emphasizing their importance in promoting ITB adoption. Comparatively, staff members, while generally leaning towards agreement on Challenges 1 and 2, displayed somewhat lower mean scores in relation to students. Nevertheless, these differences were still statistically significant, indicating that both groups largely agree on the availability of internet access and technical gadgets, with staff members slightly more reserved in their responses. However, when it comes to challenges related to the availability of platforms like workshops and symposiums addressing ITB issues, students expressed a more neutral stance with a mean score of 2.95. The one-sample t-test did not reveal a statistically significant difference from the neutral point. This suggests that students' perceptions were not significantly different from neutrality concerning the availability of such events. Similarly, students' expectations regarding workshops and symposiums (Challenge 4) were moderately met, with a mean Likert score of 3.00, close to the neutral point. The one-sample t-test indicated no statistically significant difference from the test value of 3, again suggesting a balanced response among students. These findings underscore the nuanced differences in perceptions between the two groups, emphasizing the importance of tailoring ITB strategies to accommodate these variations while highlighting the broad consensus

among both students and staff members regarding internet access and technical gadget availability in the context of ITB adoption.

5.3 Answers to critical Questions of the study for Staff members

How does performance expectancy affect behavioural intention to use the ITB?

This research evaluated the impact of an ITB's performance expectancy from staff members, which was determined by an examination of their choice to embrace technology in Chapter 4. The performance expectancy was found to be the strongest factor of UTAUT contrast for staff members that influence behavioural intentions to adopt ITB technology. According to the outcomes of the research, staff members found the ITB to be beneficial to their academic performance. Due to the elevated degree of quality and the standardized ITB's isiZulu terms, staff members were able to produce quality work. Tao et al. (2020) found similar result with academic support lecturers on language technology adoption. The statistical importance of the association between performance expectancy and behavioural intention toward ITB enables us to arrive at a broad conclusion about the impact of performance expectation on staff members' intentions to accept and utilize technology. The analysis of correlations revealed a strong relationship which showed that staff members are willing to adopt ITB provided the technology improves their performance. The comparative analysis between students and staff members underscores that both groups attribute substantial importance to performance expectancy in their ITB adoption intentions. However, staff members exhibited a somewhat stronger correlation between PE and BI compared to students. This difference might be influenced by their distinct professional context, where the impact of technology on academic performance holds significant weight. This, therefore, implies that ITB end-users (staff members) are willing to adopt and use ITB if they are assured that ITB can achieve accurate academic content, and improve isiZulu terms quality.

To what extent does effort expectancy influence behavioural intention to use ITB?

From the results obtained, effort expectancy revealed a positive influence towards behavioural intention to adopt ITB technology. Staff members indicated that ITB is easily accessible and complete what end-users wanted to complete. Furthermore, staff members believe that their level of technological understanding and abilities is enough for using the ITB. As shown in chapter 4, a correlation and regression test revealed that the ease of use or complexity of ITB affects end-users to adopt the technology. End-users have a favourable opinion of the ITB's ease of use, implying that it is user-friendly and requires little technical skill. This favourable view shows that end-users are more likely to accept and use the ITB if they perceive it is simple to use. Staff members could quickly become proficient with the ITB because it is user-friendly, easily accessible, and understandable. Learning ITB was straightforward, and it took little time to become familiar with it. The comparative analysis between students and staff members highlights the significant influence of effort expectancy (EE) on their behavioural intentions to adopt ITB. Both groups exhibited a positive correlation between EE and

intention, signifying that perceiving ITB as easy to use with minimal effort positively shapes their adoption intentions. Staff members, in particular, demonstrated a slightly stronger relationship between EE and behavioural intention, potentially reflecting the distinct importance of ease of use within their professional context. Overall, this analysis underscores the universal significance of effort expectancy in ITB adoption while acknowledging subtle variations influenced by context. The overall conclusion may be drawn from the statistical significance regarding the correlation and regression relationship between effort expectancy and behavioural intention towards the ITB. The relationship between effort expectancy and behavioural intention was found to be second strong factor that influences staff members to adopt ITB technology. The ITB is designed to be user-friendly, with a simple, clear, and understandable interface. It requires minimal time for new end-users to learn and navigate.

How does social influence affect behavioural intention to use ITB?

The survey results revealed a strong relationship between social influence and behavioural intention among staff. These findings imply that the existence of prominent people in staff members' social networks influences their willingness to adopt and use the ITB. Moreover, end-users indicated that lecturers, peers, families, and friends who influenced their behaviours contributed to their adoption of ITB. A review of the correlation analysis in Chapter 4 demonstrated that Social factors exert a significant influence on the intention to use ITB. The findings suggest that social variables play a significant role in affecting people's intentions to acquire and use ITB technology. In addition, the regression results demonstrated a strong relationship between social influence and behavioural intentions. While students and staff members shared this commonality, students attributed slightly more influence to social factors, underscoring the importance of peer and mentor influence in an educational context. In contrast, staff members in a professional setting also acknowledged the impact of colleagues and superiors. This analysis reinforces the overarching significance of social influence in ITB adoption and highlights how its weight may vary within distinct contexts. Social influence was found to be the least factor of behavioural intention among the UTAUT constructs for staff members. Despite the fact that social influence was found to have a substantial impact on behavioural intentions, the findings suggested that staff members do not extensively rely on close friends and co-workers to use ITB technology. In actual fact, social impact was shown to be the least significant component for motivating employees to use ITB technology.

What are the facilitating conditions that affect usage?

This study examined the impact of various technical factors on the utilization of ITB for delivering high-quality isiZulu terms. These factors encompassed internet accessibility, affordability of technical resources, availability of assistance during ITB usage, practical training for ITB utilization, and regular ITB updates. According to the findings, end-users emphasized the importance of having all these factors in place to enable their effective use of ITB. While many end-users already possess technical resources,

they expressed a need for additional practical training to enhance their utilization of ITB. Furthermore, end-users expressed a desire for ITB development to be compatible with their existing technical devices, such as laptops and phones. The results suggested that end-users perceive these facilitating conditions as crucial for supporting the optimal use of ITB and influencing their decision to adopt and employ the technology. However, if there are no facilitating conditions in place, the ITB will not be adopted and used. Based on bar graphs and staff members' intentions to use ITB, it can be inferred that most staff members have access to laptops, tablets, and phones to access and use the system. Study results indicate that staff members are also aware of the availability of assistance whenever they encounter a problem. Because the ITB has an easy-to-access help button and because the ITB has provided a way for end-users to communicate with the technology administrators, this can be attributed to the fact that the ITB has a help button that is easily accessible. Moreover, the results regarding training indicated that staff members received no training that could provide them with a means for interacting with ITB administrators and developers. The provision of training for ITB students is highly recommended. The comparative analysis of facilitating conditions (FC) reveals that both students and staff members perceive the availability of essential resources and support, indicating a conducive environment for ITB adoption. Their shared belief in having necessary resources and readily available ITB support underscores the importance of these factors in facilitating ITB utilization. While students displayed more diverse responses regarding the provision of practical training, staff members generally agreed on this aspect. Additionally, both groups recognized the compatibility of ITB updates with their internet and network infrastructure. The strong positive correlations between FC and intention to adopt ITB, observed in both students and staff members, highlight that the perception of facilitating conditions significantly influences their behavioural intentions. This comparative analysis underscores the pivotal role of a supportive ITB ecosystem in fostering adoption and suggests that tailored strategies considering the unique needs of students and staff members can further enhance ITB integration

What are the challenges end-users experienced when adopting ITB?

As part of this study, technical gadgets, internet coverage, platforms that address ITB challenges, and end-user satisfaction when using/attending platforms that address ITB challenges were examined. The results of obtained for challenges determined how the end-users feel. Four questions were asked. The first question looked at technical gadgets such as laptops and phones used to access ITB. Most of the end-users agreed that they possess technical gadgets. The second question looked at the availability of the internet and network to load the ITB, and the end-users also agreed that the internet is available, mostly on their school premises. The end-users were also asked about the availability of platforms such as workshops, symposiums, and conferences that talks about or addresses the issues of ITB. Most end-users were neutral about this topic since this kind of platform is not explicitly provided. Last but not least, end-users were asked whether they were satisfied when they attended platforms that addressed ITB challenges. End-users disagreed on the satisfaction of platforms because they were not provided

accurately or were not provided at all. Based on the responses of staff members, most staff members report challenges regarding the provision of platforms, such as workshops, symposiums, and conferences, which are essential to addressing ITB challenges. There are no platforms at all, according to most staff members. Staff members were dissatisfied with the platforms designed to address the challenges in the second challenge. The internet and technical gadgets are available to them when accessing the ITB. the results of the one-sample t-tests focusing on staff members' perceptions of the challenges associated with adopting ITB highlight several key insights. While staff members generally lean towards agreement on Challenges 1 and 2, indicating the availability of internet access and technical gadgets, their mean scores are slightly lower than those of students. Challenges 3 and 4, centred around the availability of workshops, research symposiums, and meeting expectations, yielded non-significant mean scores, indicating a more mixed response. These findings emphasize the importance of addressing staff members' specific concerns and tailoring ITB strategies to accommodate their distinct needs and perceptions, ultimately facilitating more effective ITB adoption within a professional context.

5.4 Recommendations

Based on the research limitations identified in this study, several recommendations will be proposed to the developers, administrators, and end-users of the ITB at UKZN. Additionally, suggestions for future research directions will be provided.

1. The major goal of the research was to analyse perceptions of ITB usage at UKZN, with 409 individuals from various disciplines, including 275 students and 134 staff members, participating. While the study yielded significant results, it is suggested that in future research, the sample size be increased to improve the stability of the data.

2. Research should also be conducted in various institutions within the country to examine variations in the problems associated with ITB adoption and use. The reason for this is that ITB is an open-source technology that is also accessed by other institutions that need to use isiZulu standardized terms.

3. There was a strong need for platforms for ITB administrators, developers, and end-users, especially platforms for workshops, conferences, and symposiums. It is highly recommended that the ITB administrators create a platform like this or reorganize them in a way that allows end-users (both students and staff members) to engage and address the issues that end-users face.

4. Social influence was found to be the most influential factor for students. This means that ITB developers and administrators must give social influences a priority, such as interacting with lecturers and supervisors, who are the main people who influence students to use ITB technology. In this approach, the institution may benefit the most from the use of ITB.

5. Among staff members, performance expectations emerged as the most influential factor influencing ITB adoption. To effectively leverage this insight, ITB developers and administrators should prioritize a multifaceted approach. Firstly, it is imperative to engage in regular dialogues with staff to gain a comprehensive understanding of their specific performance expectations concerning ITB. These dialogues can inform the development of tailored training programs and resources that empower staff to utilize ITB tools optimally. Furthermore, administrators should explore the implementation of performance evaluation systems that not only gauge the effectiveness of ITB usage but also offer feedback loops for continual improvement. Additionally, fostering a collaborative environment where staff can contribute to the development and enhancement of ITB features based on their performance needs is crucial. By recognizing the significance of performance expectations and implementing these recommendations, ITB developers and administrators can cultivate a supportive ecosystem that aligns ITB adoption with staff performance objectives, ultimately leading to more successful integration and improved academic outcomes.

6. Lastly, the researcher recommends that the end-users (students and staff members) of ITB needs to be trained to increase and improve the use of ITB within the University of KwaZulu-Natal.

5.5 Limitations of the study

The data utilized in this study was gathered during the COVID-19 pandemic, when it was prohibited for the researcher to contact participants in person to elucidate the study and to examine how they answered the questionnaires. Because of this, the researcher was only able to collect a small amount of data for the study and had to rely solely on it. The study was also limited by its time constraints, which are some of the factors that bind the research to a certain extent. The research was conducted at the University of KwaZulu-Natal for a period of two years. Despite this issue, we were able to resolve it by using simple random sampling to gather data from various campuses, which was inexpensive, easy, and fast. Last but not least, the study needed to be conducted in many different provinces, but due to limitations, like time frame and administration issues, it was only conducted in UKZN only.

5.6 Conclusion

The study set out to investigated the perception of end-users in UKZN campuses regarding the adoption of ITB for the academic activities with the goal of improving academic performance and strengthening research using the isiZulu language. Using the UTAUT framework as the lens through which to understand the study, some of the significant results revealed was that social influence was the main predictor of adoption for students whilst performance expectancy was the main predictor for staff members. Based on the study outcome, the integration of ITB at the University of KwaZulu-Natal fosters collaborative language learning, creating opportunities for end-users to engage in peer-to-peer interactions and language exchanges specific to isiZulu. This collaborative environment nurtures linguistic diversity and encourages the practice of translanguaging, where end-users can utilize multiple languages to deepen their understanding and expression of isiZulu concepts and ideas. Through its comprehensive resources, accessibility, and collaborative nature, ITB contributes to creating a rich language-learning environment that promotes effective communication and engagement with isiZulu terminology among students at the University of KwaZulu-Natal.

REFERENCES

Aarts, S., Wallis, S., & Cushing, I. (2019). Exploiting parsed corpora in grammar teaching. *Linguistic Issues in Language Technology*, *18*(5).

Abbad, M. M. M. (2021). Using the UTAUT model to understand students' usage of e-learning systems in developing countries. *Education and Information Technologies*, *26*(6), 7205-7224. https://doi.org/10.1007/s10639-021-10573-5

Abbas, J., Aman, J., Nurunnabi, M., & Bano, S. (2019). The impact of social media on learning behavior for sustainable education: Evidence of students from selected universities in Pakistan. *Sustainability*, *11*(6), 1683.

Abou Elassad, Z. E., Mousannif, H., Al Moatassime, H., & Karkouch, A. (2020). The application of machine learning techniques for driving behavior analysis: A conceptual framework and a systematic literature review. *Engineering Applications of Artificial Intelligence*, *87*, 103312.

Aceto, G., Persico, V., & Pescapé, A. (2019). A survey on information and communication technologies for industry 4.0: State-of-the-art, taxonomies, perspectives, and challenges. *IEEE Communications Surveys & Tutorials*, *21*(4), 3467-3501.

Ackerman, B., Lesko, C. R., Siddique, J., Susukida, R., & Stuart, E. A. (2021). Generalizing randomized trial findings to a target population using complex survey population data. *Statistics in Medicine*, *40*(5), 1101-1120.

Adamopoulou, E., & Moussiades, L. (2020). Chatbots: History, technology, and applications. *Machine Learning with Applications*, *2*, 100006.

Adams, J. B., & Rajkaran, A. (2021). Changes in mangroves at their southernmost African distribution limit. *Estuarine, Coastal and Shelf Science*, *248*, 107158.

Adler-Greene, L. (2019). Every Student Succeeds Act: Are schools making sure every student succeeds. *Touro L. Rev.*, *35*, 11.

Agbozo, G. E., & ResCue, E. (2021). Educational language policy in an African country: Making a place for code-switching/translanguaging. *Applied Linguistics Review*, *12*(4), 503-522.

Aguilera-Hermida, A. P. (2020). College students' use and acceptance of emergency online learning due to COVID-19. *International Journal of Educational Research Open*, *1*, 100011.

Ajani, O. A., & Gamede, B. T. (2020). CHALLENGES OF HIGH SCHOOL LEARNERS'TRANSITION INTO UNIVERSITIES: A CASE OF A SOUTH AFRICAN RURAL UNIVERSITY. *Gender & Behaviour*, *18*(2), 15803-15812.

Ajzen, I. (2020). The theory of planned behavior: Frequently asked questions. *Human Behavior and Emerging Technologies*, *2*(4), 314-324.

Al-Bataineh, A., & Gallagher, K. (2021). Attitudes towards translanguaging: How future teachers perceive the meshing of Arabic and English in children's storybooks. *International Journal of Bilingual Education and Bilingualism*, *24*(3), 386-400.

Al-Blaihed, D., El-Housseiny, A. A., Farsi, N. J., & Farsi, N. M. (2020). Validity and reliability of the Arabic version of the child perceptions questionnaire for 8–10-year-old children. *Quality of Life Research*, *29*(11), 3131-3141.

Al-Maroof, R. S., Salloum, S. A., Hassanien, A. E., & Shaalan, K. (2020). Fear from COVID-19 and technology adoption: the impact of Google Meet during Coronavirus pandemic. *Interactive Learning Environments*, 1-16.

Al-Thanyyan, S. S., & Azmi, A. M. (2023). Simplification of Arabic text: A hybrid approach integrating machine translation and transformer-based lexical model. *Journal of King Saud University-Computer and Information Sciences*, *35*(8), 101662.

Al Hadwer, A., Tavana, M., Gillis, D., & Rezania, D. (2021). A systematic review of organizational factors impacting cloud-based technology adoption using Technology-organization-environment framework. *Internet of Things*, *15*, 100407.

Al Shamsi, J. H., Al-Emran, M., & Shaalan, K. (2022). Understanding key drivers affecting students' use of artificial intelligence-based voice assistants. *Education and Information Technologies*, 1-21.

Alam, M. Z., Hoque, M. R., Hu, W., & Barua, Z. (2020). Factors influencing the adoption of mHealth services in a developing country: A patient-centric study. *International Journal of Information Management*, *50*, 128-143.

Alamri, H. A., Watson, S., & Watson, W. (2021). Learning technology models that support personalization within blended learning environments in higher education. *TechTrends*, *65*, 62-78.

Alarcon, G. M., & Lee, M. A. (2022). The Relationship of Insufficient Effort Responding and Response Styles: An Online Experiment. *Frontiers in Psychology*, *12*, 784375.

Aldosemani, T., Shepherd, C. E., & Bolliger, D. U. (2019). Perceptions of instructors teaching in Saudi blended learning environments. *TechTrends*, *63*(3), 341-352.

Alexander, M. (2023). The 11 languages of South Africa. https://southafrica-info.com/arts-culture/11-languages-south-africa/

Alhaisoni, E. (2016). EFL Teachers' and Students' Perceptions of Dictionary Use and Preferences. *International Journal of Linguistics*, *8*, 31. https://doi.org/10.5296/ijl.v8i6.10267

Almaiah, M. A., Al-Khasawneh, A., & Althunibat, A. (2020). Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic. *Education and Information Technologies*, *25*, 5261-5280.

Almaiah, M. A., Alamri, M. M., & Al-Rahmi, W. (2019). Applying the UTAUT model to explain the students' acceptance of mobile learning system in higher education. *IEEE Access*, *7*, 174673-174686.

Almaiah, M. A., & Almulhem, A. (2018). A conceptual framework for determining the success factors of e-learning system implementation using Delphi technique. *Journal of Theoretical and Applied Information Technology*, *96*(17), 5962-5976.

Alotumi, M. (2022). Factors influencing graduate students' behavioral intention to use Google Classroom: Case study-mixed methods research. *Education and Information Technologies*, 1-29.

Alshammari, S. H., & Rosli, M. S. (2020). A review of technology acceptance models and theories. *Innovative Teaching and Learning Journal (ITLJ)*, *4*(2), 12-22.

Ammenwerth, E. (2019). Technology acceptance models in health informatics: TAM and UTAUT. *Stud Health Technol Inform*, *263*, 64-71.

Anderson, B. S., Wennberg, K., & McMullen, J. S. (2019). Enhancing quantitative theory-testing entrepreneurship research. *Journal of Business Venturing*, *34*(5), 105928.

Andrade, C. (2019). The P value and statistical significance: misunderstandings, explanations, challenges, and alternatives. *Indian journal of psychological medicine*, *41*(3), 210-215.

Antoni, D., Jie, F., & Abareshi, A. (2020). Critical factors in information technology capability for enhancing firm's environmental performance: case of Indonesian ICT sector. *International Journal of Agile Systems and Management*, *13*(2), 159-181.

Arif, I., Aslam, W., & Hwang, Y. (2020). Barriers in adoption of internet banking: A structural equation modeling-Neural network approach. *Technology in Society*, *61*, 101231.

Arikpo, I., & Dickson, I. (2018). Development of an automated English-to-local-language translator using Natural Language Processing. *International Journal of Scientific & Engineering Research*, *9*(7), 378-383.

Armstrong, R. A. (2019). Should Pearson's correlation coefficient be avoided? *Ophthalmic and Physiological Optics*, *39*(5), 316-327.

Artola, G., & Rigau, G. (2022). Measuring HLT Research Equality of European Languages. Proceedings of the Workshop Towards Digital Language Equality within the 13th Language Resources and Evaluation Conference,

Asadi, S., Nilashi, M., Samad, S., Abdullah, R., Mahmoud, M., Alkinani, M. H., & Yadegaridehkordi, E. (2021). Factors impacting consumers' intention toward adoption of electric vehicles in Malaysia. *Journal of Cleaner Production*, *282*, 124474.

Asher, D., & Popper, M. (2019). Tacit knowledge as a multilayer phenomenon: the “onion” model. *The Learning Organization*.

Assadpour, H., Ghalehnoee, M., & Bahramian, A. (2022). Developing the model of research method in urban landscape studies emphasizing Saunders research onion. *Motaleate Shahri*.

Atas, A. H., & Çelik, B. (2019). Smartphone use of university students: Patterns, purposes, and situations. *Malaysian Online Journal of Educational Technology*, *7*(2), 59-70.

Ayaz, A., & Yanartaş, M. (2020). An analysis on the unified theory of acceptance and use of technology theory (UTAUT): Acceptance of electronic document management system (EDMS). *Computers in Human Behavior Reports*, *2*, 100032.

Baker, J. (2012). The technology–organization–environment framework. *Information systems theory*, 231-245.

Baker, M. (2019). Corpus Linguistics and Translation Studies*: Implications and applications. In *Researching translation in the age of technology and global conflict* (pp. 9-24). Routledge.

Bangani, S. (2018). The history, deployment, and future of Institutional Repositories in public universities in South Africa. *The Journal of Academic Librarianship*, *44*(1), 39-51.

Bao, W. (2020). COVID-19 and online teaching in higher education: A case study of Peking University. *Human Behavior and Emerging Technologies*, *2*(2), 113-115.

Barter, C., Batool, F., Charles, J., Devaney, J., Farrelly, N., Haynes, D., Kurdi, Z., Millar, A., Monks, C., & Richardson Foster, H. (2022). Conducting large-scale mixed-method research on harm and abuse prevention with children under 12: Learning from a UK feasibility study. *Children & Society*.

Battina, D. S., & Lakshmisri, S. (2022). Innovative study of an AI voice based smart Device to assist deaf people in understanding and responding to their body language. *no. March*.

Baumgärtel, T. (2021). *Van Gogh TV's» Piazza Virtuale «: The Invention of Social Media at documenta IX in 1992*. transcript Verlag.

Benlahcene, A., Lashari, S. A., Lashari, T. A., Shehzad, M. W., & Deli, W. (2020). Exploring the Perception of Students Using Student-Centered Learning Approach in a Malaysian Public University. *International Journal of Higher Education*, *9*(1), 204-217.

Bhatnagar, V., Poonia, R. C., Nagar, P., Kumar, S., Singh, V., Raja, L., & Dass, P. (2021). Descriptive analysis of COVID-19 patients in the context of India. *Journal of Interdisciplinary Mathematics*, *24*(3), 489-504.

Billaudeau, N., Alexander, S., Magnard, L., Temam, S., & Vercambre, M.-N. (2022). What levers to promote teachers’ wellbeing during the COVID-19 pandemic and beyond: lessons learned from a 2021 online study in six countries. *International Journal of Environmental Research and Public Health*, *19*(15), 9151.

Blazquez, M., & Fan, C. (2019). The efficacy of spell check packages specifically designed for second language learners of Spanish. *Pertanika Journal of Social Science and Humanities (JSSH)*, *27*(2), 847-863.

Blodgett, S. L., Barocas, S., Daumé III, H., & Wallach, H. (2020). Language (technology) is power: A critical survey of" bias" in nlp. *arXiv preprint arXiv:2005.14050*.

Bloomfield, J., & Fisher, M. J. (2019). Quantitative research design. *Journal of the Australasian Rehabilitation Nurses Association*, *22*(2), 27-30.

Bommasani, R., Hudson, D. A., Adeli, E., Altman, R., Arora, S., von Arx, S., Bernstein, M. S., Bohg, J., Bosselut, A., & Brunskill, E. (2021). On the opportunities and risks of foundation models. *arXiv preprint arXiv:2108.07258*.

Burghard, U., & Dütschke, E. (2019). Who wants shared mobility? Lessons from early adopters and mainstream drivers on electric carsharing in Germany. *Transportation Research Part D: Transport and Environment*, *71*, 96-109.

Calteaux, K. (2020). Human language technologies for

African languages. https://www.usaf.ac.za/wp-content/uploads/2020/12/Human-Language-Technologies-HLTs-for-African-Languages.pdf

Cao, Q., & Niu, X. (2019). Integrating context-awareness and UTAUT to explain Alipay user adoption. *International Journal of Industrial Ergonomics*, *69*, 9-13.

Carpino, C., Mora, D., De Simone, M. J. E., & Buildings. (2019). On the use of questionnaire in residential buildings. A review of collected data, methodologies and objectives. *186*, 297-318.

Cele, N. (2021). Understanding language policy as a tool for access and social inclusion in South African Higher Education: a critical policy analysis perspective. *South African Journal of Higher Education*, *35*(6), 25-46.

Česonis, R. (2020). Human language technologies and digitalisation in a multilingual interpreting setting. *Fit-For-Market Translator and Interpreter Training in a Digital Age*, 179-195.

Chang, T., DeJonckheere, M., Vydiswaran, V. V., Li, J., Buis, L. R., & Guetterman, T. C. (2021). Accelerating mixed methods research with natural language processing of big text data. *Journal of Mixed Methods Research*, *15*(3), 398-412.

Chao, C.-M. (2019). Factors determining the behavioral intention to use mobile learning: An application and extension of the UTAUT model. *Frontiers in psychology*, *10*, 1652.

Charamba, E. (2020). Translanguaging in a multilingual class: a study of the relation between students' languages and epistemological access in science. *International Journal of Science Education*, *42*(11), 1779-1798.

Chatterjee, A., Gupta, U., Chinnakotla, M. K., Srikanth, R., Galley, M., & Agrawal, P. (2019). Understanding emotions in text using deep learning and big data. *Computers in Human Behavior*, *93*, 309-317.

Chen, Y., Ding, Z., Zheng, Q., Qin, Y., Huang, R., & Shah, N. (2020). A history and theory of textual event detection and recognition. *IEEE Access*, *8*, 201371-201392.

Chowdhary, K., & Chowdhary, K. (2020). Natural language processing. *Fundamentals of artificial intelligence*, 603-649.

Christopher, B. M. (2021). Higher Education Institutions (HEIs) in Africa Embracing the "New Normal" for Knowledge Production and Innovation: Barriers, Realities, and Possibilities. In W. Lee & W. Sharon (Eds.), *Higher Education* (pp. Ch. 7). IntechOpen. https://doi.org/10.5772/intechopen.101063

Chuttur, M. (2009). Overview of the technology acceptance model: Origins, developments and future directions.

Clark, J., & Causer, G. (2020). Introduction: Research strategies and decisions. In *Handbook for research students in the social sciences* (pp. 163-176). Routledge.

Clark, L. A., & Watson, D. (2019). Constructing validity: New developments in creating objective measuring instruments. *Psychological assessment*, *31*(12), 1412.

Costa-jussà, M. R., Cross, J., Çelebi, O., Elbayad, M., Heafield, K., Heffernan, K., Kalbassi, E., Lam, J., Licht, D., & Maillard, J. (2022). No language left behind: Scaling human-centered machine translation. *arXiv preprint arXiv:2207.04672*.

Dallywater, L. (2020). 'Black Fire' Conceptualisations of Black Liberation and Engaged Views of African and Black Aesthetics in the United States and South Africa. *Third Text*, *34*(4-5), 551-567.

Daly, N. (2021). *Insights into the usefulness of machine grammar/spell checkers for improving research writing: A preliminary investigation comparing 5 machine and 1 human Language checker for detected errors and readability*. https://doi.org/10.13140/RG.2.2.18280.19205

Darmansyah, D., Fianto, B. A., Hendratmi, A., & Aziz, P. F. (2020). Factors determining behavioral intentions to use Islamic financial technology: Three competing models. *Journal of Islamic Marketing*, *12*(4), 794-812.

Dash, N. S., & Ramamoorthy, L. (2019). *Utility and application of language corpora*. Springer.

Deochand, N., Eldridge, R. R., & Peterson, S. M. (2020). Toward the development of a functional analysis risk assessment decision tool. *Behavior Analysis in Practice*, *13*, 978-990.

Dew, K. N., Turner, A. M., Choi, Y. K., Bosold, A., & Kirchhoff, K. (2018). Development of machine translation technology for assisting health communication: A systematic review. *Journal of biomedical informatics*, *85*, 56-67.

Ding, N., Chen, W., Zhang, Z., Hu, S., Cui, G., Yao, Y., Qin, Y., Zeng, Z., Han, X., & Liu, Z. (2023). Ten Key Problems of Pre-trained Models: An Outlook of Representation Learning. *Representation Learning for Natural Language Processing*, 491.

Doyle, L., McCabe, C., Keogh, B., Brady, A., & McCann, M. J. J. o. R. i. N. (2020). An overview of the qualitative descriptive design within nursing research. *25*(5), 443-455.

du Plessis, M., Jansen van Vuuren, C. D., Simons, A., Frantz, J., Roman, N., & Andipatin, M. (2022). South African Higher Education Institutions at the beginning of the covid-19 pandemic: Sense-making and lessons learnt. Frontiers in education,

Du Plessis, P., & Mestry, R. (2019). Teachers for rural schools–a challenge for South Africa. *South African Journal of Education*, *39*.

Dubey, R., Gunasekaran, A., Childe, S. J., Blome, C., & Papadopoulos, T. (2019). Big data and predictive analytics and manufacturing performance: integrating institutional theory, resource-based view and big data culture. *British Journal of Management*, *30*(2), 341-361.

Ducar, C., & Schocket, D. H. (2018). Machine translation and the L2 classroom: Pedagogical solutions for making peace with Google translate.

Dukhan, S. (2020). Value for learning during this time of transformation: the first-year students' perspective. *Higher Education Research & Development*, *39*(1), 39-52.

Dyer, J. (2022). *People of the Screen: How Evangelicals Created the Digital Bible and How It Shapes Their Reading of Scripture*. Oxford University Press.

Einola, K., & Alvesson, M. (2021). Behind the numbers: questioning questionnaires. *Journal of Management Inquiry*, *30*(1), 102-114.

Emezue, C. C., & Dossou, B. F. P. (2022). MMTAfrica: Multilingual Machine Translation for African Languages. Conference on Machine Translation,

Eraslan Yalcin, M., & Kutlu, B. (2019). Examination of students' acceptance of and intention to use learning management systems using extended TAM. *British Journal of Educational Technology*, *50*(5), 2414-2432.

Estriegana, R., Medina-Merodio, J.-A., & Barchino, R. (2019). Student acceptance of virtual laboratory and practical work: An extension of the technology acceptance model. *Computers & Education*, *135*, 1-14.

Ezumah, B. A. (2020). Challenges of Educational Technology Adoption in Africa. In B. A. Ezumah (Ed.), *Critical Perspectives of Educational Technology in Africa: Design, Implementation, and Evaluation* (pp. 69-89). Springer International Publishing. https://doi.org/10.1007/978-3-030-53728-9_4

Faloye, S. T., Ajayi, N. A., & Raghavjee, R. (2020). Managing the Challenges of the Digital Divide Among First Year Students: A Case of UKZN. 2020 IST-Africa Conference (IST-Africa),

Fidalgo, P., Thormann, J., Kulyk, O., & Lencastre, J. A. (2020). Students' perceptions on distance education: A multinational study. *International Journal of Educational Technology in Higher Education*, *17*(1), 1-18.

Fishbein, M. (1979). A theory of reasoned action: some applications and implications.

Fishbein, M., & Ajzen, I. (2011). *Predicting and changing behavior: The reasoned action approach*. Psychology press.

Fitria, T. N. (2021). Grammarly as AI-powered English writing assistant: Students' alternative for writing English. *Metathesis: Journal of English Language, Literature, and Teaching*, *5*(1), 65-78.

Flickinger, D., Pollard, C., & Wasow, T. (2021). The evolution of HPSG. *Head-Driven Phrase Structure Grammar: The handbook*, *9*, 47.

Fox, E. M. (2019). Mobile technology: a tool to increase global competency among higher education students. *International Review of Research in Open and Distributed Learning*, *20*(2).

Ganesha, & Aithal. (2022). How to Choose an Appropriate Research Data Collection Method and Method Choice among Various Research Data Collection Methods and Method Choices During

Ph. D. Program in India? *International Journal of Management, Technology, and Social Sciences (IJMTS)*, *7*(2), 455-489.
Ghounane, N. (2020). Moodle or social networks: What alternative refuge is appropriate to Algerian EFL students to learn during Covid-19 pandemic. *Arab World English Journal*, *11*.
Goh, E., & Sigala, M. (2020). Integrating Information & Communication Technologies (ICT) into classroom instruction: teaching tips for hospitality educators from a diffusion of innovation approach. *Journal of Teaching in Travel & Tourism*, *20*(2), 156-165.
Gong, Y., Gao, X., Li, M., & Lai, C. (2021). Cultural adaptation challenges and strategies during study abroad: New Zealand students in China. *Language, Culture and Curriculum*, *34*(4), 417-437.
Granić, A. (2022a). Educational Technology Adoption: A systematic review. *Education and Information Technologies*, *27*(7), 9725-9744. https://doi.org/10.1007/s10639-022-10951-7
Granić, A. (2022b). Technology Acceptance and Adoption in Education. In *Handbook of Open, Distance and Digital Education* (pp. 1-15). Springer Singapore. https://doi.org/10.1007/978-981-19-0351-9_11-1
Granić, A., & Marangunić, N. (2019). Technology acceptance model in educational context: A systematic literature review. *British Journal of Educational Technology*, *50*(5), 2572-2593.
Greenstein, S. (2020). The basic economics of internet infrastructure. *Journal of Economic Perspectives*, *34*(2), 192-214.
Gunst, R. F., & Mason, R. L. (2018). *Regression analysis and its application: a data-oriented approach*. CRC Press.
Gursoy, D., Chi, O. H., Lu, L., & Nunkoo, R. (2019). Consumers acceptance of artificially intelligent (AI) device use in service delivery. *International Journal of Information Management*, *49*, 157-169.
Hakim, M. A. R., Jafre, M., & Bahari, A. (2018). *Dictionary Use to Increase Students' Vocabulary Mastery: Electronic Dictionary or Printed One?* https://doi.org/10.5220/0008215001500159
Hanelt, A., Bohnsack, R., Marz, D., & Antunes Marante, C. (2021). A systematic review of the literature on digital transformation: Insights and implications for strategy and organizational change. *Journal of Management Studies*, *58*(5), 1159-1197.
Harris, D. E., Holyfield, L., Jones, L., Ellis, R., & Neal, J. (2019). Research methods. In *Spiritually and Developmentally Mature Leadership* (pp. 57-65). Springer.
Haseeb, M., Hussain, H. I., Kot, S., Androniceanu, A., & Jermsittiparsert, K. (2019). Role of social and technological challenges in achieving a sustainable competitive advantage and sustainable business performance. *Sustainability*, *11*(14), 3811.
Hassan, H. A., & Abbas, S. K. (2019). Factors influencing the investors' intention to adopt Takaful (Islamic insurance) products: a survey of Pakistan. *Journal of Islamic Marketing*.
Heidari, A., Jafari Navimipour, N., & Unal, M. (2022). The history of computing in Iran (Persia)—since the achaemenid empire. *Technologies*, *10*(4), 94.
Heugh, K., Stroud, C., & Hickey, R. (2019). Multilingualism in South African education: A southern perspective. *English in Multilingual South Africa: The Linguistics of Contact and Change. Studies in english language*, 216-238.
Hjort, J., & Poulsen, J. (2019). The arrival of fast internet and employment in Africa. *American Economic Review*, *109*(3), 1032-1079.
Ho, J. C., Wu, C.-G., Lee, C.-S., & Pham, T.-T. T. (2020). Factors affecting the behavioral intention to adopt mobile banking: An international comparison. *Technology in Society*, *63*, 101360.
Hooda, A., Gupta, P., Jeyaraj, A., Giannakis, M., & Dwivedi, Y. K. (2022). The effects of trust on behavioral intention and use behavior within e-government contexts. *International Journal of Information Management*, *67*, 102553.
Hou, J., Li, X.-Y., Zhu, P., Wang, Z., Wang, Y., Qian, J., & Yang, P. (2019). Signspeaker: A real-time, high-precision smartwatch-based sign language translator. The 25th Annual International Conference on Mobile Computing and Networking,
Houmache, A., Fates, N., & Neghiz, S. (2022). *The Use of Mobile Dictionaries in Developing EFL Students' Vocabulary Level*

Hu, S., Laxman, K., & Lee, K. (2020). Exploring factors affecting academics' adoption of emerging mobile technologies-an extended UTAUT perspective. *Education and Information Technologies*, *25*(5), 4615-4635.

Humida, T., Al Mamun, M. H., & Keikhosrokiani, P. (2022). Predicting behavioral intention to use e-learning system: A case-study in Begum Rokeya University, Rangpur, Bangladesh. *Education and Information Technologies*, *27*(2), 2241-2265.

Iglesias-Pradas, S., Hernández-García, Á., Chaparro-Peláez, J., & Prieto, J. L. (2021). Emergency remote teaching and students' academic performance in higher education during the COVID-19 pandemic: A case study. *Computers in human behavior*, *119*, 106713.

Ilomäki, L., & Lakkala, M. (2018). Digital technology and practices for school improvement: innovative digital school model. *Research and Practice in Technology Enhanced Learning*, *13*(1), 25. https://doi.org/10.1186/s41039-018-0094-8

Janiesch, C., Zschech, P., & Heinrich, K. (2021). Machine learning and deep learning. *Electronic Markets*, *31*(3), 685-695.

Jaradat, M., Ababneh, H. T., Faqih, K., & Nusairat, N. M. (2020). Exploring cloud computing adoption in higher educational environment: an extension of the UTAUT model with trust. *International journal of advanced science and technology*, *29*(5), 8282-8306.

Jere, J. N., & Ngidi, N. (2020). A technology, organisation and environment framework analysis of information and communication technology adoption by small and medium enterprises in Pietermaritzburg. *South African Journal of Information Management*, *22*(1), 1-9.

Jiang, Y., Wang, X., & Yuen, K. F. (2021). Augmented reality shopping application usage: The influence of attitude, value, and characteristics of innovation. *Journal of Retailing and Consumer Services*, *63*, 102720.

Jimenez, C., Saavedra, E., del Campo, G., & Santamaria, A. (2021). Alexa-based voice assistant for smart home applications. *IEEE Potentials*, *40*(4), 31-38.

Johri, P., Khatri, S. K., Al-Taani, A. T., Sabharwal, M., Suvanov, S., & Kumar, A. (2021). Natural language processing: History, evolution, application, and future work. Proceedings of 3rd International Conference on Computing Informatics and Networks: ICCIN 2020,

Joshi, P., Santy, S., Budhiraja, A., Bali, K., & Choudhury, M. (2020). The state and fate of linguistic diversity and inclusion in the NLP world. *arXiv preprint arXiv:2004.09095*.

Joubert, A., Murawski, M., & Bick, M. (2023). Measuring the big data readiness of developing countries–index development and its application to Africa. *Information Systems Frontiers*, *25*(1), 327-350.

Kamal, S. A., Shafiq, M., & Kakria, P. (2020). Investigating acceptance of telemedicine services through an extended technology acceptance model (TAM). *Technology in Society*, *60*, 101212.

Kamath, U., Liu, J., & Whitaker, J. (2019). *Deep learning for NLP and speech recognition* (Vol. 84). Springer.

Kamilla, K. (2021). The use of electronic dictionaries and their impact on the vocabulary development of prospective foreign language teachers in Transcarpathia.

Karlsson, J., McPherson, G., & Pampallis, J. (2020). A critical examination of the development of school governance policy and its implications for achieving equity. In *The State, Education and Equity in Post-Apartheid South Africa* (pp. 139-177). Routledge.

Keet, C. M., & Khumalo, L. (2017). Evaluation of the Effects of a Spellchecker on the Intellectualisation of IsiZulu. *Alternation Journal*, *24*(2), 75-98.

Kessler, G. (2018). Technology and the future of language teaching. *Foreign language annals*, *51*(1), 205-218.

Keynes, M., Åström Elmersjö, H., Lindmark, D., & Norlin, B. (2021). Introduction: Connecting Historical Justice and History Education. In *Historical Justice and History Education* (pp. 1-20). Springer.

Khan, N. S., Abid, A., & Abid, K. (2020). A novel natural language processing (NLP)–based machine translation model for English to Pakistan sign language translation. *Cognitive Computation*, *12*(4), 748-765.

Khan, N. S., Abid, A., & Abid, K. (2020). A novel natural language processing (NLP)–based machine translation model for English to Pakistan sign language translation.

Khumalo, L. (2017). Intellectualization through terminology development. *Lexikos*, *27*, 252-264.

Khurana, D., Koli, A., Khatter, K., & Singh, S. (2022). Natural language processing: State of the art, current trends and challenges. *Multimedia Tools and Applications*, 1-32.

Khyani, D., Siddhartha, B., Niveditha, N., & Divya, B. (2021). An interpretation of lemmatization and stemming in natural language processing. *Journal of University of Shanghai for Science and Technology*, *22*(10), 350-357.

Kim, N.-Y., Cha, Y., & Kim, H.-S. (2019). Future English learning: Chatbots and artificial intelligence. *Multimedia-Assisted Language Learning*, *22*(3), 32-53.

Kirchmeier, S., Pedersen, B. S., Nimb, S., Diderichsen, P., & Henrichsen, P. J. (2020). World class language technology-developing a language technology strategy for Danish. Proceedings of the 12th Language Resources and Evaluation Conference,

Kulmanov, M., Smaili, F. Z., Gao, X., & Hoehndorf, R. (2021). Semantic similarity and machine learning with ontologies. *Briefings in bioinformatics*, *22*(4), bbaa199.

Kumar, V., Verma, A., Mittal, N., & Gromov, S. V. (2019, 2019//). Anatomy of Preprocessing of Big Data for Monolingual Corpora Paraphrase Extraction: Source Language Sentence Selection. Emerging Technologies in Data Mining and Information Security, Singapore.

Kunst, K., Ringberg, T., & Vatrapu, R. (2022). Beyond popularity: A user perspective on observable behaviours in a digital platform. *Information Systems Journal*, *32*(3), 595-622.

Lanlan, Z., Ahmi, A., & Popoola, O. M. J. (2019). Perceived ease of use, perceived usefulness and the usage of computerized accounting systems: A performance of micro and small enterprises (mses) in china. *International Journal of Recent Technology and Engineering*, *8*(2), 324-331.

Lauriola, I., Lavelli, A., & Aiolli, F. (2022). An introduction to deep learning in natural language processing: Models, techniques, and tools. *Neurocomputing*, *470*, 443-456.

LeCun, Y. (2019). 1.1 deep learning hardware: past, present, and future. 2019 IEEE International Solid-State Circuits Conference-(ISSCC),

Lee, Y., & Kozar, K. A. (2008). An empirical investigation of anti-spyware software adoption: A multitheoretical perspective. *Information & Management*, *45*(2), 109-119.

Li, G., Liu, F., Sharma, A., Khalaf, O. I., Alotaibi, Y., Alsufyani, A., & Alghamdi, S. (2021). Research on the natural language recognition method based on cluster analysis using neural network. *Mathematical Problems in Engineering*, *2021*.

Li, M. (2021). Corpus Analysis and Corpus-Based Writing Instruction. In M. Li (Ed.), *Researching and Teaching Second Language Writing in the Digital Age* (pp. 183-216). Springer International Publishing. https://doi.org/10.1007/978-3-030-87710-1_8

Liberman, M., & Wayne, C. (2020). Human language technology. *AI Magazine*, *41*(2), 22-35.

Lin, Z., Abdullah, A. N., & Samad, A. A. (2022). Exploring Chinese EFL Teachers' Acceptance of Mobile-Assisted Language Learning (MALL). *International Journal of Information and Education Technology*, *12*(11).

Liu, Y., Sivaparthipan, C., & Shankar, A. (2022). Human–computer interaction based visual feedback system for augmentative and alternative communication. *International Journal of Speech Technology*, *25*(2), 305-314.

Ma, C. (2021). Smart city and cyber-security; technologies used, leading challenges and future recommendations. *Energy Reports*, *7*, 7999-8012.

Mac Naughton, G., & Rolfe, S. A. (2020). The research process. In *Doing early childhood research* (pp. 13-34). Routledge.

MacCann, C., Jiang, Y., Brown, L. E., Double, K. S., Bucich, M., & Minbashian, A. (2020). Emotional intelligence predicts academic performance: A meta-analysis. *Psychological bulletin*, *146*(2), 150.

Magen-Nagar, N., & Firstater, E. (2019). The obstacles to ICT implementation in the kindergarten environment: Kindergarten teachers' beliefs. *Journal of Research in Childhood Education*, *33*(2), 165-179.

Mager, M., Gutierrez-Vasques, X., Sierra, G., & Meza, I. (2018). Challenges of language technologies for the indigenous languages of the Americas. *arXiv preprint arXiv:1806.04291*.

Magocha, M., Mutasa, D. E., & Rammala, J. R. (2019). Mother-tongue education in South Africa: A highly contested terrain of the 21st century. *South African Journal of African Languages*, *39*(3), 253-262.

Mahdum, M., Hadriana, H., & Safriyanti, M. (2019). Exploring Teacher Perceptions and Motivations to ICT Use in Learning Activities in Indonesia. *Journal of Information Technology Education*, *18*.

Maluleke, M. J. (2019). Using code-switching as an empowerment strategy in teaching mathematics to learners with limited proficiency in English in South African schools. *South African Journal of Education*, *39*(3).

Mammadli, E., & Klivak, V. (2020). Measuring the effect of the Digitalization. *Available at SSRN 3524823*.

Maphosa, V. (2021). Teachers' perspectives on remote-based teaching and learning in the COVID-19 era: Rethinking technology availability and suitability in Zimbabwe. *European Journal of Interactive Multimedia and Education*, *2*(1), e02105.

Markard, J. (2020). The life cycle of technological innovation systems. *Technological forecasting and social change*, *153*, 119407.

Martínez-Plumed, F., Gómez, E., & Hernández-Orallo, J. (2021). Futures of artificial intelligence through technology readiness levels. *Telematics and Informatics*, *58*, 101525.

Mathivanan, S. K., Jayagopal, P., Ahmed, S., Manivannan, S., Kumar, P., Raja, K. T., Dharinya, S. S., & Prasad, R. G. (2021). Adoption of e-learning during lockdown in India. *International Journal of System Assurance Engineering and Management*, 1.

Maučec, M. S., & Donaj, G. (2019). Machine translation and the evaluation of its quality. *Recent trends in computational intelligence*, *143*.

Mawonde, A., & Togo, M. (2019). Implementation of SDGs at the university of South Africa. *International Journal of Sustainability in Higher Education*.

Mayaba, N. N., Ralarala, M. K., & Angu, P. (2018). Student voice: Perspectives on language and critical pedagogy in South African higher education. *Educational Research for Social Change*, *7*(1), 1-12.

McGrath, S., Zhao, X., Steele, R., Thombs, B. D., Benedetti, A., & Collaboration, D. S. D. (2020). Estimating the sample mean and standard deviation from commonly reported quantiles in meta-analysis. *Statistical methods in medical research*, *29*(9), 2520-2537.

Melnikovas, A. (2018). Towards an explicit research methodology: Adapting research onion model for futures studies. *Journal of Futures Studies*, *23*(2), 29-44.

Milne-Ives, M., de Cock, C., Lim, E., Shehadeh, M. H., de Pennington, N., Mole, G., Normando, E., & Meinert, E. (2020). The effectiveness of artificial intelligence conversational agents in health care: systematic review. *Journal of medical Internet research*, *22*(10), e20346.

Mishra, P., Pandey, C. M., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of cardiac anaesthesia*, *22*(1), 67.

Mishra, P., Pandey, C. M., Singh, U., Keshri, A., & Sabaretnam, M. (2019). Selection of appropriate statistical methods for data analysis. *Annals of cardiac anaesthesia*, *22*(3), 297.

Mishra, S., Alowaidi, M. A., & Sharma, S. K. (2021). Impact of security standards and policies on the credibility of e-government. *Journal of Ambient Intelligence and Humanized Computing*. https://doi.org/10.1007/s12652-020-02767-5

Mkhize, D., & Balfour, R. (2017). Language rights in education in South Africa. *South African Journal of Higher Education*, *31*(6), 133-150.

Mlachila, M. M., & Moeletsi, T. (2019). Struggling to make the grade: A review of the causes and consequences of the weak outcomes of South Africa's education system.

Mohlahlo, A. L., & Ditsele, T. (2022). Exploring multilingualism at the national department levels in South Africa post the Use of Official Languages Act of 2012. *Literator-Journal of Literary Criticism, Comparative Linguistics and Literary Studies*, *43*(1), 1819.

Mohohlwane, N. L. (2019). How language policy and practice sustains inequality in education. *South African Schooling: The Enigma of Inequality: A Study of the Present Situation and Future Possibilities*, 127-146.

Moon, H., Cheon, J., Lee, J., Banda, D. R., Griffin-Shirley, N., & Ajuwon, P. M. (2020). Factors influencing the intention of persons with visual impairment to adopt mobile applications based on the UTAUT model. *Universal Access in the Information Society*, 1-15.

Moorthy, K., Chun T'ing, L., Ming, K. S., Ping, C. C., Ping, L. Y., Joe, L. Q., & Jie, W. Y. (2019). Behavioral intention to adopt digital library by the undergraduates. *International Information & Library Review*, *51*(2), 128-144.

Moshood, T. D., Nawanir, G., Sorooshian, S., Mahmud, F., & Adeleke, A. Q. (2020). Barriers and benefits of ICT adoption in the Nigerian construction industry. A comprehensive literature review. *Applied System Innovation*, *3*(4), 46.

Mõttus, R., Wood, D., Condon, D. M., Back, M. D., Baumert, A., Costantini, G., Epskamp, S., Greiff, S., Johnson, W., & Lukaszewski, A. J. E. J. o. P. (2020). Descriptive, predictive and explanatory personality research: Different goals, different approaches, but a shared need to move beyond the Big Few traits. *34*(6), 1175-1201.

Mthombeni, Z. M., & Ogunnubi, O. (2021). A socio-constructivist analysis of the bilingual language policy in South African higher education: Perspectives from the university of Kwazulu-natal. *Cogent Education*, *8*(1), 1954465.

Muangmee, C., Kot, S., Meekaewkunchorn, N., Kassakorn, N., & Khalid, B. (2021). Factors determining the behavioral intention of using food delivery apps during COVID-19 pandemics. *Journal of Theoretical and Applied Electronic Commerce Research*, *16*(5), 1297-1310.

Müller, M., Kocánová, B., & Zacharov, P. (2022). Meteorological glossaries and dictionaries: A review of their history and current state. *Bulletin of the American Meteorological Society*, *103*(1), E157-E180.

Munirathinam, S. (2020). Industry 4.0: Industrial internet of things (IIOT). In *Advances in computers* (Vol. 117, pp. 129-164). Elsevier.

Mutenyo, J., Buyinza, F., & Ssennono, V. (2022). Digital Divides or Dividends? Including Basic Services in Africa's Digitalization Agenda: Evidence from Uganda.

Mzangwa, S. T. (2019). The effects of higher education policy on transformation in post-apartheid South Africa. *Cogent Education*, *6*(1), 1592737.

Naidoo, S., Gokool, R., & Ndebele, H. (2018). The case of isiZulu for non-mother tongue speakers at the University of KwaZulu-Natal, South Africa–Is the compulsory language module promoting social cohesion? *Journal of multilingual and multicultural development*, *39*(4), 356-368.

Nami, F. (2020). Educational smartphone apps for language learning in higher education: Students' choices and perceptions. *Australasian Journal of Educational Technology*, *36*(4), 82-95.

Nartiningrum, N., & Nugroho, A. (2020). Online learning amidst global pandemic: EFL students' challenges, suggestions, and needed materials. *ENGLISH FRANCA: Academic journal of English language and education*, *4*(2), 115-140.

Naujokaitiene, J., Tereseviciene, M., & Zydziunaite, V. (2015). Organizational Support for Employee Engagement in Technology-Enhanced Learning. *SAGE Open*, *5*(4), 2158244015607585. https://doi.org/10.1177/2158244015607585

Nekoto, W., Marivate, V., Matsila, T., Fasubaa, T., Kolawole, T., Fagbohungbe, T., Akinola, S. O., Muhammad, S. H., Kabongo, S., & Osei, S. (2020). Participatory research for low-resourced machine translation: A case study in african languages. *arXiv preprint arXiv:2010.02353*.

Ngcobo, M. N., & Barnes, L. A. (2021). English in the South African language-in-education policy on higher education. *World Englishes*, *40*(1), 84-97.

Nguyen, H. T., & Chu, Q. P. (2021). Estimating university students' acceptance of technological tools for studying English through the UTAUT model. *International Journal of TESOL & Education*, *1*(3), 209-234.

Nzimande, B. E. (2020). Language Policy Framework for Public Higher Education Institutions. https://www.gov.za/sites/default/files/gcis_document/202011/43860gon1160.pdf

Oktriviani, Y. (2022). *Students'perception of using e-dictionary in e-learning english during pandemic at sman 1 tandun* Universitas islam negeri sultan syarif kasim riau].

Oladeji, A. D. (2019). *Influence of Social Media on Skill Acquisition and Academic Performance of Business Education Students in Colleges of Education in Southwest, Nigeria* Kwara State University (Nigeria)].

Olivetti, E. A., Cole, J. M., Kim, E., Kononova, O., Ceder, G., Han, T. Y.-J., & Hiszpanski, A. M. (2020). Data-driven materials research enabled by natural language processing and information extraction. *Applied Physics Reviews*, *7*(4).

Omidire, M. F., & Ayob, S. (2022). The utilisation of translanguaging for learning and teaching in multilingual primary classrooms. *Multilingua*, *41*(1), 105-129.

Opie, C. (2019). Research approaches. *Getting Started in Your Educational Research: Design, Data Production and Analysis*, *137*.

Oribhabor, C. B., & Anyanwu, C. A. (2019). Research sampling and sample size determination: a practical application. *Journal of Educational Research (Fudjer)*, *2*(1), 47-57.

Ozdemir, E., & Papi, M. (2022). Mindsets as sources of L2 speaking anxiety and self-confidence: The case of international teaching assistants in the US. *Innovation in Language Learning and Teaching*, *16*(3), 234-248.

Palau-Saumell, R., Forgas-Coll, S., Sánchez-García, J., & Robres, E. (2019). User acceptance of mobile apps for restaurants: An expanded and extended UTAUT-2. *Sustainability*, *11*(4), 1210.

Pandey, P., & Pandey, M. M. (2021). *Research methodology tools and techniques*. Bridge Center.

Papagiannidis, D. M. S. (2023). Unified Theory of Acceptance and Use of Technology: A review. https://open.ncl.ac.uk/theories/2/unified-theory-of-acceptance-and-use-of-technology

Park, C., Lee, C., Yang, Y., & Lim, H. (2020). Ancient Korean neural machine translation. *IEEE Access*, *8*, 116617-116625.

Park, H. J., & Zhang, Y. (2022). Technology readiness and technology paradox of unmanned convenience store users. *Journal of Retailing and Consumer Services*, *65*, 102523.

Patel, N., & Trivedi, S. (2020). Leveraging Predictive Modeling, Machine Learning Personalization, NLP Customer Support, and AI Chatbots to Increase Customer Loyalty. *Empirical Quests for Management Essences*, *3*(3), 1-24.

Peter J. Liu, a. Y. Z. (2020). PEGASUS: A State-of-the-Art Model for Abstractive Text Summarization. https://ai.googleblog.com/2020/06/pegasus-state-of-art-model-for.html

Pilehvar, M. T., & Camacho-Collados, J. (2020). Embeddings in natural language processing: Theory and advances in vector representations of meaning. *Synthesis Lectures on Human Language Technologies*, *13*(4), 1-175.

Portz, J. D., Bayliss, E. A., Bull, S., Boxer, R. S., Bekelman, D. B., Gleason, K., & Czaja, S. (2019). Using the technology acceptance model to explore user experience, intent to use, and use behavior of a patient portal among older adults with multiple chronic conditions: descriptive qualitative study. *Journal of medical Internet research*, *21*(4), e11604.

Qader, K. S., Jamil, D. A., Sabah, K. K., Anwer, S. A., Mohammad, A. J., Gardi, B., & Abdulrahman, B. S. (2022). The impact of Technological acceptance model (TAM) outcome on implementing accounting software.

Rachmadtullah, R., Marianus Subandowo, R., Humaira, M. A., Aliyyah, R. R., Samsudin, A., & Nurtanto, M. (2020). Use of blended learning with moodle: Study effectiveness in elementary school teacher education students during the COVID-19 pandemic. *International journal of advanced science and technology*, *29*(7), 3272-3277.

Rahi, S., & Ghani, M. A. (2019). Investigating the role of UTAUT and e-service quality in internet banking adoption setting. *The TQM Journal*.

Ramadhan, A., Hidayanto, A. N., Salsabila, G. A., Wulandari, I., Jaury, J. A., & Anjani, N. N. (2022). The effect of usability on the intention to use the e-learning system in a sustainable way: A case study at Universitas Indonesia. *Education and Information Technologies*, *27*(2), 1489-1522.

Ramuedzisi, L. S., van Huyssteen, L., & Mandende, I. P. (2019). An enhanced terminology development and management approach for South African languages. *South African Journal of African Languages*, *39*(3), 263-272.

Ranathunga, S., Lee, E.-S. A., Prifti Skenduli, M., Shekhar, R., Alam, M., & Kaur, R. (2023). Neural machine translation for low-resource languages: A survey. *ACM Computing Surveys*, *55*(11), 1-37.

Rapp, A., Curti, L., & Boldi, A. (2021). The human side of human-chatbot interaction: A systematic literature review of ten years of research on text-based chatbots. *International Journal of Human-Computer Studies*, *151*, 102630.

Raza, S. A., Qazi, W., Khan, K. A., & Salam, J. (2021). Social isolation and acceptance of the learning management system (LMS) in the time of COVID-19 pandemic: an expansion of the UTAUT model. *Journal of Educational Computing Research*, *59*(2), 183-208.

Razno, M. (2019). Machine learning text classification model with NLP approach. COLINS 2019. Volume II: Workshop,

Reglitz, M. (2020). The human right to free internet access. *Journal of Applied Philosophy*, *37*(2), 314-331.

Reitmaier, T., Wallington, E., Kalarikalayil Raju, D., Klejch, O., Pearson, J., Jones, M., Bell, P., & Robinson, S. (2022). Opportunities and challenges of automatic speech recognition systems for low-resource language speakers. Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems,

Rogers, E. M., Singhal, A., & Quinlan, M. M. (2014). Diffusion of innovations. In *An integrated approach to communication theory and research* (pp. 432-448). Routledge.

Rogers, E. M., Singhal, A., & Quinlan, M. M. (2019). Diffusion of innovations 1. *An integrated approach to communication theory and research*, 415-434.

Romani, L., Barmeyer, C., Primecz, H., & Pilhofer, K. (2018). Cross-cultural management studies: state of the field in the four research paradigms. *International Studies of Management & Organization*, *48*(3), 247-263.

Roux, J. C., & Ndinga-Koumba-Binza, S. (2019). African languages and human language technologies. *The Cambridge Handbook of African Linguistics*, 623-644.

Sah, P. K., & Li, G. (2022). Translanguaging or unequal languaging? Unfolding the plurilingual discourse of English medium instruction policy in Nepal's public schools. *International Journal of Bilingual Education and Bilingualism*, *25*(6), 2075-2094.

Sahin, I. (2006). Detailed review of Rogers' diffusion of innovations theory and educational technology-related studies based on Rogers' theory. *Turkish Online Journal of Educational Technology-TOJET*, *5*(2), 14-23.

Salloum, S. A., Alhamad, A. Q. M., Al-Emran, M., Monem, A. A., & Shaalan, K. (2019). Exploring students' acceptance of e-learning through the development of a comprehensive technology acceptance model. *IEEE Access*, *7*, 128445-128462.

Sangeeta, & Tandon, U. (2021). Factors influencing adoption of online teaching by school teachers: A study during COVID-19 pandemic. *Journal of Public Affairs*, *21*(4), e2503.

Sao, S., Sanghi, M., Kanoje, J. P., & Bhatia, S. (2021). A Review Paper Based on Paradigm in Using E-Text Books and E-Learning Apps in the Classroom.

Saprikis, V., Avlogiaris, G., & Katarachia, A. (2022). A Comparative Study of Users versus Non-Users' Behavioral Intention towards M-Banking Apps' Adoption. *Information*, *13*(1), 30.

Saunders, M., Lewis, P., & Thornhill, A. (2007). Research methods. *Business Students 4th edition Pearson Education Limited, England*, *6*(3), 1-268.

Schmid, M., Brianza, E., & Petko, D. (2021). Self-reported technological pedagogical content knowledge (TPACK) of pre-service teachers in relation to digital technology use in lesson plans. *Computers in human behavior*, *115*, 106586.

Schober, P., Boer, C., & Schwarte, L. A. (2018). Correlation coefficients: appropriate use and interpretation. *Anesthesia & Analgesia*, *126*(5), 1763-1768.

Scott, S. D., Plotnikoff, R. C., Karunamuni, N., Bize, R., & Rodgers, W. (2008). Factors influencing the adoption of an innovation: An examination of the uptake of the Canadian Heart Health Kit (HHK). *Implementation Science*, *3*(1), 41. https://doi.org/10.1186/1748-5908-3-41

Seethal, C. (2023). The State of Languages in South Africa. In *Language, Society and the State in a Changing World* (pp. 169-185). Springer.

Selmi, S. A. (2023). Use of ICT to promote literacy in sub-Saharan Africa. *American Journal of Multidisciplinary Research and Innovation*, *2*(1), 49-64.

Shao, Z., Zhang, L., Brown, S. A., & Zhao, T. (2022). Understanding users' trust transfer mechanism in a blockchain-enabled platform: A mixed methods study. *Decision Support Systems*, *155*, 113716.

Sharma, D., & Kumar, N. (2022). Instruments Used in the Collection of Data in Research. *Available at SSRN 4138751*.

Shorten, C., Khoshgoftaar, T. M., & Furht, B. (2021). Text data augmentation for deep learning. *Journal of big Data*, *8*(1), 1-34.

Shuhaiber, A., & Mashal, I. (2019). Understanding users' acceptance of smart homes. *Technology in Society*, *58*, 101110.

Siaw, A., Jiang, Y., Twumasi, M. A., & Agbenyo, W. (2020). The impact of internet use on income: The case of rural Ghana. *Sustainability*, *12*(8), 3255.

Sileyew, K. J. (2019a). *Research design and methodology*. IntechOpen Rijeka.

Sileyew, K. J. (2019b). Research design and methodology. *Cyberspace*, 1-12.

Singh, J., & Mansotra, V. (2019). Factors affecting cloud computing adoption in the Indian school education system. *Education and Information Technologies*, *24*(4), 2453-2475.

Singh, N., Sinha, N., & Liébana-Cabanillas, F. J. (2020). Determining factors in the adoption and recommendation of mobile wallet services in India: Analysis of the effect of innovativeness, stress to use and social influence. *International Journal of Information Management*, *50*, 191-205.

Singh, R. K., Luthra, S., Mangla, S. K., & Uniyal, S. (2019). Applications of information and communication technology for sustainable growth of SMEs in India food industry. *Resources, Conservation and Recycling*, *147*, 10-18.

Singh, S., Sahni, M. M., & Kovid, R. K. (2020). What drives FinTech adoption? A multi-method evaluation using an adapted technology acceptance model. *Management Decision*.

Siraj-Blatchford, J. (2020). Surveys and questionnaires: An evaluative case study. In *Doing early childhood research* (pp. 223-238). Routledge.

Siripongdee, K., Pimdee, P., & Tuntiwongwanich, S. (2020). A blended learning model with IoT-based technology: effectively used when the COVID-19 pandemic? *Journal for the Education of Gifted Young Scientists*, *8*(2), 905-917.

Sitar-Tăut, D. A. (2021). Mobile learning acceptance in social distancing during the COVID-19 outbreak: The mediation effect of hedonic motivation. *Human Behavior and Emerging Technologies*, *3*(3), 366-378.

Skosana, N. J., & Mlambo, R. (2021). A brief study of the Autshumato Machine Translation Web Service for South African languages. *Literator*, *42*(1), 7.

Slater, S., Ocumpaugh, J., Baker, R., Almeda, M. V., Allen, L., & Heffernan, N. (2017). Using natural language processing tools to develop complex models of student engagement. 2017 Seventh International Conference on Affective Computing and Intelligent Interaction (ACII),

Smith, P. A., & Dawber, J. (2019). Random probability vs quota sampling.

Soe, T. H., Guribye, F., & Slavkovik, M. (2021). Evaluating AI assisted subtitling. ACM International Conference on Interactive Media Experiences,

Soetan, A. K., Onojah, A. O., Alaka, T. B., & Aderogba, A. J. (2020). Hearing impaired students' self-efficacy on the utilization of assistive technology in federal college of education (special) Oyo. *International Journal for Cross-Disciplinary Subjects in Education*, *11*(1), 4658-4666.

Stander, L., Plooy, B. D., & Scheckle, E. (2022). "Some of them are afraid of the language": Perceptions of TVET college staff about the relationship between English language proficiency and academic performance among Engineering students. *South African Journal of Higher Education*, *36*(1), 296-311.

Stats, I. W. (2022). https://www.internetworldstats.com/stats.htm

Steve, M. (2023). Exploring the Prospects and Hurdles of Implementing Natural Language Processing in Japanese Clinical Settings.

Stoeckli, E., Dremel, C., Uebernickel, F., & Brenner, W. (2020). How affordances of chatbots cross the chasm between social and traditional enterprise systems. *Electronic Markets*, *30*, 369-403.

Subchi, I., Kusmana, Z., Khairani, D., & Latifa, R. (2022). Cyber Fatwa and Da'wah Acceptance in New Media: How Technology Affects Religious Message by Female Ulama.

Sun, S., Cegielski, C. G., Jia, L., & Hall, D. J. (2018). Understanding the factors affecting the organizational adoption of big data. *Journal of computer information systems*, *58*(3), 193-203.

Sunitha, T., Bhargavi, K., Charishma, P., Chowdary, R. V., Devaraj, A., & Kolli, N. B. (2022). Text Identification of handwritten using Deep Learning. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, *13*(03), 1123-1130.

Taecharungroj, V. (2023). "What Can ChatGPT Do?" Analyzing Early Reactions to the Innovative AI Chatbot on Twitter. *Big Data and Cognitive Computing*, *7*(1), 35.

Takiar, R. (2023). The validity of t-test, Mann-Whitney test and Z test for testing significant differences between two sample means when sample size is 10 or below. *Bulletin of Mathematics and Statistics Research*, *11*(2), 1-15.

Tam, C., Santos, D., & Oliveira, T. (2020). Exploring the influential factors of continuance intention to use mobile Apps: Extending the expectation confirmation model. *Information Systems Frontiers*, *22*(1), 243-257.

Tang, C. W., Jun Shi, M., & de Guzman, A. B. (2022). Lecturer teaching styles and student learning involvement in large classes: a Taiwan case study. *Asia Pacific Journal of Education*, *42*(3), 447-463. https://doi.org/10.1080/02188791.2020.1852913

Tao, D., Wang, T., Wang, T., Zhang, T., Zhang, X., & Qu, X. (2020). A systematic review and meta-analysis of user acceptance of consumer-oriented health information technologies. *Computers in human behavior*, *104*, 106147.

Tayal, R., Upadhyay, R., Yadav, M., Rangnekar, S., & Singh, R. (2018). The impact of transformational leadership on employees acceptance to change: Mediating effects of innovative behaviour and moderating effect of the use of information technology. *VINE Journal of Information and Knowledge Management Systems*, *48*, 00-00. https://doi.org/10.1108/VJIKMS-05-2018-0039

Tewari, D. D., & Ilesanmi, K. D. (2020). Teaching and learning interaction in South Africa's higher education: Some weak links. *Cogent Social Sciences*, *6*(1), 1740519.

Thompson, B., & Post, M. (2020). Automatic machine translation evaluation in many languages via zero-shot paraphrasing. *arXiv preprint arXiv:2004.14564*.

Toraman, C., & Akay, E. (2015). Students' attitudes towards learning English grammar: A study of scale development. *JOURNAL OF LANGUAGE AND LINGUISTIC STUDIES*, *11*, 67-82.

Toufaily, E., Zalan, T., & Dhaou, S. B. (2021). A framework of blockchain technology adoption: An investigation of challenges and expected value. *Information & Management*, *58*(3), 103444.

Trivedi, A., Pant, N., Shah, P., Sonik, S., & Agrawal, S. (2018). Speech to text and text to speech recognition systems-Areview. *IOSR J. Comput. Eng*, *20*(2), 36-43.

Ullah, F., Sepasgozar, S. M., Thaheem, M. J., & Al-Turjman, F. (2021). Barriers to the digitalisation and innovation of Australian Smart Real Estate: A managerial perspective on the technology non-adoption. *Environmental Technology & Innovation*, *22*, 101527.

Van Schalkwyk, F. B., van Lill, M. H., Cloete, N., & Bailey, T. G. (2022). Transformation impossible: policy, evidence and change in South African higher education. *Higher Education*, *83*(3), 613-630. https://doi.org/10.1007/s10734-021-00687-7

Varpio, L., Paradis, E., Uijtdehaage, S., & Young, M. (2020). The distinctions between theory, theoretical framework, and conceptual framework. *Academic Medicine*, *95*(7), 989-994.

Veenstra, R., & Lodder, G. M. (2022). On the microfoundations of the link between classroom social norms and behavioral development. *International Journal of Behavioral Development*, 01650254221100228.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.

Wang, N., Issa, R. R., & Anumba, C. J. (2022). NLP-based query-answering system for information extraction from building information models. *Journal of Computing in Civil Engineering*, *36*(3), 04022004.

Warner, L. A., Diaz, J. M., Silvert, C., Hobbs, W., & Reisinger, A. J. (2021). Predicting intentions to engage in a suite of yard fertilizer behaviors: Integrated insights from the diffusion of innovations, theory of planned behavior, and contextual factors. *Society & Natural Resources*, *34*(3), 373-392.

Wellman, N., Tröster, C., Grimes, M., Roberson, Q., Rink, F., & Gruber, M. (2023). Publishing Multimethod Research in AMJ: A Review and Best-Practice Recommendations. *Academy of Management Journal*, *66*(4), 1007-1015.

Williams, M. D., Rana, N. P., & Dwivedi, Y. K. (2015). The unified theory of acceptance and use of technology (UTAUT): a literature review. *Journal of Enterprise Information Management*.

Wimhurst, A. (2020). *Teachers' and Japanese Students' Perceptions of Pocket Electronic Dictionaries: A Case Study*

Wolske, K. S., Gillingham, K. T., & Schultz, P. (2020). Peer influence on household energy behaviours. *Nature Energy*, *5*(3), 202-212.

Zhang, W., Li, X., Deng, Y., Bing, L., & Lam, W. (2022). A survey on aspect-based sentiment analysis: Tasks, methods, and challenges. *IEEE Transactions on Knowledge and Data Engineering*.

Zhao, S., Zhou, G., Fallis, J., Pillon, K., & Luo, R. (2021). Information literacy skills: Investigating differences between native and non-native English-speaking students. *The Journal of Academic Librarianship*, *47*(5), 102424.

Zheng, K., Kumar, J., Kunasekaran, P., & Valeri, M. (2022). Role of smart technology use behaviour in enhancing tourist revisit intention: the theory of planned behaviour perspective. *European Journal of Innovation Management*(ahead-of-print).

Zhou, J., Miao, X., He, F., & Miao, Y. (2022). Effects of Font Style and Font Color in News Text on User Cognitive Load in Intelligent User Interfaces. *IEEE Access*, *10*, 10719-10730.

Zhou, Y., Soh, Y. S., Loh, H. S., & Yuen, K. F. (2020). The key challenges and critical success factors of blockchain implementation: Policy implications for Singapore's maritime industry. *Marine policy*, *122*, 104265.

APPENDIX A: Descriptive statistics for students

Descriptive Statistics for students

	N	Mean		Std. Deviation	Variance
	Statistic	Statistic	Std. Error	Statistic	Statistic
Student age	284	2.20	.056	.945	.894
Student gender	284	1.52	.038	.637	.406
Student	284	2.00	.000	.000	.000
Student experience	284	2.66	.067	1.121	1.257
Student disciplines	284	5.50	.184	3.109	9.664
Perfomance1	284	3.99	.045	.766	.587
Perfomance2	284	3.89	.047	.792	.628
Perfomance3	284	3.78	.047	.786	.618
Effort1	284	3.87	.052	.870	.757
Effort2	284	3.78	.050	.839	.703
Effort3	284	3.83	.049	.825	.680
Social1	284	3.45	.058	.985	.969
Social2	284	3.43	.060	1.004	1.009
Facilitating1	284	4.11	.048	.807	.652
Facilitating2	284	3.65	.054	.914	.835
Facilitating3	284	2.90	.065	1.100	1.210
Facilitating4	284	3.62	.059	.986	.972
Attitude1	284	3.26	.065	1.096	1.202
Attitude2	284	3.81	.049	.833	.694
Attitude3	284	3.66	.051	.853	.727
Behavior1	284	3.91	.053	.899	.808
Behavior2	284	3.62	.058	.978	.956
Behavior3	284	3.85	.053	.888	.789
Challenge1	284	4.02	.055	.924	.855
Challenge2	284	4.16	.047	.797	.636
Challenge3	284	2.95	.071	1.189	1.414
Challenge4	284	3.00	.075	1.265	1.601
PE	284	3.89	.040	.682	.465
EE	284	3.83	.044	.746	.557
SC	284	3.44	.056	.937	.879
FC	284	3.57	.041	.699	.489
AT	284	3.57	.048	.809	.654
BI	284	3.79	.047	.796	.633
CHA	284	3.53	.045	.755	.570
Valid N (listwise)	284				

Figure 5. 1 Descriptive statistics for students

APPENDIX B: Descriptive statistics for Staff members

Descriptive Statistics for Staff members

	N	Mean		Std. Deviation	Variance
	Statistic	Statistic	Std. Error	Statistic	Statistic
Staff age	123	2.85	.089	.989	.978
Staff gender	123	1.55	.052	.576	.331
Staff	123	1.00	.000	.000	.000
Staff experience	123	3.05	.117	1.299	1.686
Staff disciplines	123	7.24	.366	4.058	16.465
Perfomance1	123	4.03	.071	.789	.622
Perfomance2	123	4.01	.075	.835	.697
Perfomance3	123	3.93	.082	.907	.822
Effort1	123	3.97	.077	.858	.737
Effort2	123	3.89	.076	.838	.702
Effort3	123	3.98	.071	.784	.614
Social1	123	3.66	.091	1.007	1.014
Social2	123	3.55	.093	1.026	1.053
Facilitating1	123	4.35	.062	.689	.475
Facilitating2	123	3.72	.083	.926	.857
Facilitating3	123	3.11	.102	1.132	1.282
Facilitating4	123	3.76	.084	.933	.870
Attitude1	123	3.41	.100	1.108	1.227
Attitude2	123	3.91	.075	.830	.689
Attitude3	123	3.87	.077	.849	.721
Behavior1	123	4.07	.077	.856	.733
Behavior2	123	3.85	.086	.950	.902
Behavior3	123	3.96	.095	1.051	1.105
Challenge1	123	4.08	.080	.883	.780
Challenge2	123	4.26	.068	.756	.571
Challenge3	123	3.11	.107	1.189	1.413
Challenge4	123	3.14	.110	1.217	1.481
PE	123	3.99	.066	.730	.534
EE	123	3.95	.062	.683	.467
SC	123	3.61	.086	.954	.911
FC	123	3.74	.062	.685	.469
AT	123	3.73	.071	.784	.614
BI	123	3.96	.077	.858	.736
CHA	123	3.65	.072	.797	.635
Valid N (listwise)	123				

Figure 5. 2 Descriptive statistics for staff members

APPENDIX C: Research Questionnaire

University of KwaZulu-Natal

School of Management, IT and Governance

College of Law and Management Studies

Pietermaritzburg Campus

Research Topic

Perceptions of the use of isiZulu Termbank Technology at University of KwaZulu-Natal

Researcher: Njabulo Hadebe

Contact Details: 071 896 4431, 213505670@stu.ukzn.ac.za

Supervisor: Dr Ntabeni Jere

Contact Details: 033 260 6466/ 033 260 6455 jeren@ukzn.ac.za

Co Supervisor: Professor Irene Govender

Contact Details: 031 260 2660 govenderi4@ukzn.ac.za

The information collected is strictly confidential and for academic purposes only. Thank you for agreeing to take part in this survey, I really appreciate your help.

INSTRUCTIONS:

Please make use of a pen/pencil to complete the questionnaire.

Select **ONE** appropriate answer and indicate with a **TICK**.

Section A: General Information

Select **ONE** appropriate answer and indicate with a **TICK**.

Staff ☐ student ☐

Level of study (for students)

Honours ☐ Masters ☐ PhD ☐

1. Gender

Male ☐ Female ☐ Prefer not to say ☐

2. Age

26 – 28 ☐ 29 – 32 ☐ 33 – 35 ☐ Above 36 ☐

3. What is your department affiliation (for students)?

law ☐ linguistics ☐ Anatomy ☐ Agriculture ☐ ISTN ☐

Architecture ☐ Computer Science ☐ Environmental Science ☐ Nursing ☐

Physics ☐ Psychology ☐ Social Work ☐ Criminology ☐

4. Experience IsiZulu Termbank (ITB)

Below 1 ☐ 2 – 3 ☐ 4 – 6 ☐ Above 7 ☐

Section B

This section is mainly about factors that affect an individual's behaviour towards the use of isiZulu Termbank (ITB). ITB is a database of isiZulu terms developed and standardized for a range of disciplines such as Research, Mathematics, Computer science, Accounting, etc. It is freely available at https://ukzntermbank.ukzn.ac.za/PublicSearch.aspx. These factors are the subheadings followed by questions Please read carefully and select one appropriate answer.

1. Performance Expectancy (PE)

Select **ONE** appropriate answer and indicate with a **TICK**.

	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
PE1 I find the ITB easy to operate.					
PE2. I find the ITB friendly to use.					
PE3. Using the ITB would enhance my productivity at work.					

2. Effort Expectancy (EE)

Select **ONE** appropriate answer and indicate with a **TICK**.

	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
EE1. I find it easy to use ITB to accomplish what I want.					
EE2. The ITB will not take time to use it from scratch.					
EE3. The ITB is not complicated.					

3. Social influence (SI)

Select **ONE** appropriate answer and indicate with a **TICK**.

	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
SI1. People who are important to me think that I should use the ITB.					
SI2. People who influence my behaviour think that I should use ITB.					

4. Facilitating conditions (FC)

Select **ONE** appropriate answer and indicate with a **TICK**.

	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
FC1. I Have the necessary resources (laptop, phone) to use ITB.					
FC2. Help is readily available to support my usage of the ITB.					
FC3. Practical trainings are provided for ITB.					
FC3. ITB updates are compatible with my internet and network.					

5. Attitude toward the use of ITB

Select **ONE** appropriate answer and indicate with a **TICK**.

	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
BI1. I find it difficult to stop using ITB once I've started.					
BI2. I enjoy working with ITB.					
BI3. I am looking forward to working on tasks of my academic work that require the use of ITB.					

1.10 6. Behavioral intention to Use ITB(BI)

1.11 Select ONE appropriate answer and indicate with a TICK.

	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
BI1. I intend to use ITB in the future.					
BI2. I will always try to use ITB in my daily activities.					
BI3. I plan to inform my schoolmates to use ITB.					

Section C

Challenges Experienced while using isiZulu Termbank (ITB)

Please select the appropriate answer

Internet is always available for me to use ITB in the institution premises.				
Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**

Technical Gadgets (Smartphone, Laptop, Tablets) are available for me to use ITB				
Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**

Workshops and research symposiums that addresses ITB challenges and opportunities are available.				
Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**

When I attend workshops and research symposiums about ITB, my expectations are met.				
Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**

Thank you for your time!!

APPENDIX D: Ethical Clearance from UKZN

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

20 May 2022

Njabulo Hadebe (213505670)
School Of Man Info Tech & Gov
Pietermaritzburg Campus

Dear N Hadebe,

Protocol reference number: HSSREC/00003756/2022
Project title: Perceptions of the use of IsiZulu Termbank Technology at University of KwaZulu-Natal
Degree: Masters

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 07 January 2022 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

This approval is valid until 20 May 2023.
To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

All research conducted during the COVID-19 period must adhere to the national and UKZN guidelines.

HSSREC is registered with the South African National Research Ethics Council (REC-040414-040).

Yours sincerely,

[redacted]

Professor Dipane Hlalele (Chair)

/dd

Humanities and Social Sciences Research Ethics Committee
Postal Address: Private Bag X54001, Durban, 4000, South Africa
Telephone: +27 (0)31 260 8350/4557/3587 **Email:** hssrec@ukzn.ac.za **Website:** http://research.ukzn.ac.za/Research-Ethics
Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville