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# A Language Application for Health Science Students: A Study on User Experience


by

**Ilana Wilken**


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**FACULTY OF HUMANITIES**


**SUPERVISOR: Prof Elsabé Taljard**
**CO-SUPERVISOR: Dr Febe de Wet**


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# DECLARATION

I declare that the dissertation, which I hereby submit for the degree Master of Arts in Applied Language Studies at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

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ILANA WILKEN DATE

# ETHICS STATEMENT

The author, whose name appears on the title page of this dissertation, has obtained, for the research described in this work, the applicable research ethics approval.

The author declares that she has observed the ethical standards required in terms of the University of Pretoria's Code of Ethics for Researchers and the policy guidelines for responsible research.

# ABSTRACT

South Africa is home to 11 official languages and speakers of these languages communicate with one another on a daily basis. Such multilingual communication occurs throughout the country, especially at hospitals and clinics. Every so often, someone needs to visit a healthcare facility and then it is difficult for the patient to find a health professional that speaks a language he/she understands. Some universities in South Africa, including the University of Pretoria, address this matter by teaching students an additional language to enable them to communicate with their patients.

This study aimed to assist the University of Pretoria in this endeavour by providing three custom-designed, mobile-assisted Sepedi language learning applications to students from the Faculty of Health Sciences enrolled for the Sepedi language module. The students used the applications as supplementary tools for their studies over nine weeks and then completed a questionnaire on user experience. The questionnaire was used to determine whether the students perceived the mobile applications to be useful supplementary tools to their studies and whether they had a clear preference for a specific application.

The results of this user experience study report a positive response to the applications, including strong preferences made by the students who participated in the study.

**KEY TERMS**

user experience, supplementary language learning tools, additional language, Sepedi, acquisition, mobile-assisted language learning, mobile applications, health science students, multilingual communication, healthcare in South Africa, health professional and patient communication

# PUBLICATIONS

A conference paper on the application design and development aspects relevant to Chapter 3 of this dissertation was presented at:

The Language Teaching, Learning and Technology Workshop held in Leipzig, Germany, on 4 September 2015. The paper can be accessed in the archive of the International Speech Communication Association (ISCA), which is available at http://www.isca-speech.org/archive/ltlt_2015

Bibliographic reference:

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Some of the results discussed in Chapter 4 of this dissertation were presented at:

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*"When you can't change the direction*
*of the wind, adjust your sails."*
- *H. Jackson Brown Jr.*

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# ABBREVIATIONS

| | |
|---|---|
| ASR | Automatic Speech Recognition |
| CALL | Computer-Assisted Language Learning |
| CMS | Content Management System |
| CSIR | Council for Scientific and Industrial Research |
| HCI | Human Computer Interaction |
| ISCA | International Speech Communication Association |
| MALL | Mobile-Assisted Language Learning |
| ML | Mobile Learning |
| TTS | Text-to-Speech |

# DEFINITIONS

| TERM | DEFINITION |
|---|---|
| Administrator | The administrator is the person responsible for uploading content on the CMS. |
| Application or mobile application or app | A program installed on a mobile device that is used to perform specific functions or achieve specific goals. |
| ASR | The process of converting speech into text by computers or computerised devices. |
| CMS | Content Management System, a system used to manage the content that is downloaded to mobile devices. |
| Health professional | A health professional is any person working in the medical field including, but not limited to, doctors, nurses, radiologists, physiotherapists and dieticians. |
| Intervention | An intervention is the interaction with the students over a specific period. |
| Multilingual communication | Multilingual communication is classified as communication that occurs in multiple languages. |
| Sepedi | Sepedi is one of the 11 official languages of South Africa. Sepedi is also known as *Sesotho sa Leboa* and *Northern Sotho*. |
| TTS | The process that automatically converts text into computerised speech. |
| User experience | The complete experience a person has with a specific application, product or service. |
| Xhosa | Xhosa is one of the 11 official languages of South Africa. Xhosa is also known as *isiXhosa*. |
| Zulu | Zulu is one of the 11 official languages of South Africa. Zulu is also known as *isiZulu*. |

# CHAPTER 1

# INTRODUCTION AND CONTEXTUALISATION

## 1.1. Background

Communication plays a vital role in everyday life and in some situations multilingual communication across language borders is a necessity. In South Africa, communication in multiple languages occurs almost everywhere because of the variety of languages spoken in the country. Environments characterised by multilingual communication include hospitals and clinics. When the need arises for people (who do not speak a global language like English) to seek medical attention in South Africa, it becomes a challenge to find a health professional that speaks their first language. This study attempts to assist with addressing this challenge.

South Africa is home to 11 official languages and although medical professionals are expected to communicate in the languages of the area where they work (Van de Poel, Fourie & Seberechts 2013:339), few of them do (Drennan & Swartz 2002:1854). Communication barriers and the associated challenges experienced by health professionals are widely documented in South Africa's healthcare sector (Hussey 2012:190; Kilian, Swartz & Joska 2010:309; Pfaff & Couper 2009:520; Schlemmer & Mash 2006:1084). Health professionals hardly ever speak their patients' first languages. This communication barrier is especially problematic in the rural communities of South Africa (Herselman 1996:153). This situation arises because medical students often apply to universities in areas other than those they grew up in, so they have to learn another language to function in professionally, and this is sometimes challenging (Van de Poel *et al.* 2013:339). Moreover, students sometimes have to complete their practical training in areas other than where they studied. This means that it is especially difficult for a student who, for example, grew up in the Tswana-speaking North-West province and studied at a university based in the Zulu-speaking Kwa-Zulu Natal to work in the Xhosa-speaking Eastern Cape.

The language barrier issue is addressed to some extent by universities through teaching health science students an additional language. As shown in Table 1.1, some universities in South Africa teach health science students at least one additional language, apart from English. These language modules do not solely focus on the acquisition of medical terminology in another language, but also on the communication between a health professional and a patient.

Table 1.1: Universities that provide language modules for health science students

| **University** | **Faculty/College** | **Language(s) taught** |
|---|---|---|
| Stellenbosch University | Faculty of Medical and Health Sciences | Afrikaans and Xhosa |
| University of Cape Town | Faculty of Health Sciences | Afrikaans and Xhosa |
| University of KwaZulu-Natal | College of Health Sciences | Zulu |
| University of Pretoria | Faculty of Health Sciences | Sepedi and Zulu |
| University of the Western Cape | Faculty of Community and Health Sciences | Afrikaans and Xhosa |

A section of the beginner's language modules at the University of Pretoria typically focuses on the acquisition of basic communicative skills in the target language, with emphasis on everyday expressions and suitable high-frequency vocabulary for everyday situations (University of Pretoria 2013:378). By achieving the outcomes of the language module, students are empowered to construct their own conversations with patients. These can be to either retrieve information from patients or to communicate information to patients.

This study involved research done in the field of applied linguistics. A specific area of study within applied linguistics is language acquisition. Numerous theories exist on how people acquire an additional language. The focus of many of these theories is on how adults acquire an additional language compared to children, and if adults can ever attain native-like proficiency levels in the target language. These theories are discussed in more detail in Chapter 2.

This study utilised a theory focusing on language subsystems. When acquiring a new language, the process involves internalising specific language subsystems, including grammar, phonology and vocabulary (De Groot & Van Hell 2009:9). Even though vocabulary is of vital importance in language acquisition, it is often neglected and teachers rather focus

on grammar and phonology (De Groot & Van Hell 2009:9). Students are largely left to their own devices when they have to acquire a new vocabulary. It has been claimed that the chances of communicating in an additional language are significantly larger if the speaker knows some well-chosen basic vocabulary in the target language than when they have mastered the language's grammar (De Groot & Van Hell 2009:9). This is supported by Wilkins' statement (in Chen & Li 2010:342) "without grammar very little can be conveyed, and without vocabulary nothing can be conveyed". This is true of communication in general, but especially of communication in a specific domain. Communication that takes place in a specific domain requires vocabulary suited to that domain. The specific domain in which a health professional and a patient communicate adjusts the size of the vocabulary to that which is relevant to the specific situation. For example, when discussing a patient's broken leg, the only vocabulary the health professional will need is vocabulary relating to the patient's leg and the procedures around it. It is because of the need for a set of specialised vocabulary items suited to specific purposes and situations in which the students will function that this study focuses explicitly on the user experience of vocabulary acquisition using supplementary tools.

In South Africa's healthcare sector, there is a large diversity of languages spoken by health professionals and patients. As a result, a communication gap between the two parties arises because they do not share a common language. Bridging that gap is the biggest motivation behind teaching health science students an additional language. The language modules are taught as part of the health science module to enable students to communicate more effectively with their patients. Language learning traditionally happens in classrooms with lecturers teaching students, but this has changed somewhat with time. Devices like smartphones, tablets, laptops, etc., have in recent years become easier to access and use. The software (mobile applications) that these devices use have subsequently also become easier to develop and access. These applications not only offer users information or assistance on various subjects, but some also act as learning applications, focusing on subjects ranging from mathematics to language learning. In light of this, applications can be seen as extensions of learning methods for learning in new and different environments. When it comes to language learning applications, the applications allow learning not to be limited to the classroom (Miangah 2012:310). Since mobile learning is "spontaneous,

informal, personalised and ubiquitous", busy students can use portable devices to learn whenever they have free time available (Miangah 2012:309-310). The portability of mobile learning is a big advantage when learning vocabulary because students can learn at their own pace and in an environment in which they feel comfortable. This study investigates the possibility of using mobile applications as supplementary tools in language modules taught at universities.

### 1.2. Problem statement

South Africans visiting healthcare facilities across South Africa struggle to communicate with health professionals, and vice versa, due to language barriers. This study investigated how health science students experience using mobile-assisted language learning applications as supplementary tools for Sepedi[1] vocabulary acquisition when learning an additional language.

### 1.3. Purpose of the study and research questions

Health science students from the University of Pretoria who are enrolled for the Sepedi 110 *Sepedi for Beginners* language learning module were identified as suitable candidates to participate in the study.

The purpose of the study was:

- to determine whether the students perceive mobile-assisted language learning (MALL) applications useful to acquire vocabulary in Sepedi for medical purposes; and
- to establish whether the students have a clear preference for a specific MALL application.

The Sepedi content used in the applications forms part of the learning material used in the Sepedi 110 module.

[1] It is noted that Sepedi is also known as Sesotho sa Leboa and Northern Sotho. For the purpose of consistency and to remove any possibilities of confusion, *Sepedi* will be used throughout the dissertation, because the language module the students enrol for is called Sepedi 110 *Sepedi for Beginners*.

To achieve the goals of the study, MALL applications had to be designed and developed. The following factors influenced the design and development of the applications:

- availability of the Sepedi study material
- suitability of the Sepedi study material for use in mobile applications
- outcomes of the Sepedi 110 module
- access to the participating students
- time available for data collection

The researcher decided to design and develop three mobile applications, taking the influencing factors into consideration, and consequently, posed the following research questions:

i. Do students perceive MALL applications as being useful to acquire vocabulary in Sepedi for medical application purposes?
ii. Do students have a clear preference for a specific MALL application?

The following hypotheses originated from the research questions:

- The students are of the opinion that the applications assisted them with acquiring Sepedi vocabulary.
- The students would use the applications if they formed part of the Sepedi 110 Sepedi for Beginners module.
- The students would recommend the applications to other students in the Health Sciences.
- The students do not have a clear preference for a particular application and will use any application to acquire Sepedi.

### 1.4. Research design

To answer the research questions, a survey research approach was followed. However, no suitable applications existed at the start of this study, so custom-made applications had to be designed and developed for this purpose. This resulted in the study consisting of two components.

i. Custom-made applications that incorporated the study material the health science students used for the Sepedi 110 module were designed and developed. Sound files and images were added to the applications as extra features.

ii. The applications were then used by the health science students for a period of nine weeks as part of a user experience study conducted at the University of Pretoria. At the end of the study, the students completed a questionnaire to communicate their experience with the applications. The questionnaire included close-ended Likert scale questions and open-ended questions and these were used to collect quantitative and qualitative data.

### 1.5. The scope and limitations of the study

The study consisted of two fundamental components: the design and development of three MALL applications for vocabulary acquisition in Sepedi as well as a user experience study.

The applications were designed with similar basic functionalities:

- Silent (vocabulary acquisition with text and pictures only)
- Listen (vocabulary acquisition with text, pictures and pre-recorded audio clips)
- Speak (vocabulary acquisition with text, pictures, pre-recorded audio clips and record-and-playback)

The content used for the applications consisted of a vocabulary list, pictures and sound files. The vocabulary list forms part of the Sepedi 110 module for which the students were enrolled. The pictures were purchased from the Shutterstock catalogue (Oringer 2015) and the sound files were example pronunciations of the words in the vocabulary list produced by a female Sepedi speaker.

Figure 1.1 gives an overview of the process followed to have fully functional applications for the user experience study. An administrator first uploaded the content in the form of lessons to a content management system (CMS). The applications were then installed on devices that communicated with the CMS to retrieve the lessons, which were saved on the devices. Each student then received a device to use during the intervention.

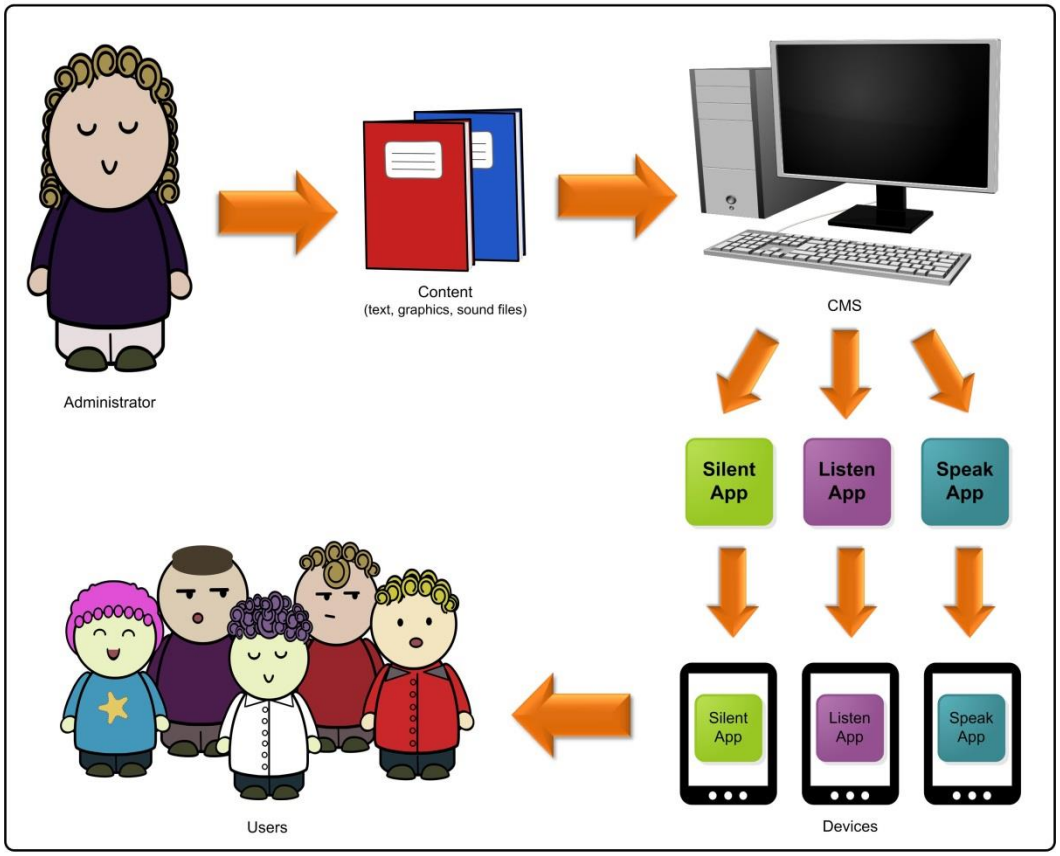


Figure 1.1: An overview of the applications' preparation process

The applications were used in a user experience study conducted at the University of Pretoria involving health science students enrolled for the Sepedi 110 *Sepedi for Beginners* language module. The intervention with the applications took place over nine weeks. The students who participated each received an Asus Google Nexus 7 tablet with either the Silent, Listen or Speak applications distributed at random. They had the opportunity to complete lessons on the applications for 30 minutes after each Sepedi lecture. At the end of the intervention, the students were asked to complete a questionnaire to communicate their experience with the applications. A copy of the questionnaire is included in Appendix A. A focus group discussion was planned for the last week of the intervention, a

week after the students filled out the questionnaires. The questions planned for the focus group discussion included:

- the students' thoughts about the applications
- which application(s) they liked the most and the least and their reasons why
- what else they would like to see in the applications
- whether or not they think the applications assisted them in acquiring Sepedi vocabulary, etc.

A list of the focus group discussion questions is included in Appendix B. There were, unfortunately, many challenges faced during the study and, in the end, no focus group discussion could take place. This was primarily due to campus unrest as a result of which lectures were suspended, thus limiting contact time with students.

### 1.6. Delineations

The study measured how the students experienced the applications during the intervention and not the effectiveness of their resultant vocabulary acquisition. Due to practical and logistical reasons, the study solely involved students from the Faculty of Health Sciences at the University of Pretoria, and its conclusions are only relevant to this participating group of students. Nevertheless, the participating students from the University of Pretoria were true representatives of the bigger population of health science students starting their tertiary studies. The degrees they are enrolled for, their backgrounds and ages and the fact that they are studying at a university offering a language learning module as part of their formal degree indicates this.

### 1.7. Structure of the dissertation

This chapter gives a brief overview of the study, including its purpose, scope and limitations, the research questions and research design. Chapter 2 presents the literature pertaining to this study, namely, applied linguistics, additional language acquisition, healthcare in South Africa, language for specific purposes, multilingual communication and mobile-assisted language learning. Chapter 3 discusses the design and development of the applications in depth, as well as the profile and selection of research participants and the data collection

procedure. Chapter 4 presents and discusses the results of the data collected. The dissertation concludes with Chapter 5, which includes a summary of the study and recommendations for future work.

# CHAPTER 2

# LITERATURE REVIEW AND THEORETICAL CONSPECTUS

## 2.1. Introduction

In South Africa, communication challenges are rife, largely due to the language barriers people are faced with every day. South Africa's healthcare sector is one of the areas where communication is particularly demanding. Some South African universities address this challenge by teaching health science students an additional language. This study aims to assist in this endeavour by providing the students with mobile-assisted language learning applications. It fits into the field of applied linguistics and focuses on additional language acquisition for a specific, multilingual purpose.

## 2.2. Applied linguistics

Applied linguistics is defined by Cook (2003:5) as "the academic discipline concerned with the relation of knowledge about language to decision making in the real world". More specifically, it is an interdisciplinary field that focuses on investigating either educational or social problems relating to language that occur throughout the world, (Cook 2003:5). As a result of its language diversity and the associated challenges, South Africa experiences both social and educational problems. Applied linguistics can be used as a means to solve these communication problems. However, the field of applied linguistics is too broad to try and solve just any language-related problem. Problems need to be sorted into specific areas of study within applied linguistics, as categorised by Cook (2003:5), namely:

- Language and education
- Language, work and law
- Language, information and effect

This study focuses on a portion of South Africa's communication problems in the area of language and education, as it includes, amongst others, additional language education as a specialisation field. Additional language education itself can be divided into two more areas, namely, second-language education and foreign language education. Second-language

education refers to "when someone studies their society's majority or official language which is not their home language" (Cook 2003:7) and foreign language education refers to "when someone studies the language of another country" (Cook 2003:7). Since South Africa has 11 official languages, it is difficult to establish which language is defined as a second language. Also, if people do not hear a certain official language every day, they can find it so unfamiliar that they themselves might define it as foreign. Added to that, many people in South Africa speak more than one language and in many instances more than two. It is for these reasons that the term additional language will be used in this study to describe the studying of any language. This will avoid confusion about the type of additional language being referred to.

## 2.3. Additional language acquisition

South Africans communicate in a variety of languages and understanding one another is not always easy. Health professionals and patients, in particular, find it difficult because they might not speak the same language and, as a result, information sharing becomes problematic. Students in the health sciences learn an additional language at some universities to enable them to communicate with patients and also to improve the relationship between health professionals and patients. Within the South African context, this is usually done by including a module or similar unit of learning in an indigenous language in the curriculum. In this section, additional language acquisition will be discussed in terms of age and language acquisition, vocabulary acquisition and multimedia annotation. Very little to nothing is reported on additional language acquisition for South African indigenous languages, especially Sepedi. The literature studied for this section is thus mostly relevant to English as a second or foreign language.

### 2.3.1. Age and language acquisition

An abundance of literature on additional language acquisition exists. One of the main themes discussed in the literature concerns the possibility of adults being able to learn an additional language up to a proficiency level close to that of a native speaker. (Marinova-Todd, Marshall & Snow 2000:9; Abello-Contesse 2009:170; Hellman 2011:163; Piehl 2011:33). Such a theme stems from the beliefs that younger children acquire a language

faster and achieve better outcomes than older children or adults (Abello-Contesse 2009:170). One of the first claims made about these beliefs is called the *critical period hypothesis.* It argues that there is "an optimal period for language acquisition, ending at puberty" (Abello-Contesse 2009:170) and that once that period has passed, a learner is less likely to achieve native-like proficiency in the target language (Marinova-Todd *et al.* 2000:9). Numerous findings have indicated that most adult additional language learners "do not attain the [proficiency] level of native speakers" (Hellman 2011:163), but they still manage to acquire high levels of proficiency in an additional language, regardless of their age (Abello-Contesse 2009:171).

A number of scholars succeed in explaining why adults indeed manage to acquire high levels of proficiency in an additional language. After analysing relating studies, Marinova-Todd *et al.* (2000:9) state that "the age differences [as referred to by the critical period hypothesis] reflect differences in the situation of learning rather than in the capacity to learn". Also, adults acquiring high levels of proficiency in an additional language could be ascribed to their existing knowledge of any language other than the one they are currently learning (Abello-Contesse 2009:170). The existing knowledge can comprise anything from different ways of studying to where to find additional help if they need it. Lastly, adult additional language learners are also not necessarily bound to classrooms and are free to interact with people who speak the language they wish to learn. By interacting with native speakers on a peer-to-peer level, language learners experience a valuable and effective way of learning (Nguyen & Kellogg 2010:57). The explanations given can possibly add to what psycholinguists believe, i.e. that the critical period only exists for first language acquisition and cannot be extended and applied to additional language acquisition (Marinova-Todd *et al.* 2000:9).

On many occasions, adults are required to learn an additional language for educational or employment purposes, as is the case with the health science students in this study. Most of these students chose the field of health sciences not because they had to, but because they wanted to become health professionals. The students also knew beforehand that they would possibly have to communicate with someone who does not speak their first language at some stage during their career. Given this information, it is safe to assume that certain

students will strive to master an additional language to deliver a service to as many people as they possibly can. In this particular instance, the remark made by Abello-Contesse (2009:170) about the role played by existing knowledge in the acquisition of an additional language is of particular importance. Take into account that the majority of students involved in this study have Afrikaans and/or English as first languages, both of which are Indo-Germanic languages. When learning an African language, these students cannot draw on their existing knowledge of a language with which they are familiar. This is due to the fact that what is popularly known as African languages actually belong to the Bantu language family. The Bantu language family is characterised inter alia by an extremely complex morphological system and has very little in common with languages belonging to the Indo-Germanic languages. On the other hand, these students have the benefit of literally being surrounded by these languages in day-to-day life. They will be able to hear words being applied in sentences and experience how the language is used by everyday speakers. This is a resource for additional language acquisition that is to a large extent underutilised and underestimated.

### 2.3.2. Vocabulary acquisition

When learning a new language, students are required to make every effort to study the three language subsystems equally, namely grammar, phonology and vocabulary. They should do this regardless of whether or not they are exposed to the language in its natural form on a daily basis. However, of these subsystems, vocabulary is often neglected the most (by students and lecturers), even though it is seen as an essential step in mastering any language (De Groot & Van Hell 2009:9; Zhang 2016:44).

When a student wants to master a language, the question asked quite often is: *How much vocabulary does a language student really need to know?* In an attempt to answer this question, Nation (2001:6) asks three additional questions:

- How many words are there in the language?
- How many words do native speakers know?
- How much vocabulary do you need to use in another language?

According to Nation (2001:6), it is an extremely ambitious goal to try and know all the words in the language you are learning when even the native speakers of that language do not know all the vocabulary. It is also difficult to decide what to count as a word and what not. However, Nation (2001:6-7) finds a solution by identifying four ways of counting words, namely tokens, types, lemmas and word families:

- Tokens: every word in a text or spoken form, including repeating words
- Types: every word in a text or spoken form, excluding repeating words
- Lemmas: the headword and some inflected and reduced forms
- Word families: the headword, its inflected forms and closely related derived forms

An easier undertaking when learning a language is to look at how many words native speakers know. However, "research on measuring vocabulary size has generally been poorly done" (Nation 2001:8). After reviewing relevant studies, Nation (2001:9) estimates "that for each year of their early life, native speakers add on average 1000 word families a year to their vocabulary" and states that it is a manageable goal for non-native speakers.

To answer the question of how much vocabulary a person has to know to use a language, Nation (2001:9) states that it might be "useful in the long term" to know as much vocabulary as a native speaker. He further states that it is "not an essential short-term goal" because even though studies show all words as being equal to a native speaker, it is not true for learners as some words carry more weight than others in terms of their usefulness.

After taking all three questions and answers into consideration when learning a language, it is possible to determine students' proficiency levels through their vocabulary knowledge. Vocabulary knowledge is studied through two dimensions, namely size and organisation (Meara, in Nizonkiza & Van Dyk 2015:149). Throughout the years, the dimensions were also referred to by other terms, like vocabulary size and depth knowledge (Nizonkiza & Van Dyk 2015:150). Vocabulary size "refers to how many words one knows irrespective of how well they are known" (Nizonkiza & Van Dyk 2015:150) and depth knowledge "refers to how well a word is known" (Nizonkiza & Van Dyk 2015:150).

Nizonkiza and Van Dyk (2015:150) also state that scholars are in agreement that learners' vocabulary size is directly related to their language proficiency. Vocabulary tests can thus be used to determine a learner's level of proficiency. This, in turn, will also determine the vocabulary a learner still requires to use the language efficiently for specific purposes like, amongst others, watching television and reading a newspaper (Nizonkiza & Van Dyk 2015:150). For example, when a student has to read the business section of a newspaper, but knows no vocabulary related to economics, it means that the student requires vocabulary for this specific purpose to complete the task. This type of vocabulary is known as specialised vocabulary.

Specialised vocabularies are vocabularies with restricted topics (Nation 2001:17). A specialised vocabulary is of great use in specific domains where a learner only needs a certain number of words to effectively communicate about a specific topic. A prime example of communication in a specific domain is when health professionals communicate with patients about diagnoses or treatments. That is why this study makes use of the specialised vocabulary for health sciences, and more specifically vocabulary related to the communication between health professionals and patients.

The vocabulary for the module which forms the focus of this study was sourced in a hands-on manner. Students and healthcare professionals were asked to provide the lecturers responsible for the curriculum design with typical phrases and vocabulary that they use on a daily basis in their communication with patients. Two thematic categories were established from this data; one with vocabulary shared by all healthcare professionals, and the second with vocabulary specific to a particular profession. This approach ensured that students derive the maximum benefit from a relatively small but dedicated core vocabulary.

### 2.3.3. Multimedia annotations

A research area of vocabulary acquisition that is relevant to this study includes using multimedia for vocabulary acquisition, or rather multimedia vocabulary annotations. These annotations are used to assist language learning students in better comprehending what they are reading and learning (Lin & Yu 2016:2). Multimedia vocabulary annotations can be

seen as "texts, pictures, films, animations, and sounds", but pictures are used most frequently (Lin & Yu 2016:2).

In a study done on multimedia annotations, Yeh and Wang (2003) found that text along with a still image of the vocabulary item has the biggest impact on vocabulary acquisition. However, in a similar study done by Lin and Yu (2016), they found that text with a still image and an example pronunciation of the vocabulary item was the most effective type of annotation for vocabulary acquisition. The audio used played a critical role in the students' "retention of word meanings and their reduction of learning load" (Lin & Yu 2016:11).

Even though the main focus of the current study is not vocabulary acquisition, but rather the user's experience of the applications, the researcher decided to implement multimedia in the form of text, pictures and sounds. This was done to give the users of the applications an indication of what supplementary learning tools can offer in terms of vocabulary acquisition should they feel they are learning some vocabulary in the process of using the applications.

By acquiring an additional language health science students will be able to use a language for a specific purpose, such as communicating with patients. This will, in turn, improve the relationship between health professionals and patients in the South African health sector.

### 2.4. Healthcare in South Africa

Before the Western notion of medical care was introduced in South Africa, patients from the indigenous cultures had traditional healers whom they consulted. The traditional healers mostly used natural remedies such as sheep- and ox-fat or plant materials to cure illnesses (Deacon, Philips & Van Heyningen 2004:64). In the early 19$^{th}$ century, medical missionaries from the Dutch East India Company introduced modern medicine to the indigenous population. However, the outcome of the modern care was only slightly different compared to the outcome of the traditional healers' care (Coovadia, Jewkes, Barron, Sanders & McIntyre 2009:829). The results were attributed to the fact that the doctors relied heavily on "classical Greek and Arabic humoral theory, as well as innovations in the Renaissance and

the Enlightenment" (Deacon *et al.* 2004:50). This implies that people, the universe and nature are all bound together. The four humours – blood, yellow bile, black bile and phlegm – were believed to be the basic substances in a person's body that uphold the body's internal balance (Hart 2001:721). Diseases were thus interpreted as imbalances occurring through external causes and because people, the universe and nature are all bound together, natural remedies were believed to be the best cure for these (Deacon *et. al.* 2004:50). It was only after significant scientific discoveries like anaesthesia and antisepsis were made in the late 19$^{th}$ century that biomedicine became more effective (Deacon *et al.* 2004:53). These discoveries had a big impact on the South African health system and had a hand in forming the system into what it is today.

According to the South African Bill of Rights (South African Government 1996), all South Africans have the right to access healthcare services. Socio-economic differences, access barriers and poor service delivery are some of the factors hindering the realisation of this right (Harris, Goudge, Ataguba, McIntyre, Nxumalo & Jikwana 2011:103). Extreme poverty affects a large portion of South Africa's population, and basic needs such as nutrition, clean water, sanitation and housing cannot be met without aid from the government. According to Mayosi, Lawn, Van Niekerk, Bradshaw, Abdool Karim and Coovadia (2012:2037), "health and wealth are mutually reinforcing" and without the mentioned basic needs, people's health deteriorates and more strain is put on the public healthcare system. Approximately 30% of the doctors in South Africa work in the public healthcare sector and they care for about 84% of the population. The other 70% of doctors work in the private healthcare sector where only 16% of the population has private health insurance (Mayosi & Benatar 2014:1345). Many public healthcare facilities in South Africa do not function to their full capacity due to "underfunding, mismanagement, and neglect" (Mayosi & Benatar 2014:1346). These contribute to the stress health professionals in the public healthcare sector experience.

The provincial departments of health are responsible for the management of public healthcare facilities in South Africa. Health services are distributed among three levels, namely clinics and Level 1 hospitals (district), Level 2 hospitals (regional) and Level 3 hospitals (tertiary/central) (Von Holdt & Murphy 2007:313). In 2007, there were 63 regional

and 14 tertiary hospitals in South Africa (Von Holdt & Murphy 2007:314) providing healthcare to South Africa's population of between 45 and 50 million (Lehohla 2012:9). The structure of the public health sector provides clinical care that increases in terms of speciality and intensity according to level. Patients should, ideally, visit a clinic for an initial examination after which they are referred to higher level facilities if necessary (Von Holdt & Murphy 2007:313). However, patients sometimes bypass Level 1 and Level 2 hospitals due to "the weaknesses of the referral system and the lack of comprehensive hospital coverage" in their area (Von Holdt & Murphy 2007:313). This also places a strain on delivering adequate services to patients

District hospitals are spread across South Africa and are the only hospitals accessible to many South Africans living in rural areas (Cullinan 2006:13). Due to the rural location of some district hospitals, the patients generally speak the language spoken in the community, resulting in communication challenges between health professionals and patients because of language barriers. When new medical graduates are required to complete a mandatory year or two of community service, they are generally assigned to these remote areas (Abdool Karim 2004:1395). However, they are often not able to communicate with patients or community members. By learning an additional language as part of their tertiary education, and with the use of supplementary tools as described in this study, aspiring health practitioners should be able to communicate with patients in remote areas. In doing so, they should improve the quality of care they provide.

### 2.5. Language for specific purposes: health professional and patient communication

Being a multilingual country, it is inevitable that South Africa's society is also multicultural – the link between language and culture being an undisputed one. Different cultures have an indirect impact on the communication and the relationship shared between health professionals and patients. To establish a good relationship with patients, health professionals need to (fully or partially) acquire the language spoken by their patients. This language for a specific purpose is seen as an additional language that remains "restricted to particular domains or functions" (Van de Poel, Van Dyk, Gasiorek & Blockmans 2015:191), i.e., communication between health professionals and patients. It is also seen as "language

for intercultural communication" (Van de Poel *et al.* 2015:191), which is essential in the South African context.

Throughout history, patients from what can broadly be termed the African cultures often prefer to consult a traditional healer as well as a medically trained practitioner for the same condition (Herselman 1996:153). Receiving opinions from two health practitioners for the same condition does not necessarily imply that the patient prefers to consult with one practitioner in favour of the other, or to consult with both practitioners. It rather means that the traditional healer was not reachable in time. The traditional healer will then be consulted at a later time, but for the same condition. The findings of a study conducted by Herselman (1996:153-170) confirm the reasoning behind both consultations. They claim that African patients often feel that non-traditional medicine is mostly provided by medical practitioners whose cultures differ too much from their own and that the medical practitioners seldom speak their language. Therefore, a traditional healer's diagnosis is trusted more, because a culture and a language are shared.

It needs to be pointed out, though, that the findings of Herselman's study date back 20 years. Although it probably was the case in the early 1990s, it can no longer be assumed that the majority of the health professionals working in rural areas are necessarily non-African and/or speakers of either Afrikaans or English. With increased access to medical training, the number of African doctors has increased dramatically over the past two decades. A big increase in enrolment figures occurred between 2000 and 2012 when there was an attempt to increase the number of black African and female enrollees (Mayosi & Benatar 2014:1347). In the same period, there was an 18% increase in the number of graduating doctors, with the majority of them being black Africans, persons of mixed ancestry and women (Mayosi & Benatar 2014:1347). However, it must be noted that being African does not guarantee competence in an African language. Due to the South African educational system, it is becoming more and more common for black students to be products of a language shift towards English. Often, these students have little more than a rudimentary knowledge of an African language. The mismatch between the health professionals' language and that of the patient is, therefore, a phenomenon that will probably be around for at least some years to come.

Even when a culture or a language is shared, the health professional-patient relationship is still not an easy relationship to establish. This is because it "involves interaction between individuals in non-equal positions, is often non-voluntary, concerns issues of vital importance, is therefore emotionally laden, and requires close cooperation" (Chaitchik, in Ong, De Haes, Hoos & Lammes 1995:903). Nevertheless, the elements mentioned only make it more difficult for a relationship to be established and does not necessarily prevent it in any way.

One way of improving health professional-patient relationships is for the health professional and patient to effectively communicate with each other. When health professionals and patients communicate, three different purposes of communication exist. Ong *et al.* (1995:903-904) define the purposes as: "[establishing] a good inter-personal relationship, exchanging information and making treatment-related decisions".

For the first purpose, talk is identified as the main element in medical care, and it also plays a vital part in how health professional-patient relationships are shaped (Roter & Hall in Ong *et al.* 1995:904). A health professional-patient relationship that is also a "good inter-personal relationship" is viewed as essential to achieve the best medical care (Ong *et al.* 1995:904).

The exchange of information, the second purpose, first takes place when patients inform the health professionals what symptoms they are experiencing, and then when the health professionals give them a diagnosis and a treatment to follow. Information can thus be seen as a resource that both parties bring to verbal interactions (Beisecker & Beisecker 1990:3).

The third purpose, medical decision-making, has changed somewhat over the years. Ong *et al.* (1995:905) state that traditionally "the doctor directs care and makes decisions about treatment", but "during the past two decades, this approach has been replaced by the ideal of *shared decision-making*". However, even though patients are positive about the idea of being a part of the decision-making process when it involves their health, they would still prefer their health professional to make all the decisions when it comes to certain medical issues like cancer (Ong *et al.* 1995:904). If and when patients are part of the decision-making

process, it is important to note that they still need adequate information about their conditions to make a decision about the treatment. That means health professionals need to have a good relationship with their patients to provide information and make these decisions, shared or not.

In a study conducted by Herselman (1996:153-170) on problems in health communication in a multicultural South Africa, two interconnected barriers related to this study were identified. These were socio-cultural differences between a health professional and a patient and problems pertaining to language.

The socio-cultural differences between a health professional and a patient are signified mainly by differences in class, status and values, as well as differences in perspectives regarding illness and treatments (Herselman 1996:153-170). Since the 1950s, nurses have been seen as cruel and they also saw themselves as "authority figures in control of the lives of their patients" (Coovadia *et al.* 2009:829). This image that patients have of nurses instantly brings to attention the differences in class, status and values between the patient and nurse, which could affect the patient's hospital experience negatively. Patients are also not always familiar with their surroundings, as many may have never been to a modern-day hospital or clinic (Herselman 1996:158) and do not know what to expect in terms of procedures or treatment. When patients are thus uncomfortable in the presence of a nurse or another health practitioner, effective communication becomes tense.

According to Herselman (1996:158), knowing a foreign language helps one to comprehend someone else's culture and to understand the problems in the process of information exchange. No or low language proficiency is an immense barrier to effective communication, and when a health professional does not speak a patient's language, the patient suffers further (Walker, Trofimovich, Cedergren & Gatbonton 2011:722). Not only do patients suffer more, but when they do not speak the health practitioner's language, they will struggle to describe their symptoms because compatible terms in both languages do not necessarily exist (Herselman 1996:158). Two example terms are *x-ray* and *stomach ache*. Patients sometimes describe *x-ray* as "going under the lights" (Herselman 1996:158). Also, when trying to express that they are experiencing a stomach ache, some Sepedi

speaking patients say “ke longwa ke mala”. When translated directly into English, it means “I am being bitten/chewed by my insides” and some people interpret this as *there is a snake inside the person’s stomach*. An incorrect translation like this can cause havoc in a hospital, as having a stomach ache because of food poisoning, for example, is vastly different from literally having a snake in your stomach. Descriptive terms like these are used either when patients lack the knowledge to describe symptoms in a language they are not proficient in, or because certain terms do not exist in their language. They try to explain their symptoms in the best way they can, which leaves the description open for interpretation. Empowering health practitioners to speak their patients' language would familiarise them with the patients’ “customs and beliefs” (Herselman 1996:158). It would also enable health practitioners to understand the way in which their patients think and experience the world. This would, in turn, guarantee better communication between health practitioner and patient, making the exchange of information and effective treatment easier.

Interpreting services also have an effect on the communication between a health professional and a patient. In South Africa, doctors often use nurses, family members or other staff members as informal and untrained interpreters to communicate with patients (Kilian *et al.* 2010:309; Hussey 2012:191). These informal interpreters are used because of practical and/or logistical reasons and because formal interpreter posts do not exist in most South African hospitals and clinics (Drennan & Swartz 2002:1862; Meeuwesen, Twilt, Ten Thije & Harmsen 2010:198). Often the informal interpreters have time-wasting side conversations with the patients on topics that are not related to the health issue the health practitioner raised (Penn & Watermeyer 2012:392). A few other disadvantages of using informal interpreters include (Pfaff & Couper 2009:520):

- making translation mistakes;
- their unavailability at possible important times;
- the inclusion of their own views when interpreting; and
- causing friction between staff members when expecting certain members to fulfil this role.

Given the disadvantages mentioned, interpreters are currently "the best available communication method" in the public healthcare domain, and because they also serve as "cultural mediators", they are seen as valuable to health professional and patient communication (Hussey 2012:191). However, a few studies done found that the interpretation services in South Africa are not at a satisfactory level and have suggested that interpreters be properly trained in the healthcare domain and policies implemented nationwide (Kilian *et al.* 2010:312; Levin 2011:13; Penn & Watermeyer 2012:397). Only then will it be possible to deliver an acceptable interpreting service to all the patients in South Africa who might need it.

In a study conducted by Van de Poel *et al.* (2015) on the communication by pharmacists in a multilingual setting, pharmacists were approached to determine if there were specific needs that have to be addressed to bridge the gap in communication between health professionals (in particular pharmacists) and patients. The study found that pharmacists have a need for communication support in African languages. This support could be learning materials which cover basic vocabulary, scientific terminology, grammar and pronunciation, as well as simple explanations for patients and how to ask questions. Studying these learning materials would enable pharmacists to confidently communicate with patients, for example, when they ask for a patient's history or when they want to ensure that patients use their medication correctly.

### 2.6. Multilingual communication

South Africa has 11 official languages, including Afrikaans and English, as well as nine indigenous languages. South Africa is thus defined as a multilingual country, where "multiple languages enjoy equal status by law, and where the national curriculum acknowledges and supports multilingualism" (Klapwijk & Van der Walt 2016:67). Literature, as discussed by Banda (2000:51-52), has shown that a typical South African can speak at least two of the official languages, with black South Africans being able to speak up to three (sometimes more) of them. Many South Africans are therefore defined as being multilingual and when they interact with one another, multilingual communication takes place. For the

purpose of this study, the term multilingual communication is thus defined as the activity or process of expressing oneself and of sharing information in multiple languages.

The language diversity in South Africa is formally measured by looking at the number of first language or mother tongue speakers of a language. According to the Census of 2011, as conducted by Statistics South Africa (2011), 22.7% of South Africans speak Zulu as their first language, followed by Xhosa (16%), Afrikaans (13.5%) and English (9.6%) (SouthAfrica.info 2015). The full statistics for the languages mentioned as well as the other languages spoken in South Africa are indicated in Table 2.1.

Table 2.1: The dominant first languages of South Africa

| Rank | Language | Number of speakers | % of total |
|---|---|---|---|
| 1 | Zulu | 11 587 374 | 22.7% |
| 2 | Xhosa | 8 154 258 | 16.0% |
| 3 | Afrikaans | 6 855 082 | 13.5% |
| 4 | English | 4 892 623 | 9.6% |
| 5 | Sepedi | 4 618 576 | 9.1% |
| 6 | Tswana | 4 067 248 | 8.0% |
| 7 | Sotho | 3 849 563 | 7.6% |
| 8 | Tsonga | 2 277 148 | 4.5% |
| 9 | Swati | 1 297 046 | 2.5% |
| 10 | Venda | 1 209 388 | 2.4% |
| 11 | Ndebele | 1 090 223 | 2.1% |
| 12 | Other | 828 258 | 1.6% |
| 13 | Sign language | 234 655 | 0.5% |
| | **Total** | **50 961 442** | **100.0%** |

Even though English is ranked as only the fourth biggest language spoken by South Africans as a first language, it is considered to be South Africa's lingua franca. This is because it is the main language used in the public sphere, for example, in the government, commerce and the media (Deumert 2010:54; SouthAfrica.info 2015). English is also the dominant language in higher education, where it is the language of instruction at most schools and tertiary institutions (Klapwijk & Van der Walt 2016:67). This is also seen in other countries, as English is globally used as the lingua franca in higher education institutions (Klapwijk & Van der Walt 2016:68). This can probably be ascribed to the "perception of the importance of

English to succeed in life and work rather than the actual dominant use of English by a majority of the population" (Klapwijk & Van der Walt 2016:68).

Almost all the universities in South Africa that offer modules in the health sciences are situated in cities or large towns (SouthAfrica.info 2015), and the language of instruction is often exclusively English (Ministry of Education 2002:7). Subsequently, the health professionals who qualify and who end up working at hospitals or clinics are mainly proficient in English and/or Afrikaans. They are unable to speak the languages of their patients (Drennen, in Levin 2006:1076), and so they use English as the main language of communication. Contrary to the city scenario, South Africans living in rural areas are not as exposed to English and, as a consequence, their English proficiency skills are usually limited. This is especially true for older people and those previously affected by poverty (Deumert 2010:54) because African languages are used as the lingua francas in the townships (underdeveloped urban areas) and in the rural areas of South Africa (Probyn 2009:126). As a result, the healthcare sector in South Africa is one area where it is particularly challenging to cope with the country's language diversity because people from different language groups and backgrounds meet at hospitals and/or clinics. According to Deumert (2010:53-54) and Coetzee-Van Rooy (2010:2), one has to have a common language to communicate with patients. This is not always possible and can lead to major challenges like incorrect medical diagnoses and treatment, especially in South Africa (Deumert 2010:60). When patients – who are not fully or even partially proficient in English – visit a hospital or a clinic, they often cannot effectively communicate with a health professional because they rarely share a common language.

Teaching health science students the language spoken by the majority of patients in a specific area provides them with the ability to communicate with their patients in a language in which both parties are proficient or at least communicatively competent.

## 2.7. Mobile-assisted language learning

To explore mobile-assisted language learning (MALL), one has to first look at computer-assisted language learning (CALL). CALL can be defined as finding ways of using computers in language teaching and learning (Torut 2000:130) and according to Hardisty and Windeatt (in Gündüz 2005:197), a simpler definition of CALL is "the use of computers as part of a language course". CALL is one of the earliest methods of using a computer to learn and is seen as an aid to language learning, used by teachers and students both in and out of the classroom environment (Gündüz 2005:197). Given the definitions of CALL, one can deduce that MALL is similar to CALL, but that mobile devices are used instead of computers.

MALL is classified as a specialisation of mobile learning (ML), which is also known as mLearning (Viberg & Grönlund 2012:1). Scholars seem to disagree about what *mobile* in mobile learning refers to - the mobility of the technologies, the mobility of the learner or the mobility of the learning content (Kukulska-Hulme 2009:158).

Three possible meanings of *mobile* were identified and three authors define mobile learning as follows:

- Quinn (2000) defines mobile learning by focusing on the **technology**, stating that it is "elearning through mobile computational devices".
- Kim and Kwon's (2012:33) definition focuses on the **mobility of individual learners,** saying that mobile learning helps learners to develop a "sense of individuality, community, and ubiquitousness in learning".
- Thornton and Houser (2005:226) focus on the **mobility of the language learning content** by referring to a study conducted about the usage of mobile phones in English education in Japan. In the study, they found that mobile devices can be used as effective tools when distributing language learning material to students.

These three definitions modelled the definition of MALL for the purpose of this study. MALL is thus defined as using language learning content and handheld, portable devices as aids in language learning.

Given the definitions of MALL and CALL, MALL can never be seen as a fully independent field (Stockwell & Hubbard 2013:5), especially because it is a specialisation of mobile learning and also related to CALL. Stockwell and Hubbard (2013:5) state that "MALL has so much in common with CALL and ML, that it is best understood as mostly belonging to both disciplines rather than being set apart from them". A Venn diagram in Figure 2.1 illustrates the "cross-field relationships" of MALL, CALL and ML, as defined by Stockwell and Hubbard (2013:5).

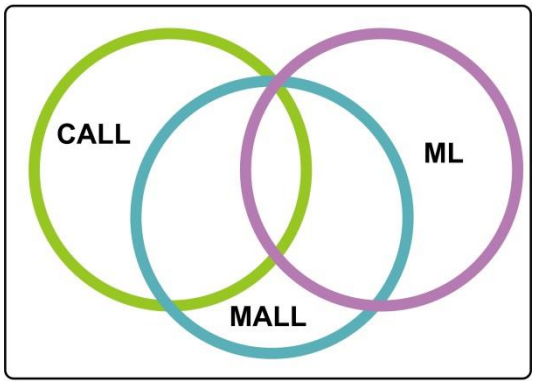


Figure 2.1: The dependent relationship of CALL, MALL and ML

The areas without writing signify the overlap between the different fields

### 2.7.1. Devices used in MALL

The usage of mobile devices for mobile language learning has seen an increase in recent years. The research done on MALL has also increased and Stockwell and Hubbard (2013:2-5) have, in turn, identified positive and negative features of mobile devices in three fields relevant to this study. The fields are physical, pedagogical and psycho-social.

- Physical features
  - The devices are small enough to be portable.
  - The size limits the usage of the device in terms of learning.
  - Mobile devices recently included tablet computers.
- Pedagogical features
  - Language learning tasks have to be suitable for the devices.
  - Information can easily be sent to learners.

  - Learners do not necessarily know how to use the devices and that may negatively influence the learning process.
- Psycho-social features
  - Mobile devices' primary function is for personal purposes, whereas computers' primary function is for work and study purposes.
  - The applications installed on mobile devices are mainly for socialising, communication and gaming.
  - Learners may not want to use their mobile devices for learning, especially if there is a link to their online identity.

In line with what Stockwell and Hubbard (2013) described above, Klopfer, Squire and Jenkins (2002:95) mention five features of handheld devices, which include:

- Portability – a mobile device can be taken anywhere
- Social interactivity – data exchange and interaction with people can take place
- Context sensitivity – unique data can be collected
- Connectivity – mobile devices can connect to other devices, data collection devices or common networks that share information
- Individuality – can provide support to suit each individual's tasks

These features are important to keep in mind when using mobile learning in a classroom environment. These features will have no negative effect on mobile learning if:

- learning content is generated in a manner that is suitable to specific devices;
- the application through which learning occurs takes the users' technical abilities into consideration; and
- the learning process does not feel like actual learning.

On the contrary, it will enable mobile learning to not only remain a possibility but to become a reality. This study took all the features mentioned into consideration and therefore the learning content was generated to be suitable for Asus Google Nexus 7 tablets. The applications used for learning are basic enough for all the students to use, but still challenge their learning abilities. The interaction with the applications also took place

after a lecture to separate the informal, relaxed application usage activity from the formal learning process.

### 2.7.2. Advantages of MALL

The advantages of MALL can be summarised under three points (Kim & Kwon 2012:35):

- MALL enables students to access language learning materials with little or no trouble and to communicate at any time and at any place.
- The fast development of speaking, listening, reading and writing skills is allowed by digital technology which aids students to take part in joint and individualised language learning activities.
- Thanks to a variety of resources and tools provided by mobile technology, learners are more motivated, independent, and socially interactive.

With MALL, students are able to communicate with their teachers and/or peers at any given time, independent of place. MALL supports the retention and use of newly learned language skills, independent of how these skills were attained (Hamada & Mitsui 2013:369-370).

The advantages of MALL were implemented into the current study and all the students were provided with the necessary learning material. The students also interacted with each other by asking questions and requesting assistance on pronunciation. This gave a number of students more confidence and motivation to use the applications.

### 2.7.3. Disadvantages of MALL

In the literature studied, the advantages of MALL far outnumber the disadvantages. The disadvantages found relate primarily to the usage of mobile devices, but also to the devices themselves. Stockwell and Hubbard (2013:4-5) mention that aiming to use mobile devices for learning might not necessarily result in learners using the devices for learning, especially when the devices are usually used for personal and social use. Some other disadvantages of mobile devices include the small keyboard and screen size (Stockwell 2008:258).

Although the small keyboard and screen size can be improved when using tablet computers instead of phones, the unwillingness of learners to use mobile devices for learning must still be kept in mind when conducting any MALL study. The Internet feature on the mobile devices used for the current study was disabled, prohibiting the students from using the devices to access social media. The devices were also collected after each session with the students to prevent them from being used for personal matters. The screen sizes were big enough for the purpose of the study and the students did not require the use of the keyboard. During the study, the students were very positive about using the devices and no student showed any unwillingness to use them for learning purposes.

## 2.8. Conclusion

This chapter discussed the study in terms of applied linguistics and a specific study area thereof, namely, additional language acquisition. Native-like proficiency in an additional language was found to be attainable regardless of a language learner's age. Vocabulary acquisition within additional language acquisition was also discussed with the focus on vocabulary for a specific domain, such as healthcare. Literature on healthcare in South Africa, language for specific purposes (ie. health professional and patient communication) and multilingual communication in South Africa, showed that culture and language are undividable. This means that patients' actions are determined and influenced by their cultural upbringing and their language skills. These actions and skills have a direct impact on the communication and relationship between a health professional and a patient. The chapter concludes by discussing MALL and its relationship with CALL and ML. MALL, CALL and ML were found to be dependent fields and that all three field share certain elements. MALL's advantages and disadvantages were also discussed, indicating that MALL is a suitable method to use for language learning. By taking all the literature studied into consideration and by applying it in the correct manner, it is possible to investigate how health science students learning an additional language experience using MALL applications as supplementary tools for Sepedi vocabulary acquisition. The implementation of the literature is discussed in detail in Chapter 3.

# CHAPTER 3

# RESEARCH METHODS

## 3.1. Introduction

This chapter focuses on the methods utilised during the study. Some focus points are the design and development of the applications, selection and profiling of the research participants and the collection of data.

## 3.2. Application design and development

The researcher did a search on the Google Play Store for medical vocabulary applications in a South African language other than English before designing and developing the applications used in this study. Only one application, *Mobile Translate MD*, was found. This application, however, has its roots in the form of a website called *Mobile Xhosa* (Moolla 2013), which was created in 2011.

*Mobile Xhosa* (Moolla 2013) is a website that was created to assist health science students who struggle to communicate with their Xhosa-speaking patients. The website can be accessed from computers or smartphones and contains English phrase lists relating to the medical domain with Xhosa translations. The content of the website is divided into different categories including history, examination, medication, etc., with each category containing a number of subcategories such as cardiovascular, prescribing, greetings, etc. In each subcategory, an English phrase list with its Xhosa translation is found. No illustrations of the phrases are given.

In 2013, four additional languages – Zulu, Afrikaans, French and Spanish – were added to the list of target languages, and the project was renamed *Mobile Translate MD*. The website content was subsequently copied into Android and Blackberry applications (Moolla 2014), with the added functionality of text-to-speech generated pronunciations of phrases for French and Spanish. However, no examples of how the Xhosa, Zulu or Afrikaans phrases

should be pronounced are given, except for a few links to external websites that explain pronunciation in general.

Because no medical vocabulary acquisition application suitable for Sepedi and/or this study could be found on the Google Play Store, a decision was taken to design and develop applications solely for the purpose of the study. The applications in this study differ in many ways from the website and application mentioned. The target language of this study's applications is Sepedi and the main focus is assisting health science students with vocabulary acquisition. The lessons in the applications contain questions in English with matching pictures and three possible answers in Sepedi. In the Listen application, students are also given the opportunity to listen to the pronunciation of a Sepedi word by a native speaker, and in the Speak application, users have to record their own pronunciation of the Sepedi word as well.

The content used in the applications is furthermore modifiable, as lessons can be added, removed and edited as necessary. In addition, it is possible to change the target language of the applications by just adding content in another language. The content, in whichever language, is added to the applications by following the process illustrated in Figure 3.1. Following the steps illustrated in the figure results in fully functional applications that can be applied in a user experience study.

This section discusses the different aspects of the design and development processes in detail. In brief, an administrator is needed to upload the content in the form of lessons to a content management system (CMS). The three applications (Silent, Listen and Speak) were installed on devices, which communicate with the CMS to retrieve the lessons. The lessons and content are saved on the devices. The devices were handed to students who used the applications as supplementary tools to learn Sepedi vocabulary.

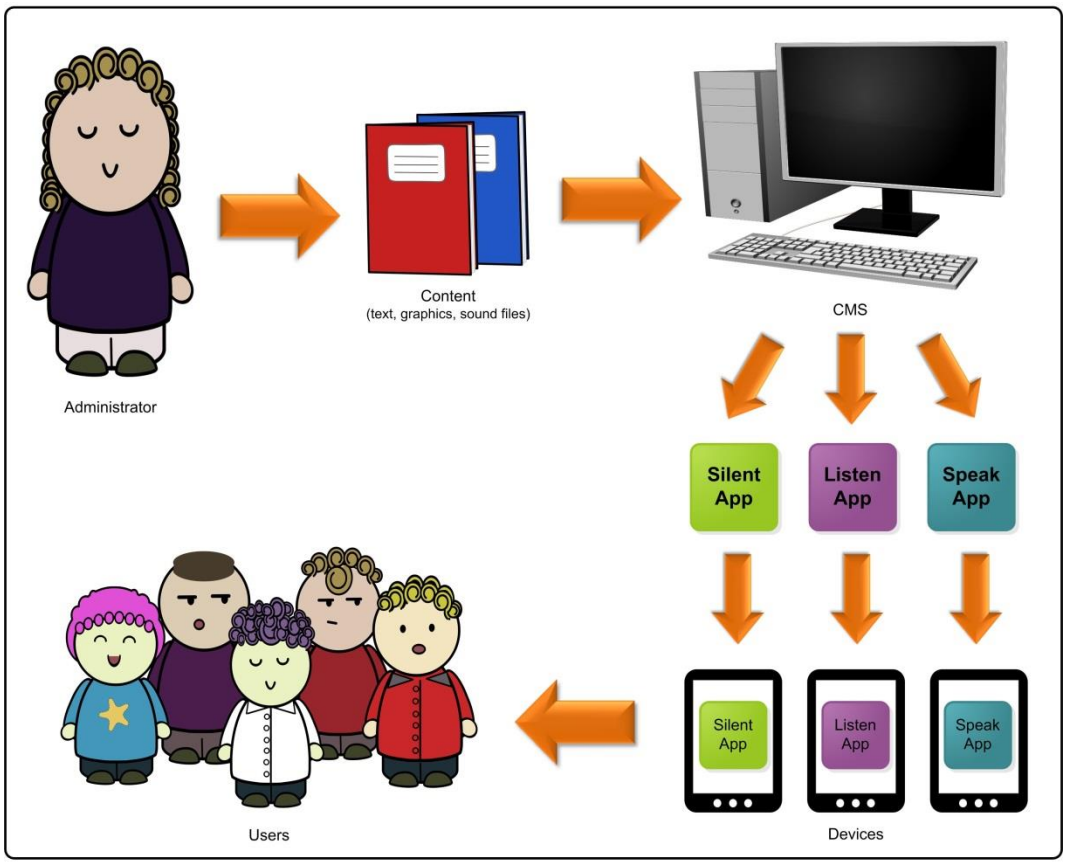


Figure 3.1: An overview of the applications' preparation process

### 3.2.1. Design

The applications were designed as follows:

- Silent (vocabulary acquisition with text and pictures only)
- Listen (vocabulary acquisition with text, pictures and pre-recorded audio clips)
- Speak (vocabulary acquisition with text, pictures, pre-recorded audio clips and record-and-playback)

The three applications were designed with similar basic functionalities, but with additional functionalities in the Listen and Speak applications. This was done to offer students a variety of vocabulary learning tools (without presenting them with three completely different and unrelated applications) and to determine if there is one particular application design that they prefer.

### 3.2.2. Functional description of the applications

The Listen and Speak applications are extensions of the Silent application. In other words:

- Silent (basic functionality)
- Listen (Silent's functionality PLUS example pronunciation of the target word)
- Speak (Silent and Listen's functionalities PLUS record-and-playback of the user's pronunciation)

The functionalities of all three applications are summarised in Figure 3.2. The Silent application's functionalities are represented by the grey and green blocks. The Listen application's functionalities are represented by the grey, green and purple blocks, and the Speak application's functionalities by the grey, green, purple and aqua blocks.

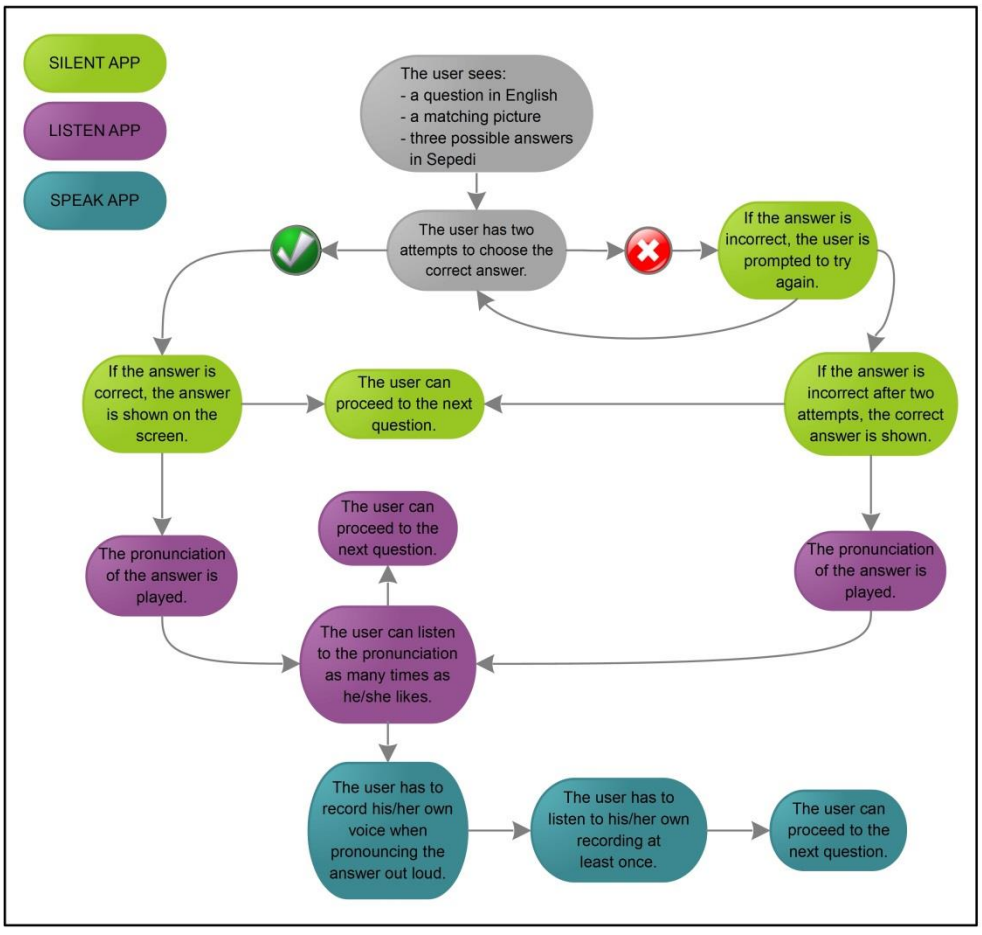


Figure 3.2: The functionalities of the applications

### 3.2.2.1. Silent application

When starting a lesson, a user sees an English word (question), a matching picture and three Sepedi words (possible answers). Adding a matching word to the written English question is a form of audio-visual teaching (Cook 2013:62), which provides the student with the meaning of the target word visually as well as in a language they know. One of the possible answers in Sepedi is the correct translation (answer) of the English word. The user has two attempts to choose the correct answer. If the user answers correctly, the answer is displayed on the screen and he/she can proceed to the next question. If the user fails to answer correctly on the first attempt, a message is displayed prompting the user to try again. If the user has still not chosen the correct answer after two attempts, a message indicates this, and the user is allowed to proceed to the next question. Screenshots of the Silent application are shown in Figure 3.3.

The figure shows, from left to right:

- The question screen.
- An indication that the chosen answer is correct.
- An indication that the chosen answer is incorrect and a prompt for the user to try again.

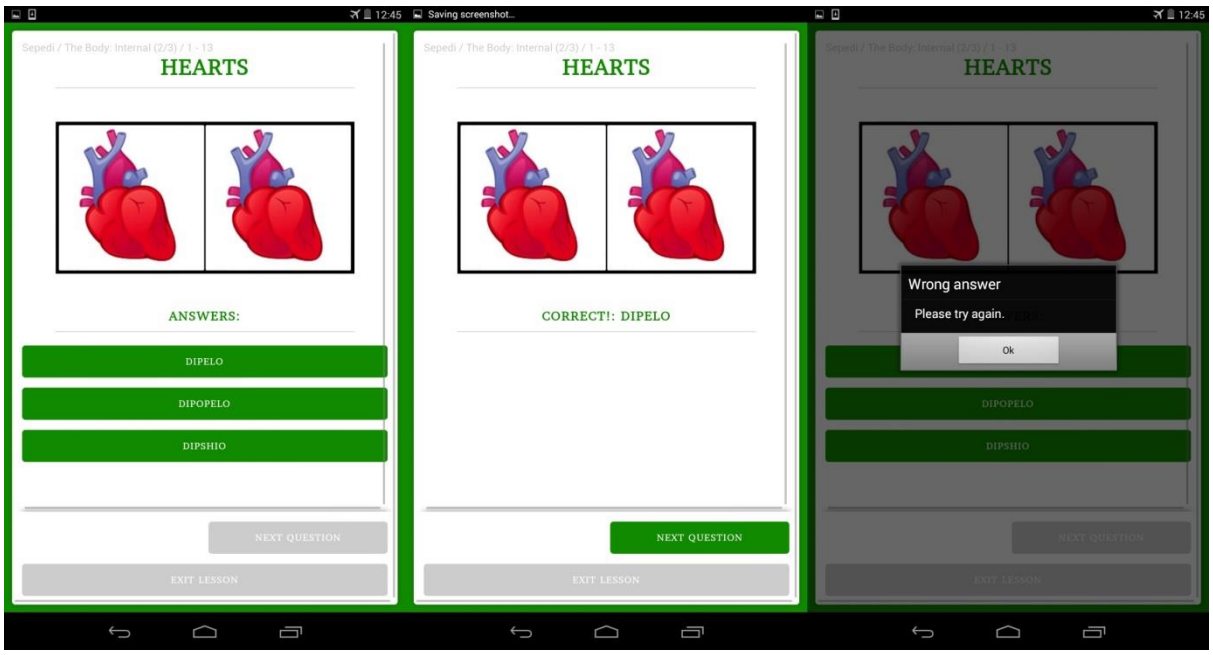


Figure 3.3: Screenshots of the Silent application

### 3.2.2.2. Listen application

The Listen application shares the Silent application's functionalities, but when the user answers correctly, an audio version of the answer is played along with the display of the answer on the screen. Users can listen to the pronunciation as many times as they like before moving on to the next question. When a user has not chosen the correct answer after two attempts, a message indicates this on the screen and the audio version of the answer is played. The user can then also listen to the pronunciation as many times as he/she likes before moving on to the next question. Screenshots of the Listen application are shown in Figure 3.4.

The figure shows, from left to right:

- The question screen.
- An indication that the chosen answer is correct. A *PLAY* button is made available for the user to listen to the correct pronunciation of the answer again.
- An indication that the chosen answer is incorrect and a prompt for the user to try again.

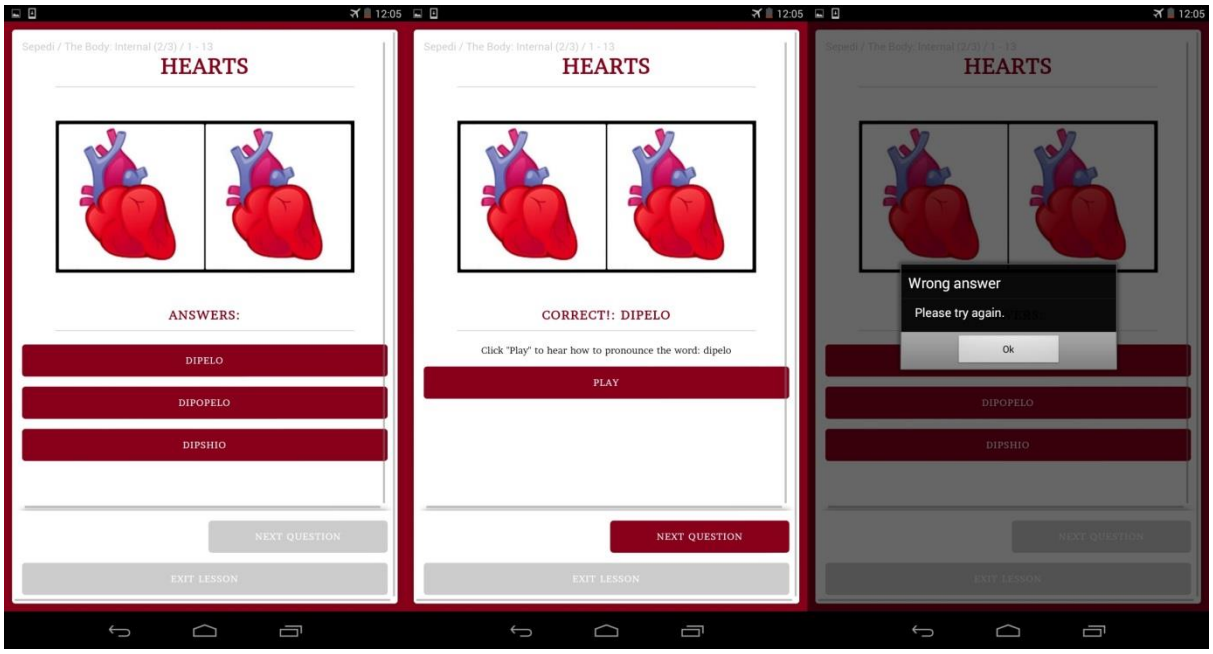


Figure 3.4: Screenshots of the Listen application

#### 3.2.2.3. Speak application

The Speak application shares the Listen application's functionalities. When users answer correctly, the audio version of the answer is played. Users can listen to it as many times as they like. Users then have to record their pronunciation of the answer and listen to it, before they can move on to the next question. When users have still answered incorrectly after two attempts, the audio version of the answer is played. They have to then record their own pronunciation of the answer and listen to it before moving on to the next question. Screenshots of the Speak application are shown in Figure 3.5.

The screenshots in Figure 3.5 are, in a clockwise direction:

- The question screen.
- An indication that the chosen answer is correct. A *PLAY* button is made available for the user to listen to the correct pronunciation of the answer again. The user also has to use the *RECORD* button to record his/her pronunciation.
- An indication that the user has successfully recorded his/her pronunciation. The user now has to use the *PLAY RECORDING* button to listen to his/her recording before being allowed to continue to the next question.
- An indication that the chosen answer is incorrect and a prompt for the user to try again.

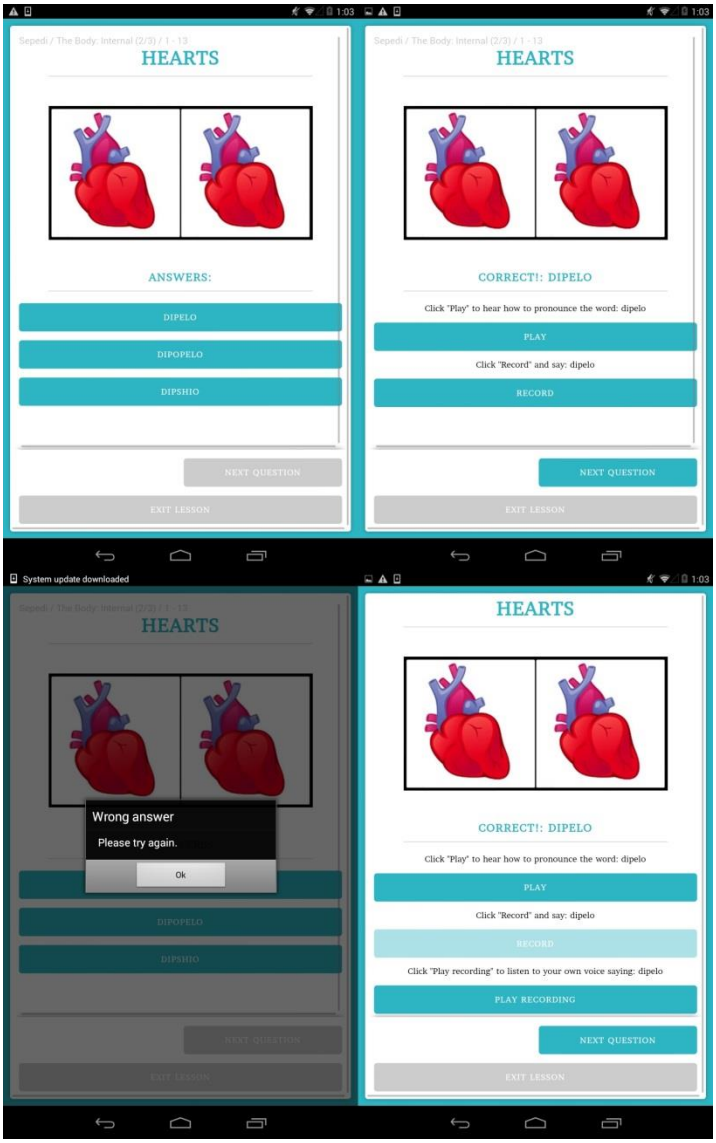


Figure 3.5: Screenshots of the Speak application

### 3.2.3. Application development

Three mobile applications were designed and developed to conduct the user experience study. The applications were developed in collaboration with Geckotech[2], a third party software developer. The technical specifications for the applications are summarised in Table 3.1. The applications were designed for mobile devices running the Android operating system, Version 4 and later. The devices used in the study were Asus Google Nexus 7 tablets.

[2] https://www.geckotech.nl/

Table 3.1: Technical specifications for the applications

| Technical specifications | |
|---|---|
| Operating system | Android |
| Version | 4 or later |
| Devices | Asus Google Nexus 7 |
| Device screen size | 7 inch |

### 3.2.4. Content management system

A content management system (CMS) is an online platform that is used to upload the content in the form of lessons for distribution across a number of devices. The CMS was developed and is hosted by Geckotech, the same software developer that developed the applications.

The functionality of the CMS is illustrated by the diagram in Figure 3.6. On the CMS, an administrator can create modules (for example Sepedi), and in these modules lessons and questions can be created. Each module can have many lessons, and each lesson can have many questions.

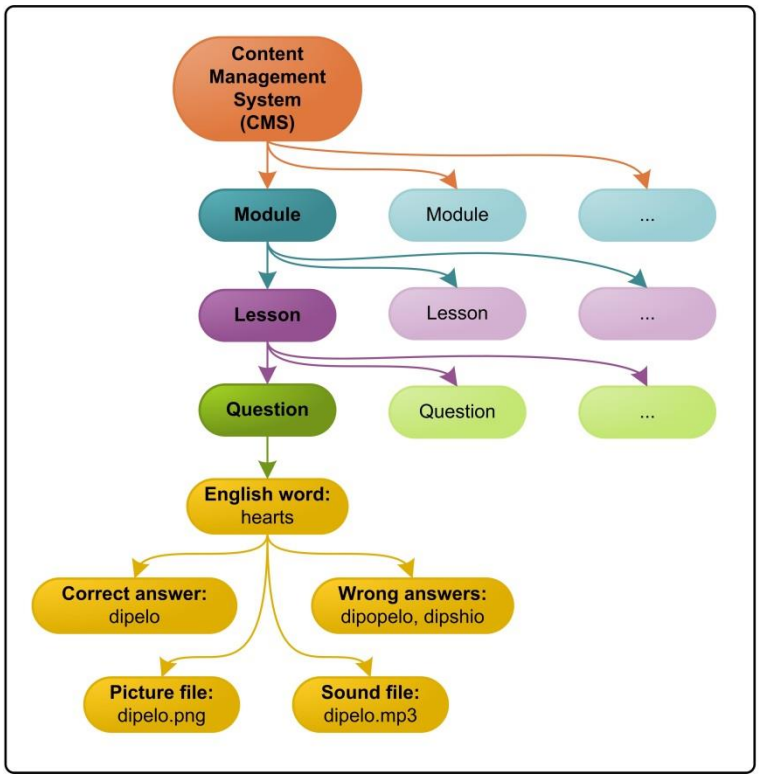


Figure 3.6: An overview of the CMS

Figure 3.7 shows how a module with lessons and questions is created, as well as what is needed for each field.

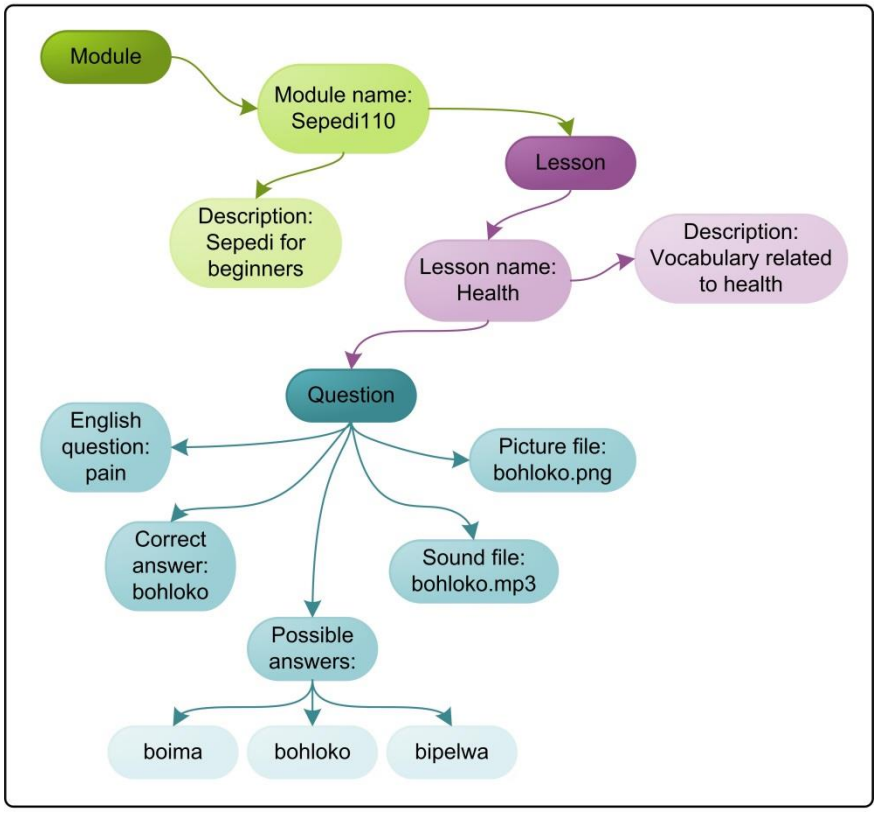


Figure 3.7: A module with lessons and questions

To create a module, the information needed is the module name and a description of the module, for example:

- Module: Sepedi 110
- Description: Sepedi for beginners

To create a lesson, the information needed is the lesson name and a description of the lesson, for example:

- Lesson: Health
- Description: Vocabulary related to health

The information needed to create a question is the question in English, the correct Sepedi answer, three possible Sepedi answers (of which one must be the correct answer) separated by two commas, an audio file (in .mp3 format) and a picture file (in .png format), for example:

- English question: pain
- Correct Sepedi answer: bohloko
- Possible answers: boima,,bohloko,,bipelwa
- Picture file: bohloko.png
- Audio file: bohloko.mp3

The Sepedi module with all the lessons and questions was uploaded to the CMS manually. This was a time-consuming task and was completed over the course of one week.

### 3.2.5. Content

The content that was used in the applications consisted of a vocabulary list, recordings of pronunciations of the words in the vocabulary list and matching pictures. The content was used to create lessons and the lessons were then uploaded manually using the CMS.

#### 3.2.5.1. Vocabulary

The vocabulary used for the applications was taken from the vocabulary list in the study guide of the Sepedi 110 module. The vocabulary list was originally divided into subsections relevant to the different disciplines within the health sciences, like dietetics, radiology, nursing, etc. However, since there is a sizeable overlap in the vocabulary utilised for the different disciplines, no such differentiation was catered for. After having removed all duplicates, the content was organised into new categories: *The Body: External*, *The Body: Internal*, *Objects and People*, *Nutrition* and *Health*. The new categories were chosen so that during the intervention, all the students could participate in and complete lessons relevant to their own studies. The categories also exposed them to other Sepedi words they might come across during their encounters with Sepedi speaking patients.

The English and Sepedi vocabulary list consisted of 336 words for each language, 317 unique words for English and 333 unique words for Sepedi, as shown in Table 3.2.

Table 3.2: Number of words in the vocabulary list

| Number of words | Number of unique words (English) | Number of unique words (Sepedi) |
|---|---|---|
| 336 | 317 | 333 |

The total number of words differs for each category and is shown in Table 3.3. The totals range, for example, from 36 words in the category *The Body: Internal* to 91 words in the category *Objects and People*.

Table 3.3: Number of words per category

| Category | Number of words |
|---|---|
| Health | 42 |
| Nutrition | 81 |
| Objects and People | 91 |
| The Body: External | 86 |
| The Body: Internal | 36 |

#### 3.2.5.2. Sound recordings

Audio versions of the target utterances were produced by a female Sepedi speaker. The recordings were done in a quiet room using Adobe Audition 1.5 with a sample rate of 44.1 kHz. The words were recorded in batches of 15 words per session over a period of four days. The fourth day was used to re-record words that were not recorded in a satisfactory manner during the first three days.

The same program was then used to edit the audio files to remove any noise and to segment the long audio files into single word audio files. The files were all normalised to ensure the same average volume throughout. The original format of the audio files was .wav, but had to be changed to .mp3 to be compatible with the CMS of the applications.

#### 3.2.5.3. Pictures

Appropriate pictures were identified in the Shutterstock catalogue. Pictures were carefully selected to match the content that was used in the applications. The pictures were then purchased by the Council for Scientific and Industrial Research (CSIR).

All the pictures were resized to 100kb or less and converted to .png format if needed. Some pictures were also duplicated to create pictures for the plural form of words and/or cropped and partially coloured. The pictures were edited using Fotor and PhotoScape photo editing software that is freely downloadable from the Internet. Examples of the changes made to some pictures can be seen in Figures 3.8, 3.9 and 3.10.

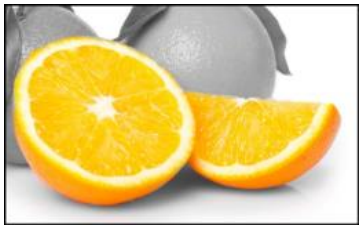

Figure 3.8: A cropped and partially coloured picture to indicate a word in the singular form

Figure 3.9: A duplicated picture to indicate a word in the plural form

Figure 3.10: An edited picture. An indicator was added to highlight a certain area on the picture

### 3.2.5.4. Lesson design

Each category was divided into several lessons so that users could complete lessons timeously and to keep them engaged. Table 3.4 indicates the number of lessons per category, as well as the number of words per lesson. The researcher decided that the maximum number of lessons per category should not be more than six. This, in turn, kept the maximum number of words per lesson to no more than 17.

Table 3.4: Number of lessons per category and number of words per lesson

| Category | Number of lessons | Number of words per lesson |
|---|---|---|
| Health | 3 lessons | 1. 14 words<br>2. 14 words<br>3. 14 words |
| Nutrition | 5 lessons | 1. 17 words<br>2. 16 words<br>3. 16 words<br>4. 16 words<br>5. 16 words |
| Objects and People | 6 lessons | 1. 16 words<br>2. 15 words<br>3. 15 words<br>4. 15 words<br>5. 15 words |
| The Body: External | 6 lessons | 1. 16 words<br>2. 14 words<br>3. 14 words<br>4. 14 words<br>5. 14 words<br>6. 14 words |
| The Body: Internal | 3 lessons | 1. 13 words<br>2. 13 words<br>3. 10 words |

The lessons were constructed in tables using Microsoft Excel, as indicated in Table 3.5. The *Question* field contains the English word for which the Sepedi translation must be chosen. The *Answer* field contains the correct Sepedi translation for the English word. The *Incorrect Answers* field contains the two incorrect Sepedi translations for the English word. The

incorrect answers were manually selected so that all three possible answers sounded or looked almost similar, or had almost similar meanings, to add a degree of difficulty to the lessons. The *Sound File* and *Picture File* fields contain the file names of the matching sound and picture files for each question.

Table 3.5: An example of the item types found in each lesson, including questions, answers, sound files and picture files

| Question | Answer | Incorrect Answers | | Sound File | Picture File |
|---|---|---|---|---|---|
| problem | molato | metša | molwetši | molato.mp3 | molato.png |
| weigh | imela | imile | itšhidulla | imela.mp3 | imela.png |
| pain | bohloko | bipelwa | boima | bohloko.mp3 | bohloko.png |

## 3.3. In-house testing

Preliminary testing and debugging took place throughout the development phase of the study. The researcher tested the applications numerous times as well as during an in-house testing session.

### 3.3.1. Data collection

An in-house testing session was held with the staff of the Human Language Technology Research Group at the CSIR. The session was attended by 10 staff members. They tested all three applications and captured any technical problems, layout issues, etc., that they came across. The staff members also completed a questionnaire, which contained both qualitative and quantitative questions, on the three applications. It formed the basis of the questionnaire used during the intervention, which contained all the original questions from the staff questionnaire. The questionnaire used during the intervention also contained extra questions based on suggestions made by staff members during the testing session.

### 3.3.2. Results

The staff members gave mostly positive feedback on the quality of the sound files. Some of their feedback contained suggestions on how to improve the applications. They suggested that a counter be added to all the applications to indicate the user's progress in a lesson. The reason for this suggestion was because it was unclear how many questions they had

already completed or how many questions still had to be answered before a lesson was completed. They also suggested that the pictures should be edited to better match the questions. This suggestion applied to the initial version of the pictures which were hand-made drawings. Some were unclear to staff members, especially when reference was made to body parts and facial features.

For the Listen application, the staff members proposed that users should be forced to listen to the example sound file at least once before continuing to the next question. Before the intervention, it was possible for users to continue to the next question without listening to the example pronunciation. This would cause the Silent and Listen applications to have no differential features.

For the Speak application, the staff members suggested that users should be forced to listen to the recording of their own pronunciation at least once before continuing to the next question so that they could compare it to that of a native speaker. In line with this, they also proposed that users be given an opportunity to re-record their pronunciation attempt, if their first or previous attempt was unsuccessful due to hesitation, background noise, etc., or if they just wanted to practise their pronunciation.

All the feedback received was acknowledged and its implementation explored. The changes that were feasible included adding a counter, editing the pictures, forcing the users to listen to the example pronunciation and their own pronunciation and giving them the option of re-recording their pronunciation. The changes were subsequently made to the applications.

After preliminary testing and the in-house testing session, and after the changes were made to the applications, debugging of the applications continued. The researcher also undertook intense testing and each lesson and question was carefully tested to eliminate any technical and/or human errors.

### 3.4. The intervention

The intervention involved the usage of the applications by target users over a period of time, including a written pre- and post-test. After using the applications for nine weeks, the users completed a questionnaire in which they rated their experience with the applications and gave feedback on the intervention and the applications in general.

#### 3.4.1. Research study participants

Undergraduate students from certain schools in the Faculty of Health Sciences at the University of Pretoria are required to complete an African language module during either their first or third year of study. They have a choice between Sepedi and Zulu. Health science students enrolled for the Sepedi 110 module were chosen as possible participants for the study. Eighty students were enrolled for the Sepedi 110 module in the second semester of 2015. The students were informed about the planned intervention and all planned activities were explained to them. The students were given an opportunity to decide whether or not they would like to participate, after which 36 students volunteered to participate in the study.

#### 3.4.2. Survey instrument

The survey instrument used in the study was a questionnaire covering all three applications. The questionnaire included both qualitative and quantitative questions and was used to determine how the students experienced the applications. The questionnaire consisted of four main sections, namely, General, Silent application, Listen application and Speak application. Each section, as discussed below, aimed to collect specific information about certain parts of the applications and the intervention. This questionnaire is based on the questionnaire used during the in-house testing session, as mentioned in Chapter 3, section 3.3.1., and a copy thereof is included in Appendix A.

A Likert scale with a score between one and five was used to measure the answers received from the quantitative questions in the questionnaire. The Likert scale was chosen to measure the students' attitudes towards the applications, with a scale ranging from strong disagreement to strong agreement.

#### 3.4.2.1. General

This section of the questionnaire included questions on:

- the users' general impression of the intervention;
- whether or not the applications were easy to use;
- what they liked most and least about the applications;
- what they would add to or remove from the applications;
- what they thought about the pictures; and
- whether they thought they acquired any vocabulary from using the applications.

The questions in the questionnaire that focused on the general aspect of the applications and intervention are Questions 1 to 12, 27 and 28. However, there were five important questions in this section directly related to the research questions for the study:

- Did you learn any Sepedi from the applications?
  - If you did, which application, in particular, helped with this?
- Would you use the applications if they formed part of the Sepedi 110 module?
  - If you would, which application(s) in particular? You may choose more than one.
- Would you recommend the applications to other students learning Sepedi?
  - If you would, which application(s) in particular?
- Which application did you prefer using? Indicate your preference with one score between 1 and 5.
- If the applications were made available on the Google Play Store, would you
  - Download them?
  - Pay for them?

#### 3.4.2.2. Silent application

Because the Silent application formed the basis of all the applications, the questions in this section of the questionnaire focused on the layout and user friendliness of the application. One question, in particular, focused on what skills the users thought they gained by using this application. The questions in the questionnaire that focused on the Silent application are Questions 13 to 15.

#### 3.4.2.3. Listen application

In this section of the questionnaire, the focus of the questions was on:

- the quality of the sound files used;
- whether or not the users liked to hear the pronunciation of a word;
- if they liked having the option to listen to the sound file more than once; and
- what skills they thought they gained by using this application.

The questions in the questionnaire that focused on the Listen application are Questions 16 to 19.

#### 3.4.2.4. Speak application

The focus of this section of the questionnaire was on whether or not the users liked to practise speaking and listening to the recording of their pronunciation, and if they found it useful or not. This section also included a question on what skills the users thought they gained by using this application, as well as whether or not they would like the application to provide feedback on their pronunciation of the words. The questions in the questionnaire that focused on the Speak application are Questions 20 to 26.

### 3.4.3. Data collection

Lectures for the Sepedi 110 module were scheduled once a week on a Thursday afternoon from 15:30 to 17:30. The lecturer of the module permitted the researcher to interact with the students every week for the last 30 minutes of the lecture. In these 30 minutes, the students used the applications at random and completed as many lessons as possible.

The intervention started on 3 September 2015 and ended on 29 October 2015. A total of five sessions over nine weeks took place during this period. At the end of the intervention, 20 students had used each application at least once and completed a questionnaire on their experience with the applications throughout the intervention. A copy of the questionnaire is included in Appendix A.

#### 3.4.3.1. Pre- and post-tests

During the planning stage of the study, it was assumed that the students had no previous knowledge of Sepedi. However, due to a delay in obtaining ethical clearance, the students had already had four weeks of lectures before the intervention started.

The researcher decided that the 36 participating students should complete a pre-test to test their Sepedi knowledge. The pre-test contained words from the vocabulary list in the Sepedi 110 study book, i.e., the words used in the applications. Students were exposed to at least some of the vocabulary during lectures preceding the intervention and while doing class exercises. The test was written on the first day of the intervention.

On the last day of the intervention, just before they completed the questionnaire, the students wrote the post-test. Only 34 students wrote the post-test, as two students were absent. The post-test was a replica of the pre-test so that an exact comparison could be made. Copies of the pre- and post-tests are included in Appendix C.

### 3.4.4. Challenges faced

The intervention was originally scheduled to run from 6 August 2015 to 5 November 2015. However, the following events caused the intervention dates to change to 3 September 2015 to 29 October 2015.

#### 3.4.4.1. Ethical clearance

The ethical clearance application was submitted in due time. However, because the study was conducted by a student from the Faculty of Humanities, but involved students from the Faculty of Health Sciences, additional permission had to be obtained from the Faculty of Health Sciences. This could only take place after permission from the Research Ethics Committee of the Faculty of Humanities had been obtained. This delayed granting of full ethical clearance and the start of the intervention was consequently delayed by one month.

#### 3.4.4.2. Sepedi 110 lecture time slot

The time slot of the Sepedi 110 lecture was a huge challenge. Lectures were scheduled from 15:30 to 17:30 every Thursday afternoon. This proved to be very problematic because the

students were tired and reluctant to remain behind after the lecture had ended to participate in a research project.

#### 3.4.4.3. Tests scheduled in lecture time

On one occasion, the students had to write a test during their lecture time. However, they left as soon as they had finished the test, and consequently before any application usage could take place. One intervention week was lost in this manner.

#### 3.4.4.4. University holiday

One of the lectures was originally scheduled in the week the university's holiday occurred. This resulted in the loss of one intervention week.

#### 3.4.4.5. Student protests

The 2015 #FeesMustFall student protests closed the campus for three days. As a result, one planned intervention session could not take place.

#### 3.4.4.6. Sepedi 110 examination date

The Sepedi 110 examination was originally scheduled to take place on 5 November 2015. However, the examination was rescheduled to 31 October 2015. This rescheduling caused the loss of one intervention week as well as the day the focus group discussion was scheduled to take place.

Due to all these events, the 14-week intervention that was originally planned was reduced to a five-week intervention over a period of nine weeks. Unfortunately, the data was not enough to perform statistical hypotheses tests; enough data was, however, collected to answer the research questions set in Chapter 1, Section 1.3.

### 3.4.5. Consent forms and response rate

Originally only one consent form for the study was compiled. However, the Research Ethics Committee of the Faculty of Humanities requested a separate consent form for the focus group discussion. This compelled the researcher to compile another consent form. Because

various aspects of the study, such as the procedures, benefits, participants' rights, etc., were identical for the intervention with the applications and the focus group discussion, the same consent form was used for both parts of the study. The title was the only dissimilarity. The consent forms are included in Appendix D.

The consent forms were compiled to provide as much information as possible about the study and therefore the study and the procedures to be followed were explained in detail. The role players that would benefit from the study were highlighted, and it was made clear that there would be no risks involved for anyone if a student decided to participate or not. Students were informed that their participation and the data they provide would remain strictly confidential and that anonymity would be guaranteed throughout the study. A section on how and where the data would be stored was also included. The students were informed about their rights as participants and that they may withdraw from the study at any time without any consequences. The consent form also stated that no student would be remunerated in any way for their participation. In total, 36 of the 80 students enrolled for the Sepedi 110 module volunteered to participate in the study and signed both consent forms.

## 3.5. Conclusion

This chapter discussed the research methodology followed in this study. More particularly, it described the design and development of the three applications, focusing on the features of the applications as well as the content used in the applications. The manner in which the content was sought and incorporated into lessons in the applications was also described. An in-house testing session held to test the applications provided valuable feedback, and important changes were made to the applications. The intervention with the students was also discussed in detail, including the study participants, the survey instrument and data collection process, the response rate and the challenges faced. Chapter 4 will discuss the results of the intervention in terms of the questionnaire and pre- and post-tests completed by the students.

# CHAPTER 4

# DATA ANALYSIS

## 4.1. Introduction

The purpose of this study was to determine whether students perceive mobile-assisted language learning (MALL) applications as being useful to acquire vocabulary in Sepedi for health care related purposes. It also aimed to establish if students have a clear preference for a specific MALL application. This was achieved by letting the students complete a questionnaire after having been given access to three MALL applications during a nine-week period. A pre- and post-test was also written to test the students' Sepedi knowledge. A copy of the results of the questionnaire and the pre- and post-tests is included in Appendices E and F, respectively.

## 4.2. The intervention

After using all three applications over a nine-week period, the students completed a questionnaire on the intervention and the applications. This comprised four main sections: General, Silent application, Listen application and Speak application. A question on the students' preferences was also included. The questionnaire was completed by 20 students.

### 4.2.1. Results

The feedback received from the questionnaire is summarised and discussed below. A copy of all the results is included in Appendix E.

#### 4.2.1.1. General

This section's questions focused on the applications and the intervention in general. Question 1 determined that the students' impression of the applications was largely positive. In total, 40% of the students said they liked the intervention very much and 45% felt extremely positive about the applications (Question 3). Overall, 80% thought the

applications were very easy to use (Question 2) and 42% liked the pictures very much (Question 8).

The students were asked what they liked the most about the applications in Question 4. A representative selection of the feedback received is given below:

Student 1: "I liked the apps that had voices to give me the way to pronounce the word."

Student 3: "Has options – helps you."

Student 4: "Picture with the word, help to remember it better."

Student 5: "The words are very well suited to the health sciences career pathway. Also, the colour themes were colourful and attention grabbing."

Student 6: "The pictures + words + correction + pronunciation."

Student 11: "That there is subjects related to the medical field, because I will be able to use them at work."

Student 12: "Pictures of what is being asked"

Student 14: "When words = pronounced → nice to hear."

Student 18: "I liked the listening to the words because it gave an idea of how the words needed to be pronounced."

The students were asked what they liked the least about the applications in Question 5. A representative selection of the feedback received is given below:

Student 4: "Listen to own recording."

Student 9: "The recording app we had to rely our own voice before continuing → time consuming"

Student 14: "That you need to record yourself but no feedback on if it was [correct]/[incorrect]"

Student 18: "I did not like the fact that you had to record yourself and listen to it, no option was given."

Student 20: "The recording. I don't like hearing myself."

Most students answered “nothing” when asked in Question 6 what they would add to the applications. However, some students did make a few suggestions, like adding a small tutorial at the beginning of the applications, enlarging the font on the applications and adding sentences to the lessons.

The majority of the students again answered “nothing” when asked in Question 7 what they would change or remove from the applications. However, some students did suggest changing the time it takes for the application to record a user. This is because some words take less/more time to pronounce than others, thus causing the user either to wait or to rush through the recording.

When asked in Question 9a if they would recommend the applications to other students learning Sepedi, 68% of the students answered they definitely would, with only 11% answering that they possibly would. The students were also asked in Question 9b to indicate which application, in particular, they would recommend to other students. The Listen application was nominated as the favourite with 50% compared to 25% each for the Silent and Speak applications. These answers are summarised in Figure 4.1.

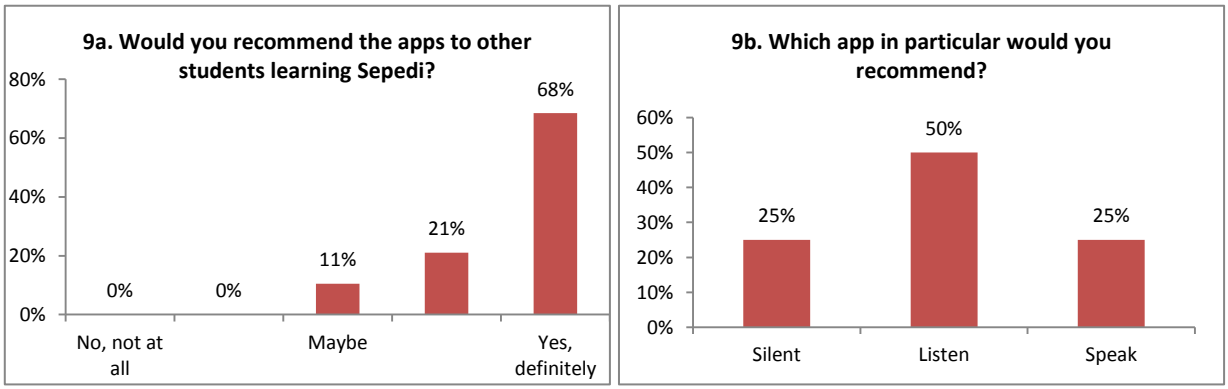


Figure 4.1: Feedback on Question 9

When the students were asked in Question 10a if they would use the applications if they formed part of the Sepedi 110 module, 58% of them answered that they would use them a lot, with only 16% answering that they possibly would. The students also indicated which application, in particular, they would prefer using in the module (Question 10b). Once again the Listen application came out as the favourite with 39% compared to 29% for the Silent application and 32% for the Speak application. These answers are summarised in Figure 4.2.

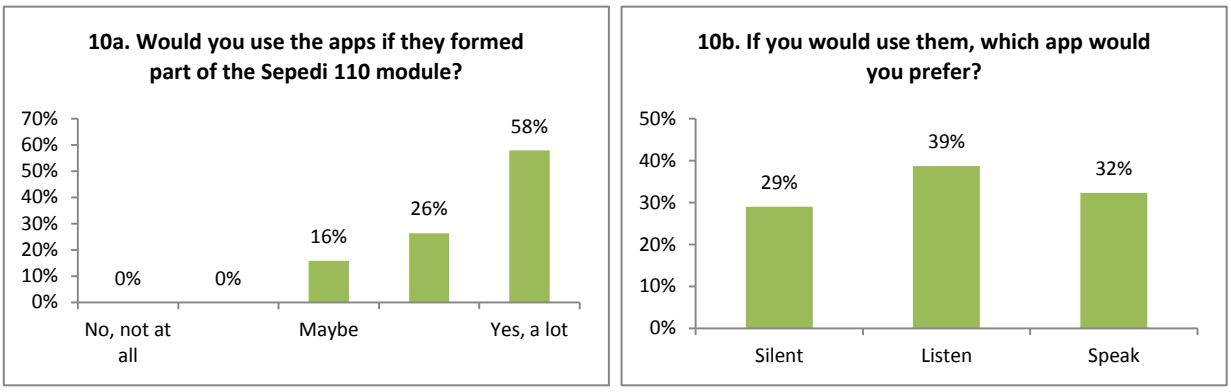


Figure 4.2: Feedback on Question 10

Question 11a asked the students to indicate whether they learned some Sepedi by using the applications. Only 10% of the students were of the opinion they learned a lot, but 50% thought that they learned a little bit of Sepedi from using the applications. The students who felt they learned some Sepedi then had to choose which application helped them the most (Question 11b). The Listen application received 50% of the votes, with the Silent and Speak applications receiving 15% and 35%, respectively. These answers are summarised in Figure 4.3.

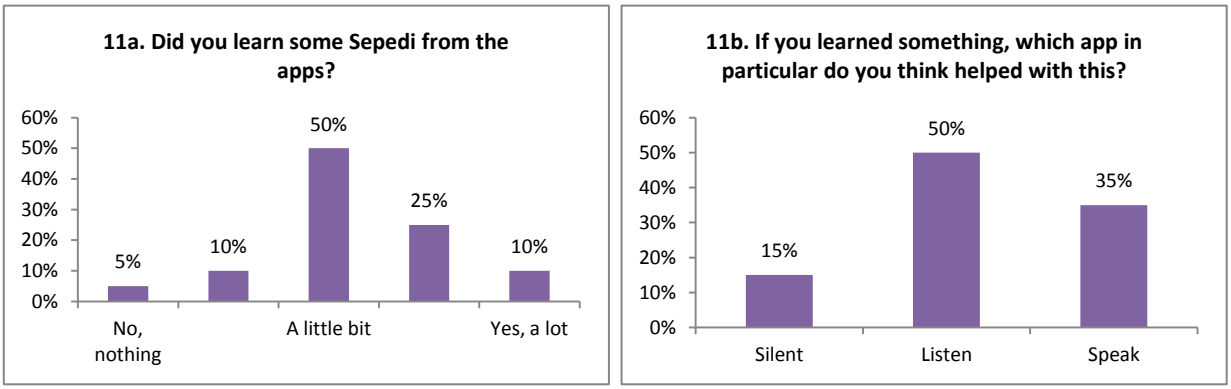


Figure 4.3: Feedback on Question 11

In Question 27 the students were also asked two questions about the applications and their availability on the Google Play Store. Seventy percent of the students said they would download the applications if they were made available on the Google Play Store (Question 27a), but only 5% said that they would definitely pay for them (Question 27b). These answers are summarised in Figure 4.4.

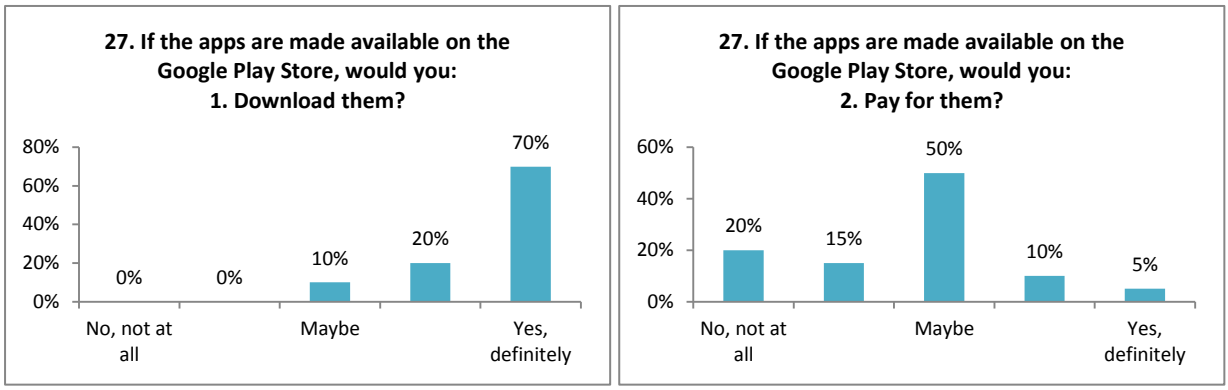


Figure 4.4: Feedback on Question 27

#### 4.2.1.2. Silent application

Because the Listen and Speak applications are extensions of the Silent application, a question on the user friendliness of the applications in general was added to this section (Question 13). In terms of the layout of the applications, 60% of the students chose the 'very user-friendly' option. They felt that the Silent application helped them with their Sepedi skills and 36% of the students selected vocabulary in Question 15 as the skill they thought benefited them most using the application.

#### 4.2.1.3. Listen application

When asked in Question 16 if they liked hearing the correct pronunciation of the word immediately after getting an answer correct, 70% of the students said they liked it very much. The students also had the option to listen to the pronunciation as many times as they liked, and 65% said they liked that very much, too when answering Question 17. The students also gave positive feedback in Question 18 on the quality of the audio files used in the applications, with 60% of the students rating the quality as excellent. The students felt that the Listen application helped them with their Sepedi skills, with 29% of the students selecting pronunciation in Question 19 as the skill they thought benefited them most from using the application.

#### 4.2.1.4. Speak application

The students did not have strong positive or negative opinions of the Speak application. The results of Question 20 show that 30% of the students liked being able to practise speaking, but 30% also found it just okay. In total, 10% of the students found it less than okay, with 5% not liking it at all. The results are shown in Figure 4.5. Even though most of the students did not like speaking to the application, 25% found speaking their answers very useful and 70% found it either okay or between okay and very useful (Question 21).

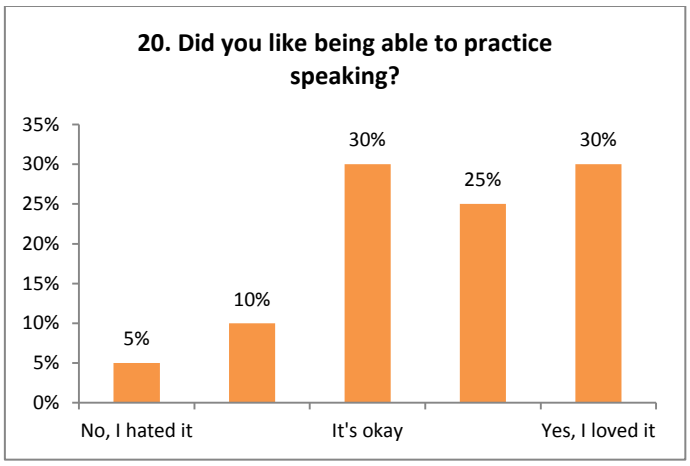


Figure 4.5: Feedback on Question 20

As indicated in Figure 4.6, 70% of the students would like it very much if the application could give them feedback on their pronunciation (Question 22). They did not, however, really like to listen to their own pronunciation (Question 23). Forty percent found it okay with only 20% liking it very much. Nevertheless, 70% of the students think the Speak application can assist with improving their pronunciation (Question 25). The students felt that the Speak application helped them with their Sepedi skills, with 31% of the students selecting speaking in Question 26 as the skill they thought they benefited from most using the application.

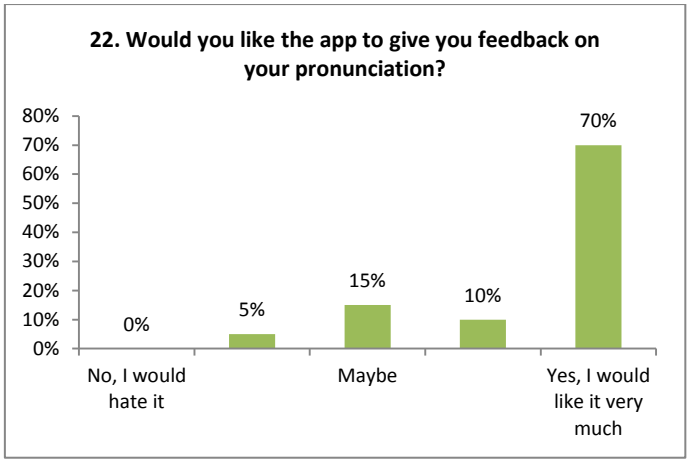


Figure 4.6: Feedback on Question 22

#### 4.2.1.5. Preference

The last question of the questionnaire (Question 28) asked the students to indicate which application they preferred to use. They had to rate the applications between 1 and 3, with 1 being the most preferred. The majority of the students rated all the applications as requested, but a few students rated all the applications as either their first choice or only rated one application. These students' actions did not disqualify them from the study and their results were still included, because ratings were still provided. It can be argued that these students imagined using the three applications in different scenarios, where each application would be most suitable for a specific scenario. Or, the students simply had a strong preference to one application and did not want to rate the other two applications.

Thirty-nine percent of the students rated the Listen application as their first preference. The Silent application was second with 35% and the Speak application was third with 26%. For the second preference, 41% of the students once again chose the Listen application. The Speak application was second with 35% and the Silent application was third with 24%. Forty-four percent of the students chose the Speak application as their third preference, followed by the Silent application with 39% and the Listen application with 17%. The results are shown in Figures 4.7, 4.8 and 4.9.

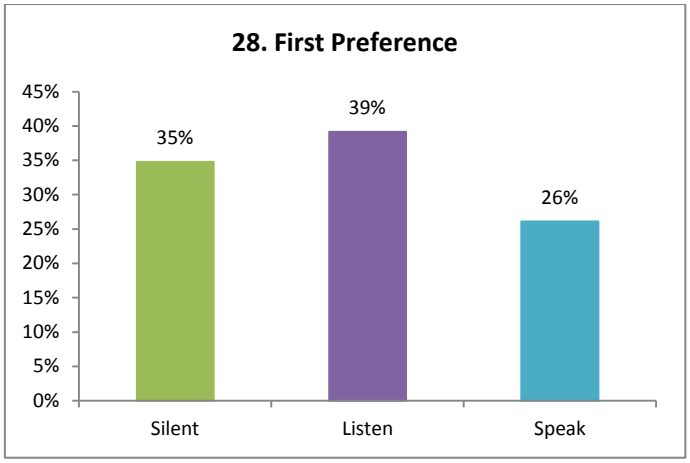


Figure 4.7: Results: First preference

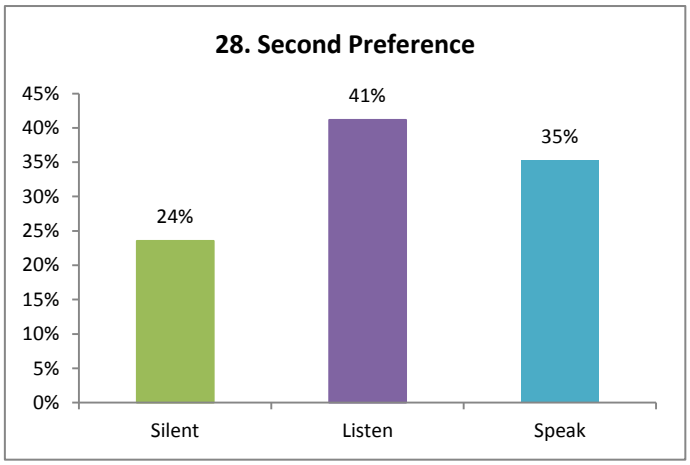


Figure 4.8: Results: Second preference

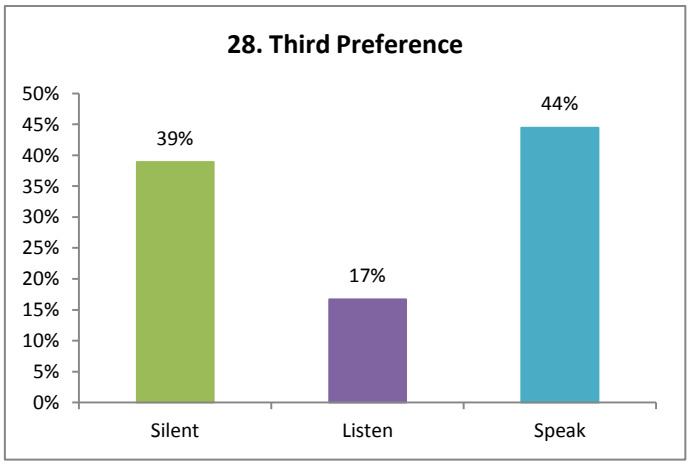


Figure 4.9: Results: Third preference

Some of the students commented on their choice of preferences. Their choices and comments are listed in Table 4.1.

Table 4.1: Preferences and comments

| Student | Rating | Comment |
|---|---|---|
| Student 1 | Speak - 1 | "Helps me to see how I pronounce words." |
| Student 2 | Speak - 1 | "Targets most of the skills at once." |
| Student 4 | Silent - 2 | "Helped with the pictures." |
| | Listen - 1 | "It helped to learn the words" |
| | Speak - 3 | "Did not like to listen to my own voice." |
| Student 5 | Listen - 1 | "The listen one gives you an advantage over just reading the words, but you don't have to record your voice." |
| Student 7 | Silent - 3 | "It only helps with vocab and grammer." |
| | Listen - 1 | "Helps with pronounciation as well." |
| | Speak - 2 | "Bit self-concious about pronouncing, but will be best app as it is seeing, hearing and speaking the word." |
| Student 8 | Silent - 2 | "This is effective if you want to use it in the library where it is quite." |
| | Listen - 3 | "It's boring to only listen and not speak back." |
| | Speak - 1 | "You learn to pronunciate as well as understand it better." |
| Student 16 | Silent - 3 | "I tended to guess answers." |
| | Listen - 1 | "It helped to hear correct pronunciation while seeing the word." |
| | Speak - 2 | "Including speech while reading is a good way to commit to memory" |
| Student 18 | Silent - 3 | "It sort of became a guessing game" |
| | Listen - 1 | "It helped to listen to the words" |
| | Speak - 2 | "Could listen to it, record yourself and then compare it." |
| Student 19 | Silent - 3 | "Only help by improving reading." |
| | Listen - 1 | "Help by improving reading, understanding" |
| | Speak - 1 | "Help by improving understanding, pronunciation, reading" |

### 4.2.2. Research questions

In this section, the results mentioned above will be discussed with reference to the research questions and hypotheses posed in Chapter 1, Section 1.3.

#### 4.2.2.1. Do students perceive MALL applications as being useful to acquire vocabulary in Sepedi for medical application purposes?

The feedback received from the questionnaires with regard to the usefulness of the applications was overall very positive. Usefulness in this context can be defined as whether or not the students perceived the applications as useful supplementary tools when learning

Sepedi. However, the analysis of the questionnaire results showed that insufficient data was collected to statistically accept or reject the four hypotheses (H). The hypotheses were consequently represented as *expected outcomes* (EO).

***EO1: The students are of the opinion that the applications assisted them with acquiring Sepedi vocabulary.***

In total, 85% of the students were of the opinion that they learned some Sepedi vocabulary with the applications. They also gave a strong indication that the Listen application helped them the most with this task.

***EO2: The students would use the applications if they formed part of the Sepedi 110 module.***

Almost two-thirds (58%) of the students indicated that they would definitely use the applications if they formed part of the Sepedi 110 module and 39% of them would choose to use the Listen application above the other applications.

***EO3: The students would recommend the applications to other students in the Health Sciences.***

More than two-thirds (68%) of the students indicated that they would definitely recommend the applications to other students learning Sepedi in the Health Sciences and half of them (50%) would recommend the Listen application above the other applications.

#### 4.2.2.2. Do students have a clear preference for a specific MALL application?

***EO4: The students do not have a clear preference for a particular application and will use any application to acquire Sepedi.***

All the results indicated that the students have a clear preference for the Listen application. When asked to rate the applications according to their preference, the students selected the Listen application as their first preference. The Listen application was again the favourite as their second preference, but their third preference was the Speak application.

### 4.3. Pre- and post-tests

As mentioned in Chapter 3, Section 3.4.3.1., the students also wrote pre- and post-tests to test their Sepedi knowledge before and after the intervention. As previously stated, the focus of the study was not to measure effectiveness. Given that the students only used the applications five times during a period of nine weeks instead of 14 weeks as originally planned, the application was not expected to make a substantial impact in terms of vocabulary acquisition. A copy of the results from the pre- and post-tests is included in Appendix F.

#### 4.3.1. Results

The average mark achieved in the pre-test was 17.8%. Only two students achieved a mark between 30-40%, with the highest mark being 33.3%. The other 34 students achieved marks of less than 30%. These marks could either be the result of the students not yet being familiar with the vocabulary in the module or because the four weeks of lectures they had already attended had not been enough. The pre-test results were grouped into percentage intervals and are shown in Figure 4.10.

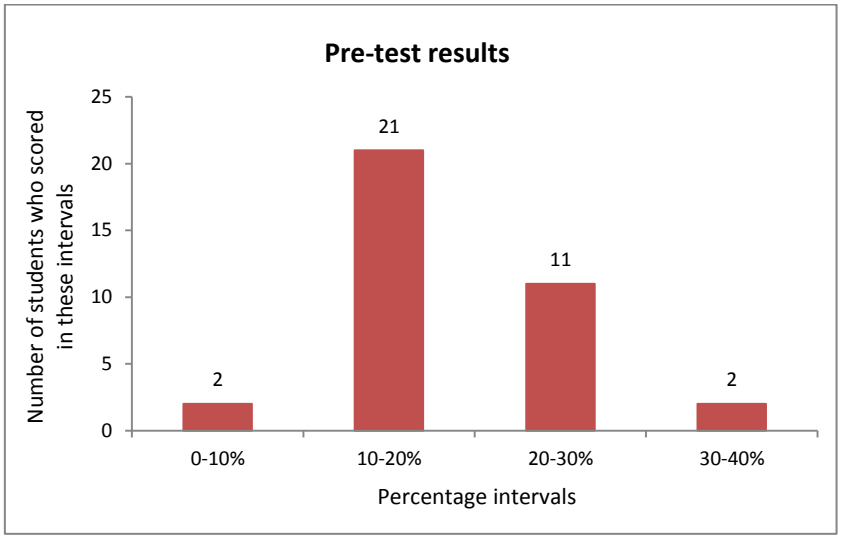


Figure 4.10: Pre-test results

Two students were absent on the day the post-test was written and that was taken into consideration when the average score was calculated. The average mark achieved in the post-test was 25.6%. This shows a mere increase of 7.8% from the average mark achieved in the pre-test. This is not significant, but it should be noted that there was an overall increase in the marks achieved by 27 students, with the highest scoring student achieving a mark of 75%. Also, four students scored between 30-70%, with only 29 students achieving a mark less than 30%. The post-test results were grouped into percentage intervals and are shown in Figure 4.11.

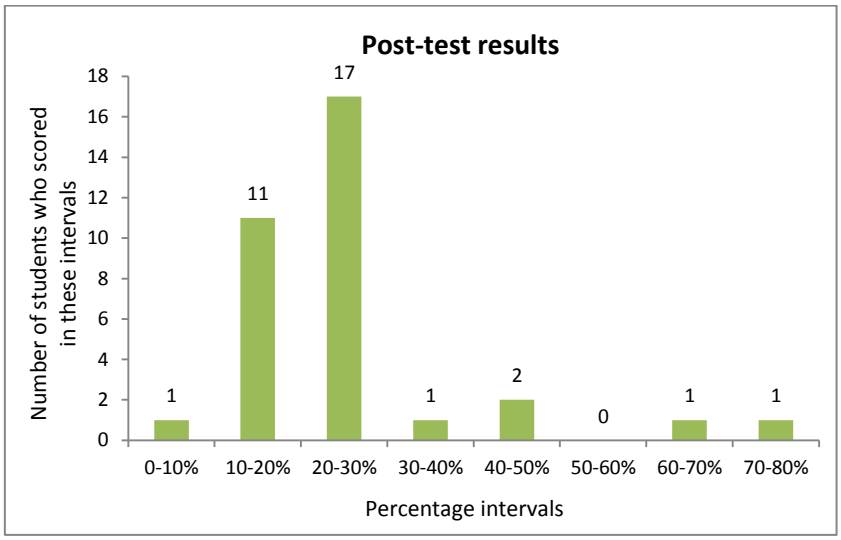


Figure 4.11: Post-test results

As indicated, there was only a slight improvement in the results. The number of times the students used the applications was not enough to measure the applications' effectiveness and therefore it is believed that the improvement is due to the students attending lectures throughout the semester and not because they used the applications. No further remarks on the effectiveness of the applications will be made since this was not the focus of the study.

## 4.4. Conclusion

The results and feedback received from the questionnaires indicate that the students enjoyed the applications and that they perceived them to be useful as a supplementary tool for learning Sepedi. The students also indicated that the Listen application was their firm

favourite and that they would prefer to use it if the applications were to form part of the Sepedi 110 module. They would also recommend the Listen application to other students learning Sepedi in the Health Sciences. The results of the post-test show a slight improvement over the results of the pre-test. The difference is not significant and no definite reason for this improvement can be given, but it could probably be ascribed to lecture attendance.

# CHAPTER 5

# CONCLUSION

## 5.1. Introduction

This study investigated the user experience of students who used mobile applications as supplementary tools for Sepedi vocabulary acquisition. The user experience study was conducted by designing and developing three mobile applications for Sepedi vocabulary acquisition for medical purposes, and then providing students with the opportunity to use the applications.

The context and the purpose of the study, as well as the research questions and hypotheses are presented in Chapter 1. The chapter also gives a brief overview of the scope of the study and provided an outline of the dissertation.

Chapter 2 consisted of a review of the literature related to this study. Some of the sections discussed include applied linguistics, additional language acquisition, healthcare in South Africa, language for specific purposes, multilingual communication and mobile-assisted language learning (MALL).

A description of the methods that were followed to conduct the study was provided in Chapter 3. The design and development of the three mobile applications, as well as the content used for the applications, were discussed. The intervention in terms of the study participants, the survey instrument, the data collection process and the challenges faced was also addressed in Chapter 3.

An analysis of the collected data was presented in Chapter 4. The results were observed as being positive and were discussed in line with the research questions. It was determined that insufficient data was collected to accept or reject the hypotheses and the hypotheses were thus represented as expected outcomes.

This chapter summarises the findings of the study in line with the research questions and expected outcomes. Recommendations for future research on this topic are also given.

## 5.2. Summary of findings

The purpose of this study was to determine whether students would perceive mobile applications as being useful supplementary tools to acquire Sepedi vocabulary for medical purposes, and if they had a clear preference for a specific application.

Students from the Faculty of Health Sciences at the University of Pretoria, who were enrolled for the Sepedi 110 module, were chosen as candidates to participate in the study. A total of 80 students were enrolled for the module, but only 36 volunteered to participate. At the end of the intervention, only 20 students participated in all the sub-components of the study, using all three applications and answering a questionnaire on their experience with them.

The questionnaire was designed to answer the research questions posed in Chapter 1, Section 1.3. by means of accepting or rejecting the hypotheses. Even though the original hypotheses were changed to expected outcomes (as discussed in Chapter 4, section 4.2.2.1), it was still possible to answer both research questions successfully.

The expected outcomes were:

- The students are of the opinion that the applications assisted them with learning Sepedi vocabulary.
- The students would use the applications if they formed part of the Sepedi 110 module.
- The students would recommend the applications to other students in the Health Sciences.
- The students do not have a clear preference for a particular application and will use any application to learn Sepedi.

The results analysed in Chapter 4, Section 4.2.1. confirmed three of these expected outcomes. The students were of the opinion that the applications assisted them with learning Sepedi, with 85% believing they had learned something. Almost two-thirds (58%) of the students would use the applications if they formed part of the Sepedi 110 module, but they would not pay for the applications. About two-thirds (68%) of the students would recommend the applications to other students learning Sepedi. An unpredicted result, though, was that the students did indeed have a clear preference for a particular application. A total of 39% of the students chose the Listen application as their first preference. This was supported throughout the questionnaire when students had to choose an application in the sub-questions. The Listen application was always in the majority as the students' application of choice.

Based on the results of the expected outcomes, it is possible to answer the research questions that were posed at the beginning of the investigation:

i. *Do students perceive MALL applications as being useful to acquire vocabulary in Sepedi for medical application purposes?*

The students clearly perceived the MALL applications used in this study as useful to acquire vocabulary in Sepedi for medical purposes, because they were of the opinion that they learned some Sepedi vocabulary by using the applications. They would use the applications if they formed part of the Sepedi 110 module and would recommend the applications to other students learning Sepedi.

ii. *Do students have a clear preference for a specific MALL application?*

The students showed a strong preference for the Listen application over the Silent and Speak applications.

## 5.3. Suggestions for future research

The applications used for this study were technologically very basic. This option was chosen to collect honest feedback from students about using applications for language learning without the performance of the technology influencing their opinions.

In the questionnaire, the students indicated that they liked listening to the pronunciation of the words after getting an answer right when using the Listen and Speak applications. The students also indicated that they would like the Speak application to provide them with feedback on their own pronunciation of the words. The following are examples of future research that could be conducted:

- Since the recording of example pronunciations are time-consuming and expensive, a suggestion is that the pre-recorded audio in the Listen and Speak applications be replaced by text-to-speech (TTS) generated sound files. Sound files of all the existing words, phrases and sentences can be produced by means of TTS. By using TTS, new words, phrases and sentences can be added at any time, saving time and money because it is not necessary for a first language speaker to record example pronunciations.
- Automatic speech recognition (ASR) can be incorporated into the Speak application to give immediate feedback to the students regarding their pronunciation of Sepedi words. This might allow students not to listen to their own voices when recording their pronunciations, as pronunciation feedback will be automated and a user will be prompted to try again should their pronunciation be incorrect.
- When a study like this is repeated, a test group and control group can be used to determine the true effect the applications have on the students' vocabulary acquisition. The use of the applications can be divided into two interventions, one for each group. A retention test can also be written after the interventions to determine to what degree the students retain newly acquired vocabulary items.
- The content used in the applications can be expanded to include sentences and basic grammar rules, which would allow the students to use the vocabulary they learn in a meaningful context.
- It would also be of huge value if the interventions can take place for a full semester, once again increasing the possible impact of the applications on the students' vocabulary acquisition.

## 5.4. Conclusion

This chapter provided an overview of the dissertation, as well as a summary of the results of this study and recommendations for future research. The students who participated in the study were overall positive about the intervention with the applications. This observation confirms that the potential for using mobile applications as supplementary tools in vocabulary acquisition does indeed exist, and can be recommended and even improved to make it more user-friendly.

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# APPENDICES

# APPENDIX A

## Questionnaire

100 1908 - 2008
UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

**FACULTY OF HUMANITIES**
**Department of African languages**

# QUESTIONNAIRE

as part of the MA study

## A Language Application for Health Science Students: a Study on User Experience

Student number: _____

Date: _____

*Estimated completion time: 30 minutes*

**SECTION 1: GENERAL**

1. Overall, what is your impression of the intervention with the apps?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| I didn't like it at all | | It was okay | | I liked it very much |
| *Explain your answer here:* | | | | |

2. Were the apps easy to use?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| No, not easy at all | | It's okay | | Yes, very easy |
| *Explain your answer here:* | | | | |

3. Did you like the apps?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| I hated it | | It's okay | | I loved it |
| *Explain your answer here:* | | | | |

4. What did you like the most about the apps? Why?

_____

_____

5. What did you like the least about the apps? Why?

_____

_____

6. What would you add/improve? Why?

_____

_____

7. What would you change/remove? Why?

_____

_____

8. What did you think of the graphics?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| I didn't like the graphics at all | | It's okay | | I liked the graphics very much |
| *Explain your answer here:* | | | | |

9. Would you recommend the apps to other students learning Sepedi?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| No, not at all | | Maybe | | Yes, definitely |
| Which app in particular?<br>Silent ☐ Listen ☐ Speak ☐<br>*Explain your answer here:* | | | | |

10. Would you use the app if they formed part of the Sepedi 110 module?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| No, not at all | | Maybe | | Yes, a lot |
| If you would use them as part of the Sepedi 110 module, which app(s) would you prefer to use? You may choose more than one.<br>Silent ☐ Listen ☐ Speak ☐<br>*Explain your answer here:* | | | | |

11. Did you learn any Sepedi from the apps?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| No, nothing | | A little bit | | Yes, a lot |

If you learned something, which app in particular do you think helped with this?

| Silent | | Listen | | Speak | |
|---|---|---|---|---|---|

*Explain your answer here:*

12. Please mark all that apply. The apps helped me to improve my Sepedi skills in:

12.1. ☐ Vocabulary

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| The apps didn't help at all | | The apps helped a little bit | | The apps helped a lot |

12.2. ☐ Grammar

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| The apps didn't help at all | | The apps helped a little bit | | The apps helped a lot |

12.3. ☐ Reading

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| The apps didn't help at all | | The apps helped a little bit | | The apps helped a lot |

12.4. ☐ Understanding

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| The apps didn't help at all | | The apps helped a little bit | | The apps helped a lot |

12.5. ☐ Speaking

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| The apps didn't help at all | | The apps helped a little bit | | The apps helped a lot |

12.6. ☐ Pronunciation

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| The apps didn't help at all | | The apps helped a little bit | | The apps helped a lot |

**SECTION 2: SILENT APP**

13. What did you think of the layout of the app in terms of user friendliness?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| It is not at all user friendly | | It's okay | | It's very user friendly |
| *Explain your answer here:* | | | | |

14. What else would you like to see in the app?

_____

_____

15. The SILENT app helped me to improve the following Sepedi skills. Please mark all that apply.

- ☐ Vocabulary
- ☐ Grammar
- ☐ Reading
- ☐ Understanding
- ☐ Speaking
- ☐ Pronunciation

**SECTION 3: LISTEN APP**

16. Did you like hearing the correct pronunciation of the word/phrase immediately after getting an answer correct?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| No, not at all | | It's okay | | Yes, I liked it very much |
| *Explain your answer here:* | | | | |

17. After listening to the pronunciation of the word, did you like having the option of listening to the pronunciation as many times as you like?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| No, not at all | | It's okay | | Yes, I liked it very much |
| *Explain your answer here:* | | | | |

18. What did you think of the quality of the sound clips that pronounced the words and phrases?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| The quality was horrible | | It's okay | | The quality was excellent |
| *Explain your answer here:* | | | | |

19. The LISTEN app helped me to improve the following Sepedi skills. Please mark all that apply.

- ☐ Vocabulary
- ☐ Grammar
- ☐ Reading
- ☐ Understanding
- ☐ Speaking
- ☐ Pronunciation

**SECTION 4: SPEAK APP**

20. Did you like being able to practice speaking?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| No, I hated it | | It's okay | | Yes, I loved it |
| *Explain your answer here:* | | | | |

21. Did you find speaking your answers useful?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Not useful at all | | It's okay | | Very useful |
| *Explain your answer here:* | | | | |

22. Would you like the app to give you feedback on your pronunciation?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| No, I would hate it | | Maybe | | Yes, I would like it very much |
| *Explain your answer here:* | | | | |

23. Did you like listening to your own pronunciation of the words?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| No, I hated it | | It's okay | | Yes, I loved it |
| *Explain your answer here:* | | | | |

24. What would the best uses of the speaking app be?

_____

_____

25. Do you think it can assist with improving your pronunciation?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| No, not at all | | Maybe | | Yes, definitely |
| *Explain your answer here:* | | | | |

26. The SPEAK app helped me to improve the following Sepedi skills. Please mark all that apply.

- ☐ Vocabulary
- ☐ Grammar
- ☐ Reading
- ☐ Understanding
- ☐ Speaking
- ☐ Pronunciation

27. If the apps are made available on the Google Play Store, would you:

27.1. Download them?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| No, not at all | | Maybe | | Yes, definitely |
| *Explain your answer here:* | | | | |

27.2. Pay for them?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| No, not at all | | Maybe | | Yes, definitely |
| *Explain your answer here:* | | | | |

28. Which app did you prefer using?

| | Write a number from 1 to 3 to indicate your preference (1 being the most preferred): | Please explain your answer here: |
|---|---|---|
| SILENT | | |
| LISTEN | | |
| SPEAK | | |

End of questionnaire.
Thank you.

# APPENDIX B

## Focus Group Discussion

## DISCUSSION POINTS FOR FOCUS GROUP DISCUSSION

- What are your thoughts on the apps that you have used?
- Did you like the apps?
    - Which app(s) did you like the most? Why?
- Did you dislike the apps? Why?
    - Which app(s) did you dislike the most?
    - What would you change?
- What else would you like to see in the apps? Why?
- Did the apps assist you with learning Sepedi?
    - Was there one app in particular that assisted you more? Why do you say that?
- Did you like speaking to the tablet? Why / why not?

# APPENDIX C

## Pre-test and Post-test

# PRE-TEST

**Name:** _____ **Student number:** _____

## Question 1

Give the English for the following Northern Sotho words:

| | Sepedi | English |
|---|---|---|
| 1 | meriri | |
| 2 | leoto le letona | |
| 3 | letsogo | |
| 4 | hlogo | |
| 5 | lebele | |
| 6 | kgara | |
| 7 | manala | |
| 8 | sefehlogo | |
| 9 | meno | |
| 10 | madi | |
| 11 | bjoko | |
| 12 | diišamadi | |
| 13 | hlahloba | |
| 14 | bolwetši bja kroniki | |
| 15 | diaparo | |
| 16 | borokgo | |
| 17 | mannese | |
| 18 | ngaka | |

| | Sepedi | English |
|---|---|---|
| 19 | sereledi | |
| 20 | boroso | |
| 21 | nama ya kgomo | |
| 22 | matapola | |
| 23 | makhura | |
| 24 | bogobe | |
| 25 | borotho | |
| 26 | maswi | |
| 27 | meetse | |
| 28 | malao | |
| 29 | sediko | |
| 30 | mmala | |
| 31 | gae | |
| 32 | phefo | |
| 33 | ntle | |
| 34 | gosasa | |
| 35 | lehono | |
| 36 | lenyora | |

## Question 2

With an *x*, mark the correct Northern Sotho translation for the following English words:

1 heel

| | |
|---|---|
| | seledu |
| | serethe |
| | serope |

7 salt

| | |
|---|---|
| | letswai |
| | lerotse |
| | lethase |

5 chronic illness

| | |
|---|---|
| | bolwetši bja swikiri |
| | bolwetši bja pelo |
| | bolwetši bja kroniki |

2 stomach (tummy)

| | |
|---|---|
| | mpa |
| | nko |
| | phatla |

8 food

| | |
|---|---|
| | nawa |
| | dijo |
| | raese |

6 patients

| | |
|---|---|
| | balwetši |
| | metša |
| | molwetši |

3 toe

| | |
|---|---|
| | menwana ya leoto |
| | monwana |
| | monwana wa leoto |

9 a loaf of bread

| | |
|---|---|
| | bogobe |
| | bogobe |
| | borotho |

11 hunger

| | |
|---|---|
| | tlala |
| | tapola |
| | teye |

4 heart

| | |
|---|---|
| | pshio |
| | pelo |
| | popelo |

10 bed

| | |
|---|---|
| | malakane |
| | malao |
| | malaong |

12 smoke

| | |
|---|---|
| | gosasa |
| | goga |
| | gae |

# POST-TEST

**Name:** _____ **Student number:** _____

## Question 1

Give the English for the following Northern Sotho words:

| | Sepedi | English |
|---|---|---|
| 1 | meriri | |
| 2 | leoto le letona | |
| 3 | letsogo | |
| 4 | hlogo | |
| 5 | lebele | |
| 6 | kgara | |
| 7 | manala | |
| 8 | sefehlogo | |
| 9 | meno | |
| 10 | madi | |
| 11 | bjoko | |
| 12 | diišamadi | |
| 13 | hlahloba | |
| 14 | bolwetši bja kroniki | |
| 15 | diaparo | |
| 16 | borokgo | |
| 17 | mannese | |
| 18 | ngaka | |

| | Sepedi | English |
|---|---|---|
| 19 | sereledi | |
| 20 | boroso | |
| 21 | nama ya kgomo | |
| 22 | matapola | |
| 23 | makhura | |
| 24 | bogobe | |
| 25 | borotho | |
| 26 | maswi | |
| 27 | meetse | |
| 28 | malao | |
| 29 | sediko | |
| 30 | mmala | |
| 31 | gae | |
| 32 | phefo | |
| 33 | ntle | |
| 34 | gosasa | |
| 35 | lehono | |
| 36 | lenyora | |

## Question 2

With an *x*, mark the correct Northern Sotho translation for the following English words:

1 heel

| | |
|---|---|
| | seledu |
| | serethe |
| | serope |

7 salt

| | |
|---|---|
| | letswai |
| | lerotse |
| | lethase |

5 chronic illness

| | |
|---|---|
| | bolwetši bja swikiri |
| | bolwetši bja pelo |
| | bolwetši bja kroniki |

2 stomach (tummy)

| | |
|---|---|
| | mpa |
| | nko |
| | phatla |

8 food

| | |
|---|---|
| | nawa |
| | dijo |
| | raese |

6 patients

| | |
|---|---|
| | balwetši |
| | metša |
| | molwetši |

3 toe

| | |
|---|---|
| | menwana ya leoto |
| | monwana |
| | monwana wa leoto |

9 a loaf of bread

| | |
|---|---|
| | bogobe |
| | bogobe |
| | borotho |

11 hunger

| | |
|---|---|
| | tlala |
| | tapola |
| | teye |

4 heart

| | |
|---|---|
| | pshio |
| | pelo |
| | popelo |

10 bed

| | |
|---|---|
| | malakane |
| | malao |
| | malaong |

12 smoke

| | |
|---|---|
| | gosasa |
| | goga |
| | gae |

# APPENDIX D

## Consent Forms: Intervention and Focus Group Discussion

100
1908 - 2008
UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

**FACULTY OF HUMANITIES**

**Department of African languages**

Date: 21 May 2015

# Participant Information Leaflet and Consent Form: Intervention

**Title of the Research Project:** A Language Application for Health Science Students:
A Study on User Experience

**Principal Researcher:** Ilana Wilken

**Address:**

Department of African Languages
Faculty of Humanities
University of Pretoria
Private Bag X20
PRETORIA 0028, South Africa

**Contact Number:** 012 841 3028

*You are being invited to take part in a research project conducted by Ilana Wilken as part of her MA study in Applied Language Studies. You were selected as a possible participant in this study because you are currently a Northern Sotho student at the University of Pretoria. Please take some time to read the information presented here, which will explain the details of this project. You are free to ask any questions you might have related to this study. It is very important that you are fully satisfied and that you clearly understand what this research entails and how you could be involved. Also, your participation is* ***entirely voluntary*** *and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.*

## 1. Purpose of the Study

A semester course in Northern Sotho (Sepedi) is offered to health science students in order to improve the communication between a student and a patient in the patient's first language. A mobile-assisted language learning (MALL) application with three modes was developed to assist students with their Northern Sotho vocabulary, listening and speaking skills. The students will use the application as a supplementary tool in their studies. This study will then try to determine whether MALL applications are useful as supplementary tools in the acquisition of vocabulary in Northern Sotho for medical purposes and to establish if students have a clear preference for the different modes of a MALL application.

## 2. Procedures

- This study will be conducted with an application on mobile devices provided by the CSIR.
- The application will be introduced at the beginning of the study (30 minutes).
- Thereafter, the use of the application will take place after each formal Northern Sotho lecture (15 minutes).
- 30 (thirty) students will be randomly selected each week to use the application.
- The students will use the application for 12 (twelve) weeks.
- All the students will complete a questionnaire at the end of the study (30 minutes).
- A focus group discussion will take place with all the students at the end of the study (1 hour).
- Each participating student will be required to provide his/her name, student number, and an email address so that he/she can be registered for use of the application. This information will be regarded as strictly confidential. Although this information is needed to register a student, it will be used exclusively for administration purposes and all data will be anonymised once collected.

## 3. Risks

No risks are involved or anticipated in your taking part in this research.

### 4. Benefits

The following role players will indirectly benefit from this research:

- Participating and future students will benefit because they will be able to use the new technology to improve their vocabulary, listening, and pronunciation skills.
- Northern Sotho speaking patients will be able to understand students during consultations.

### 5. Participants' Rights

- Participation in the study is entirely voluntary and you are free to withdraw from the study at any point, even if you do agree to take part, without any negative consequences.
- All meetings will be conducted at the Faculty of Health Sciences and at a time that is convenient for the students as well as the study staff but which will not interfere with students' lecture, test or exam schedules.
- You will receive a copy of this information and consent form for your own records.

### 6. Confidentiality

All participants' application data remains confidential and will not contain any medical information.

### 7. Anonymity

Each participating student will be required to provide his/her name, student number, and an email address so that he/she can be registered for use of the application. This information will be regarded as strictly confidential. Although this information is needed to register a student, it will be used exclusively for administration purposes. All data will be anonymised once the data has been collected, and no student will be linked to or identified through any data.

### 8. Data Storage

All data will be securely stored for purposes of archiving in the departmental safe of the Department of African Languages, Humanities Building Level 9. In accordance with university policy, storage will be for 15 years.

### 9. Costs and Payment

There will be no costs involved to participate in the study, and students will not be paid in any form to participate in this study.

**Declaration by Participant**

By signing below, I …… agree to take part in a research study entitled *A Language Application for Health Science Students: A Study on User Experience*.

**I declare that:**

- I have read this information and consent form and it is written in a language in which I am fluent and comfortable with.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I hereby grant the study staff permission to use the recordings of my voice that will be made during the study for research and development purposes.

Signed at (*place*) …… on (*date*) …….. 2015.

…….. ……

Signature of participant Signature of witness

**Declaration by Investigator**

I …… declare that:

- I explained the information in this document to ……..
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above.

Signed at (*place*) …… on (*date*) …….. 2015.

…….. ……

Signature of investigator Signature of witness

100
1908 - 2008
UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

**FACULTY OF HUMANITIES**

**Department of African languages**

Date: 21 May 2015

# Participant Information Leaflet and Consent Form:

# Focus Group Discussion

**Title of the Research Project:** A Language Application for Health Science Students:
A Study on User Experience

**Principal Researcher:** Ilana Wilken

**Address:**

Department of African Languages
Faculty of Humanities
University of Pretoria
Private Bag X20
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## 3. Risks

No risks are involved or anticipated in your taking part in this research.

## 4. Benefits

The following role players will indirectly benefit from this research:

- Participating and future students will benefit because they will be able to use the new technology to improve their vocabulary, listening, and pronunciation skills.
- Northern Sotho speaking patients will be able to understand students during consultations.

## 5. Participants' Rights

- Participation in the study is entirely voluntary and you are free to withdraw from the study at any point, even if you do agree to take part, without any negative consequences.
- All meetings will be conducted at the Faculty of Health Sciences and at a time that is convenient for the students as well as the study staff but which will not interfere with students' lecture, test or exam schedules.
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**I declare that:**

- I have read this information and consent form and it is written in a language in which I am fluent and comfortable with.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I hereby grant the study staff permission to use the recordings of my voice that will be made during the study for research and development purposes.

Signed at (*place*) …… on (*date*) …….. 2015.

…… ……

Signature of participant Signature of witness

**Declaration by Investigator**

I …… declare that:

- I explained the information in this document to ……..
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above.

Signed at (*place*) …… on (*date*) …….. 2015.

…… ……

Signature of investigator Signature of witness

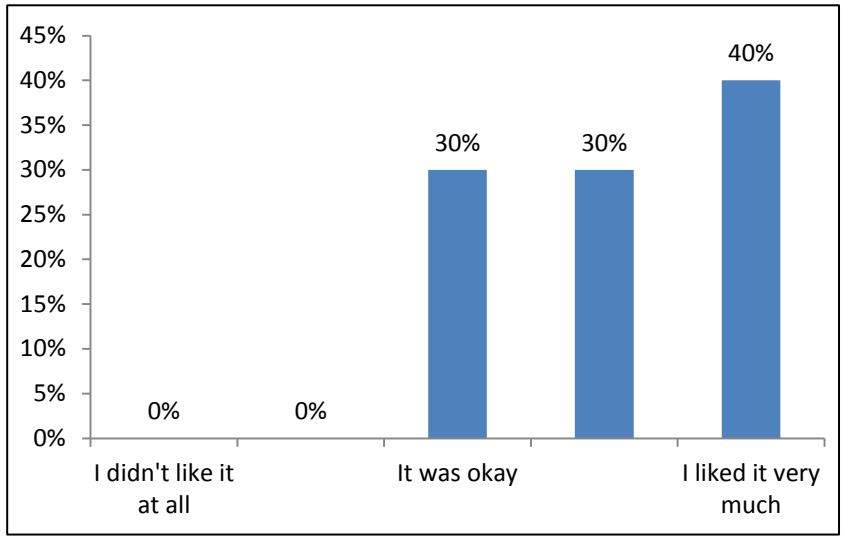
# APPENDIX E

## Results: Intervention

# 1. Overall, what is your impression of the intervention with the apps?

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Student** | **I didn't like it at all** | | **It was okay** | | **I liked it very much** |
| 1 | | | | x | |
| 2 | | | | x | |
| 3 | | | | | x |
| 4 | | | | | x |
| 5 | | | | x | |
| 6 | | | | | x |
| 7 | | | | x | |
| 8 | | | | | x |
| 9 | | | | | x |
| 10 | | | x | | |
| 11 | | | x | | |
| 12 | | | | | x |
| 13 | | | x | | |
| 14 | | | | x | |
| 15 | | | x | | |
| 16 | | | x | | |
| 17 | | | x | | |
| 18 | | | | | x |
| 19 | | | | | x |
| 20 | | | | x | |
| **Total** | **0** | **0** | **6** | **6** | **8** |
| **%** | **0%** | **0%** | **30%** | **30%** | **40%** |

Table containing the actual results.




Graphical representation of the results.

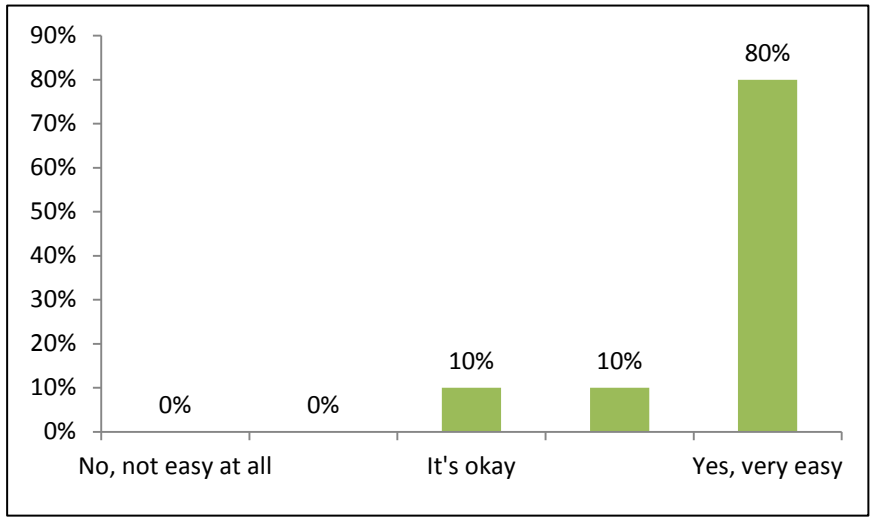
| Student | Score | Comment |
|---|---|---|
| 2 | 4 | I enjoyed working with the technology and learning Sepedi. |
| 3 | 5 | Very nice. |
| 4 | 5 | It was clear what you had to do and had nice pictures. |
| 6 | 5 | Helps more than just class. |
| 7 | 4 | It was a good app that will definitely help with studying. |
| 8 | 5 | This is a such a brilliant intervention, as this will increase the ability to gain Sepedi knowledge in a fun way. |
| 9 | 5 | It kept learning interesting. |
| 10 | 3 | I wish it was not right after Sepedi class for we were drained. |
| 12 | 5 | Teaches the way of pronouncing the Sepedi words properly. |
| 13 | 3 | Doing after the lecture were draining. |
| 14 | 4 | Cool to see the words. |
| 15 | 3 | It is a nice way to learn the language. Only words not sentences. |
| 16 | 3 | Because we have a very limited vocab and there is no demo before I found I guessed/used trial/error to find answers. |
| 18 | 5 | It was a cool app to use and you could listen to the proper pronunciation of the word. |
| 19 | 5 | It's gave's me an opportunity to improve my pronunciation. |
| 20 | 4 | It was fun to use. |

Scores given and comments made by students.

# 2. Were the apps easy to use?

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Student** | **No, not easy at all** | | **It's okay** | | **Yes, very easy** |
| 1 | | | | x | |
| 2 | | | | | x |
| 3 | | | | | x |
| 4 | | | | | x |
| 5 | | | | | x |
| 6 | | | | | x |
| 7 | | | | | x |
| 8 | | | | | x |
| 9 | | | | | x |
| 10 | | | | | x |
| 11 | | | x | | |
| 12 | | | | | x |
| 13 | | | | | x |
| 14 | | | | | x |
| 15 | | | | | x |
| 16 | | | | x | |
| 17 | | | x | | |
| 18 | | | | | x |
| 19 | | | | | x |
| 20 | | | | | x |
| **Total** | **0** | **0** | **2** | **2** | **16** |
| **%** | **0%** | **0%** | **10%** | **10%** | **80%** |

Table containing the actual results.




Graphical representation of the results.

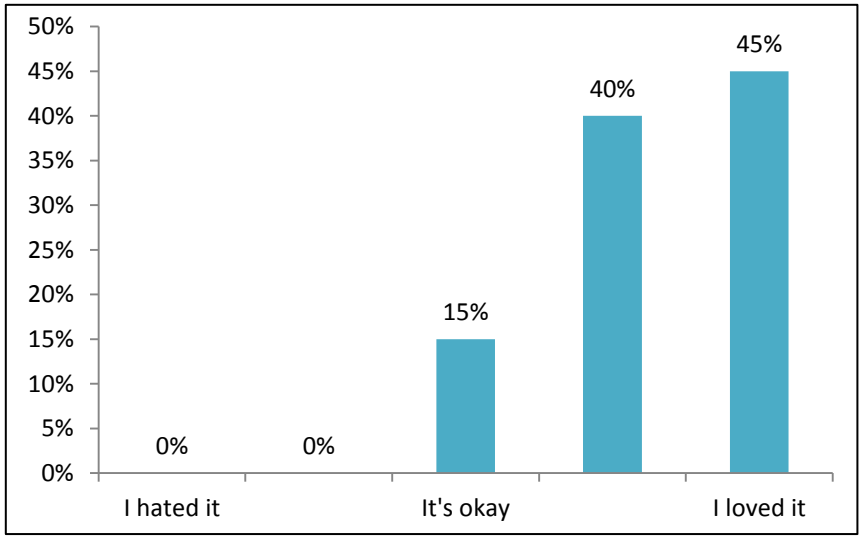
| Student | Score | Comment |
|---|---|---|
| 2 | 5 | Good explanation. |
| 3 | 5 | Easy to know what to do. |
| 7 | 5 | Instructions were clear and easy to use. |
| 8 | 5 | It is very user friendly for people who are technologically disabled. |
| 9 | 5 | Touch screen, no buttons, easy guidelines. |
| 10 | 5 | Very user friendly. |
| 12 | 5 | Tells when you chose wrong answer. |
| 13 | 5 | Yes, it was easy. |
| 14 | 5 | Self explainitary. |
| 15 | 5 | Knew exactly what to do. |
| 16 | 4 | They were easy to use. It bothered me when the "Speak" app wouldn't move on after I finished talking (waiting 3 seconds). |
| 18 | 5 | They were user friendly. It was simple. You could find things easily and did not have to look for it. |
| 19 | 5 | Because we were able to pronounce it back and it was guiding us. |
| 20 | 5 | Was very straight forward. |

Scores given and comments made by students.

# 3. Did you like the apps?

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Student** | **I hated it** | | **It's okay** | | **I loved it** |
| 1 | | | | x | |
| 2 | | | | x | |
| 3 | | | | | x |
| 4 | | | | x | |
| 5 | | | | x | |
| 6 | | | | | x |
| 7 | | | | | x |
| 8 | | | x | | |
| 9 | | | | | x |
| 10 | | | | x | |
| 11 | | | | x | |
| 12 | | | | | x |
| 13 | | | | x | |
| 14 | | | | x | |
| 15 | | | | | x |
| 16 | | | x | | |
| 17 | | | x | | |
| 18 | | | | | x |
| 19 | | | | | x |
| 20 | | | | | x |
| **Total** | **0** | **0** | **3** | **8** | **9** |
| **%** | **0%** | **0%** | **15%** | **40%** | **45%** |

Table containing the actual results.




Graphical representation of the results.

| Student | Score | Comment |
|---|---|---|
| 1 | 4 | It was very easy to use and very informative. |
| 3 | 5 | It very nice. |
| 4 | 4 | When you had to record, I just did not like that you had to listen to own recording before you could continue. |
| 7 | 5 | Well designed. |
| 8 | 3 | It's okay if you don't have time for it. Or when it is unnecessary to use at the moment, but before exams the apps would be very helpful and then I'll love it! |
| 9 | 5 | Different learning mechanisms, also helps to pronounce correctly. |
| 10 | 4 | I did not love it, but was fun. |
| 11 | 4 | It take longer than I think a app should. |
| 12 | 5 | Teaches the students a lot who is in crisis. |
| 13 | 4 | Like the pictures. |
| 15 | 5 | Nice design and pictures. |
| 16 | 3 | I like any way to learn in alternative methods. |
| 18 | 5 | I did enjoy using the app especially when you got to listen to the words and then record yourself as well. |
| 19 | 5 | It's helps by guiding our pronunciation. |
| 20 | 5 | I learned quite a bit, and had fun doing it. |

Scores given and comments made by students.

# 4. What did you like the most about the apps? Why?

| Student | Answer |
|---|---|
| 1 | I liked the apps that had voices to give me the way to pronounce the word. |
| 2 | Talk-back function, it helped with pronouncing. |
| 3 | Has options - helps you. |
| 4 | Picture with the word, help to remember it better. |
| 5 | The words are very well suited to the health sciences career pathway. Also, the colour themes were colourful and attention grabbing. |
| 6 | The pictures + words + correction + pronunciation. |
| 7 | It's accessibility. It is easy to use + quick + effictive. The pictures helped. |
| 8 | |
| 9 | User friendly and it included all aspects, speak + learn + listen. |
| 10 | User friendly, it must be easy to use. |
| 11 | That there is subjects related to the medical field, because I will be able to use them at work. |
| 12 | Pictures of what is being asked. |
| 13 | Pictures, helpful. |
| 14 | When words = pronounced -> nice to hear. |
| 15 | The versatility of the app. All people learn in different ways. |
| 16 | They have potential (if released) to be used anywhere at anytime. |
| 17 | Learn words. |
| 18 | I liked the listening to the words because it gave an idea of how the words needed to be pronounced. |
| 19 | Pictures where we were required to state the name of it. |
| 20 | They gave the answers afterwards. So that we could know the correct answer. |

Students' actual answers on question 4.

# 5. What did you like the least about the apps? Why?

| Student | Answer |
|---|---|
| 1 | Nothing I can think off, as I mentioned it was an easy to use app. |
| 2 | |
| 3 | Very repetetive. |
| 4 | Listen to own recording. |
| 5 | When you do the app where you pronounce the words, the time they allow you to speak is too long for most words and it makes you wait for the time to end. |
| 6 | Not being able to skip things - time consuming. |
| 7 | Nothing. |
| 8 | |
| 9 | The recording app we had to reply our own voice before continuing => time consuming. |
| 10 | |
| 11 | It is slow to go to the next question. |
| 12 | Nothing, because I found everything perfect! |
| 13 | |
| 14 | That you need to record yourself but no feedback on if it was [correct]/[wrong] |
| 15 | That only vocabulary is included, not sentence constructions. |
| 16 | That they had no demo. Pictures did not feel specific enough. |
| 17 | |
| 18 | I did not like the fact that you had to record yourself and listen to it, no option was given. |
| 19 | Everything was very good nothing was bad to me. |
| 20 | The recording. I don't like hearing myself. |

Students' actual answers on question 5.

# 6. What would you add/improve? Why?

| Student | Answer |
|---|---|
| 1 | N/A |
| 2 | |
| 3 | |
| 4 | Nothing. |
| 5 | I would somehow change the time that it takes to speak back to the app. |
| 6 | |
| 7 | When speaking -> app must help and state if pronunciation was correct. |
| 8 | |
| 9 | Small tutorial before each questionare. |
| 10 | A small summary of all the words. |
| 11 | The font of the words, make it bigger easy to read. |
| 12 | No |
| 13 | |
| 14 | Look above. [To know if it sounds right.] |
| 15 | Sentence constructions, not only words to help you learn the living language. |
| 16 | See above [That they had no demo, pictures did not feel specific enough.] |
| 17 | |
| 18 | Add a option if you want to record yourself. Add a test so that you can test yourself. |
| 19 | Sentences (whole sentences) |
| 20 | Nothing. They are good enough as they are. |

Students' actual answers on question 6.

# 7. What would you change/remove? Why?

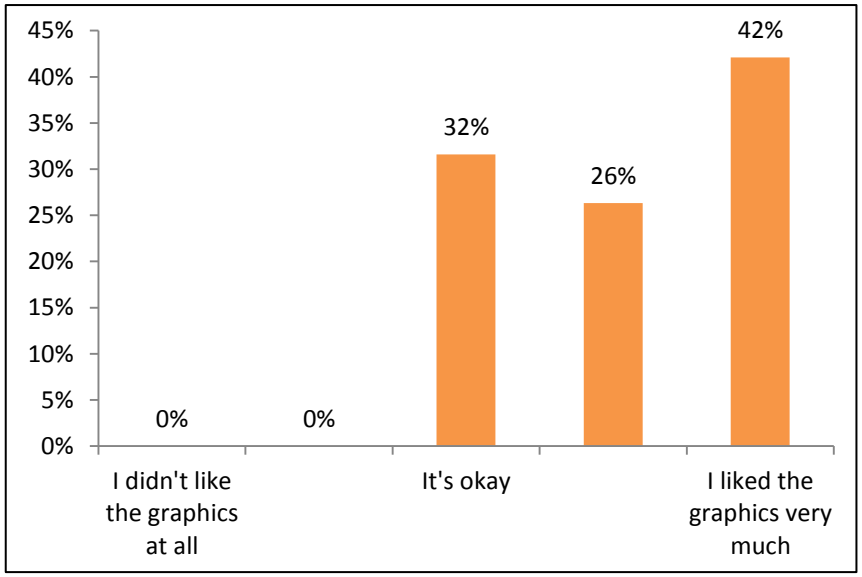
| Student | Answer |
|---|---|
| 1 | N/A |
| 2 | |
| 3 | |
| 4 | Listen to own recording. |
| 5 | Same as question 6. [I would somehow change the time that it takes to speak back to the app.] |
| 6 | |
| 7 | Nothing. |
| 8 | |
| 9 | |
| 10 | I would change nothing. |
| 11 | How long it takes to go to the next question. |
| 12 | Nothing |
| 13 | |
| 14 | Nothing |
| 15 | Nothing, worked very well. |
| 16 | The timer on the speak app, some phrases are quick - forcing you to wait, some are too long, cannot complete in time. |
| 17 | |
| 18 | Nothing. |
| 19 | Nothing. |
| 20 | |

Students' actual answers on question 7.

# 8. What did you think of the graphics?

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Student** | **I didn't like the graphics at all** | | **It's okay** | | **I liked the graphics very much** |
| 1 | | | | x | |
| 2 | | | | x | |
| 3 | | | | | x |
| 4 | | | | x | |
| 5 | | | | | x |
| 6 | | | | | x |
| 7 | | | | x | |
| 8 | | | | | |
| 9 | | | | | x |
| 10 | | | x | | |
| 11 | | | x | | |
| 12 | | | | | x |
| 13 | | | x | | |
| 14 | | | x | | |
| 15 | | | | | x |
| 16 | | | | x | |
| 17 | | | x | | |
| 18 | | | | | x |
| 19 | | | x | | |
| 20 | | | | | x |
| **Total** | **0** | **0** | **6** | **5** | **8** |
| **%** | **0%** | **0%** | **32%** | **26%** | **42%** |

Table containing the actual results.




Graphical representation of the results.

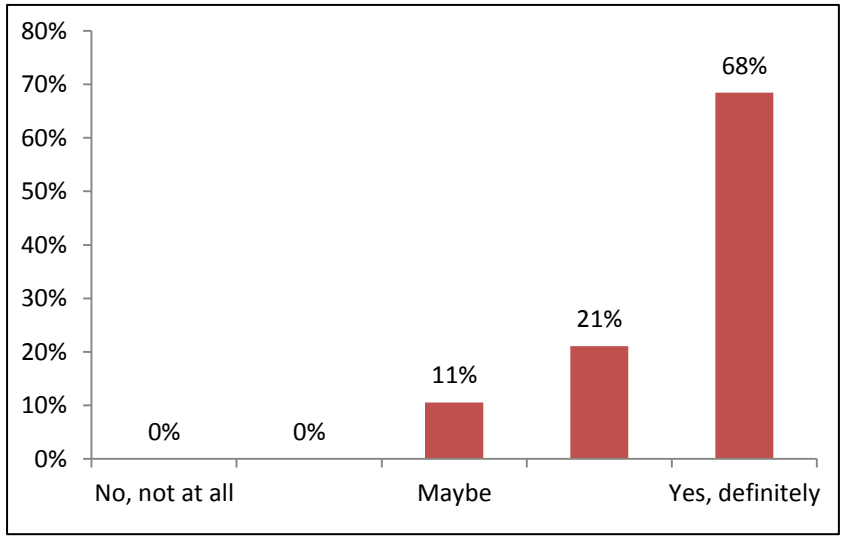
| Student | Score | Comment |
|---|---|---|
| 3 | 5 | Well done. |
| 4 | 4 | The pictures was explanatory. |
| 5 | 5 | The graphics were colourful, interesting and adds to the meanings of the words. |
| 7 | 4 | It helped with memorising. |
| 9 | 5 | Showed exactly what was asked. |
| 10 | 3 | The pictures were good quality. |
| 12 | 5 | The picture were showing very nicely and clear. |
| 13 | 3 | No to bad. |
| 14 | 3 | Bit weird. |
| 15 | 5 | Knew what you were looking at. |
| 16 | 4 | The pictures weren't specific enough. |
| 18 | 5 | The graphics were nice because then you got to see the word and look at a picture. |
| 20 | 5 | They demonstrated the word well. |

Scores given and comments made by students.

# 9a. Would you recommend the apps to other students learning Sepedi?

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Student** | **No, not at all** | | **Maybe** | | **Yes, definitely** |
| 1 | | | | x | |
| 2 | | | | | x |
| 3 | | | | | x |
| 4 | | | | | x |
| 5 | | | | | x |
| 6 | | | | | x |
| 7 | | | | | x |
| 8 | | | | | |
| 9 | | | | | x |
| 10 | | | | | x |
| 11 | | | | | x |
| 12 | | | | | x |
| 13 | | | x | | |
| 14 | | | | x | |
| 15 | | | x | | |
| 16 | | | | x | |
| 17 | | | | x | |
| 18 | | | | | x |
| 19 | | | | | x |
| 20 | | | | | x |
| **Total** | **0** | **0** | **2** | **4** | **13** |
| **%** | **0%** | **0%** | **11%** | **21%** | **68%** |

Table containing the actual results.

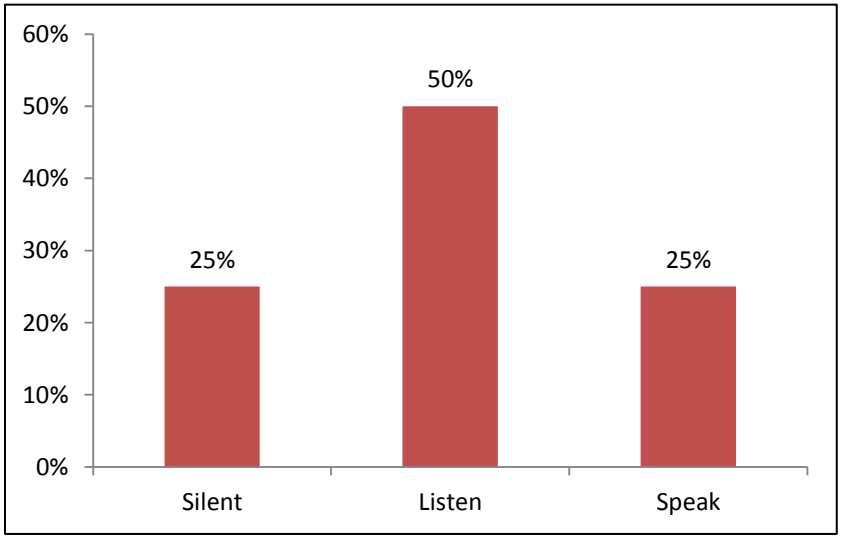



Graphical representation of the results.

# 9b. If you would recommend the apps to other students learning Sepedi, which app in particular would you recommend?

| Student | Silent | Listen | Speak |
|---|---|---|---|
| 1 | | | x |
| 2 | | | x |
| 3 | x | x | x |
| 4 | | x | |
| 5 | | x | |
| 6 | | x | |
| 7 | | x | |
| 8 | | | |
| 9 | x | x | |
| 10 | | | x |
| 11 | | | |
| 12 | | x | |
| 13 | x | | |
| 14 | | x | |
| 15 | x | x | x |
| 16 | | x | |
| 17 | x | | |
| 18 | x | x | |
| 19 | | | x |
| 20 | | x | |
| **Total** | **6** | **12** | **6** |
| **%** | **25%** | **50%** | **25%** |

Table containing the actual results.




Graphical representation of the results.

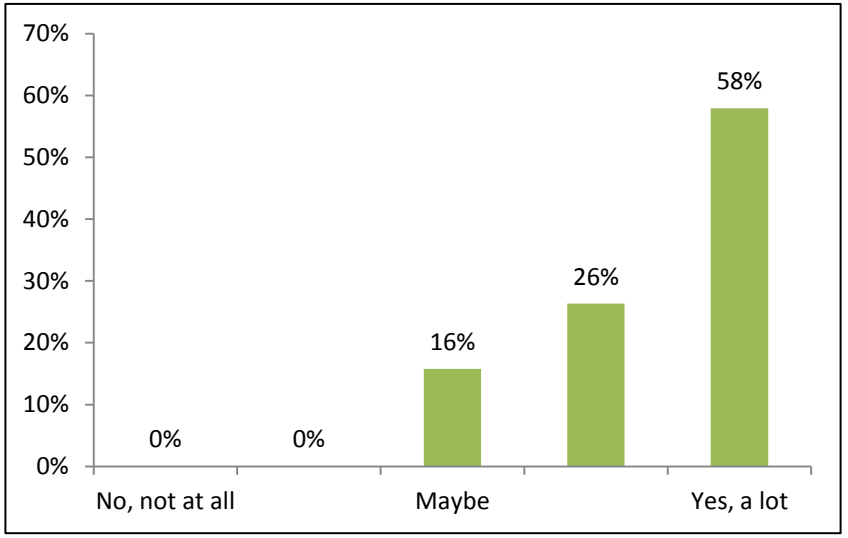
| Student | Score | Comment |
|---|---|---|
| 3 | Silent<br>Listen<br>Speak | It helps in all aspects. |
| 4 | Listen | It helps you to remember vocabulary and to remember words. |
| 5 | Listen | I think that hearing the words help the person remember the words better. |
| 6 | Listen | Helps the most with initial learning - speak can be later to learn to speak it. |
| 7 | Listen | It helps hearing and seeing the word. |
| 9 | Silent<br>Listen | These help me the most. |
| 10 | Speak | Learns you how it should be heard. |
| 12 | Listen | You learn to pronounce properly. |
| 13 | Silent | Quickest. |
| 15 | Silent<br>Listen<br>Speak | Start a bit in the deep end. Wouldn't know where everything was coming from. |
| 16 | Listen | It helps to commit the vocab + pronunciation to memory. |
| 18 | Silent<br>Listen | It helped in a way, not much, but it was a different mode of learning and I think if it was used on a daily basis it would be more effective. |
| 19 | Speak | It's gives us opportunity to improve the way we need to call the word's. |
| 20 | Listen | It helps to hear how the words are pronounced. |

Scores given and comments made by students.

# 10a. Would you use the apps if they formed part of the Sepedi 110 module?

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Student** | **No, not at all** | | **Maybe** | | **Yes, a lot** |
| 1 | | | | x | |
| 2 | | | | | x |
| 3 | | | | | x |
| 4 | | | | | x |
| 5 | | | | | x |
| 6 | | | | | x |
| 7 | | | | | x |
| 8 | | | | | |
| 9 | | | | | x |
| 10 | | | x | | |
| 11 | | | | | x |
| 12 | | | | | x |
| 13 | | | | | x |
| 14 | | | | x | |
| 15 | | | | x | |
| 16 | | | | x | |
| 17 | | | x | | |
| 18 | | | x | | |
| 19 | | | | | x |
| 20 | | | | x | |
| **Total** | **0** | **0** | **3** | **5** | **11** |
| **%** | **0%** | **0%** | **16%** | **26%** | **58%** |

Table containing the actual results.

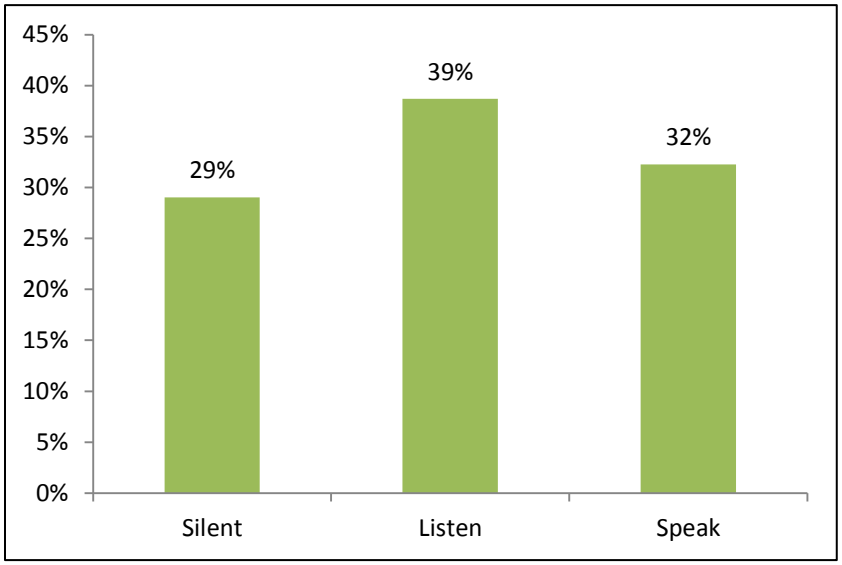



Graphical representation of the results.

# 10b. If you would use the apps as part of the Sepedi 110 module, which app in particular would you use?

| Student | Silent | Listen | Speak |
|---|---|---|---|
| 1 | | | |
| 2 | x | x | x |
| 3 | x | x | x |
| 4 | | x | x |
| 5 | x | x | |
| 6 | | x | x |
| 7 | | x | x |
| 8 | | | |
| 9 | x | x | x |
| 10 | x | | |
| 11 | | | |
| 12 | | | x |
| 13 | x | | |
| 14 | x | x | |
| 15 | | x | |
| 16 | | x | x |
| 17 | x | | |
| 18 | | x | |
| 19 | | | x |
| 20 | x | x | x |
| **Total** | **9** | **12** | **10** |
| **%** | **29%** | **39%** | **32%** |

Table containing the actual results.




Graphical representation of the results.

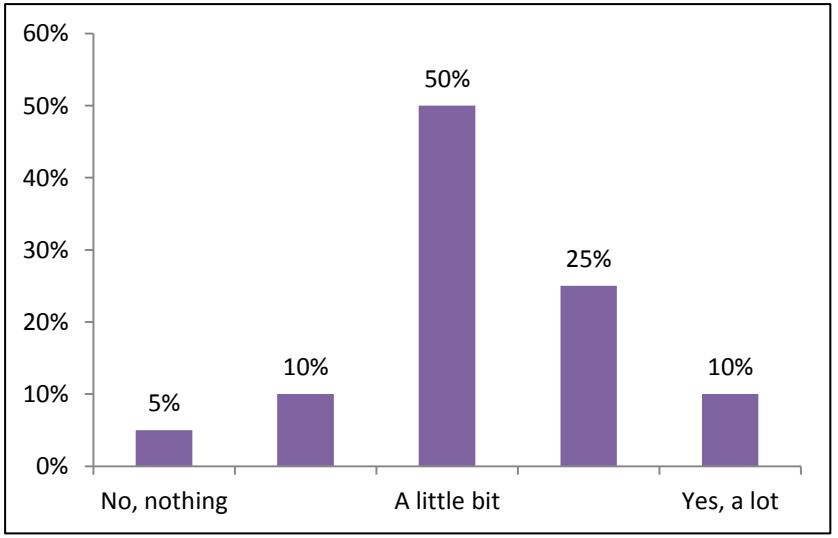
| Student | Score | Comment |
|---|---|---|
| 3 | Silent Listen Speak | It's nice to have. |
| 4 | Listen Speak | Help to know the practical side. |
| 5 | Silent Listen | The apps make remembering the vocabulary much easier. Just repetition is key. |
| 7 | Listen Speak | Seeing, hearing + speaking helps with memorisation. |
| 9 | Silent Listen Speak | Easier to study and to grasp. |
| 10 | Silent | To learn vocab. |
| 12 | Speak | Where you listen if your pronunciation is good or not. |
| 13 | Silent | Learn quicker. |
| 14 | Silent Listen | Cause we never speak thus no use for speaking. |
| 15 | Listen | Not a lot of pronunciation is done. This will help you know how to pronunciate the words. |
| 16 | Listen Speak | It would help me study. |
| 18 | Listen | Sepedi is not a main subject and classes are only once a week. |
| 19 | Speak | It's improve language (better way of pronouncing) |
| 20 | Silent Listen Speak | All three helped me. |

Scores given and comments made by students.

# 11a. Did you learn some Sepedi from the apps?

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Student** | **No, nothing** | | **A little bit** | | **Yes, a lot** |
| 1 | | | | x | |
| 2 | | | | x | |
| 3 | | | | x | |
| 4 | | | x | | |
| 5 | | | x | | |
| 6 | | | x | | |
| 7 | | | x | | |
| 8 | | | x | | |
| 9 | | | | x | |
| 10 | | | x | | |
| 11 | | | x | | |
| 12 | | | | | x |
| 13 | | | x | | |
| 14 | | x | | | |
| 15 | | | x | | |
| 16 | | x | | | |
| 17 | | | x | | |
| 18 | x | | | | |
| 19 | | | | | x |
| 20 | | | | x | |
| **Total** | **1** | **2** | **10** | **5** | **2** |
| **%** | **5%** | **10%** | **50%** | **25%** | **10%** |

Table containing the actual results.

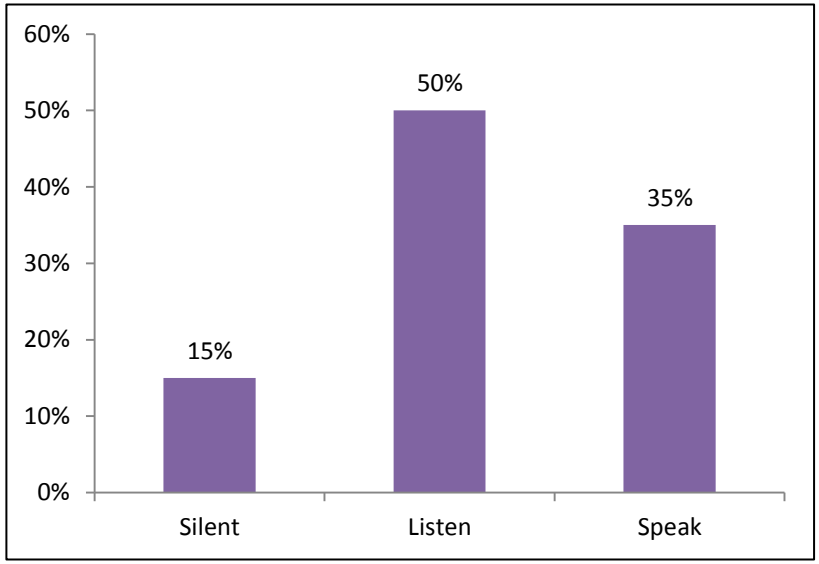



Graphical representation of the results.

# 11b. If you learned something, which app in particular do you think helped with this?

| Student | Silent | Listen | Speak |
|---|---|---|---|
| 1 | | | |
| 2 | | | x |
| 3 | | | x |
| 4 | | x | x |
| 5 | | x | |
| 6 | | | x |
| 7 | | x | |
| 8 | | | x |
| 9 | | x | |
| 10 | x | | |
| 11 | | | |
| 12 | | x | |
| 13 | x | | |
| 14 | | x | |
| 15 | x | x | x |
| 16 | | x | |
| 17 | | x | |
| 18 | | | |
| 19 | | | x |
| 20 | | x | |
| **Total** | **3** | **10** | **7** |
| **%** | **15%** | **50%** | **35%** |

Table containing the actual results.

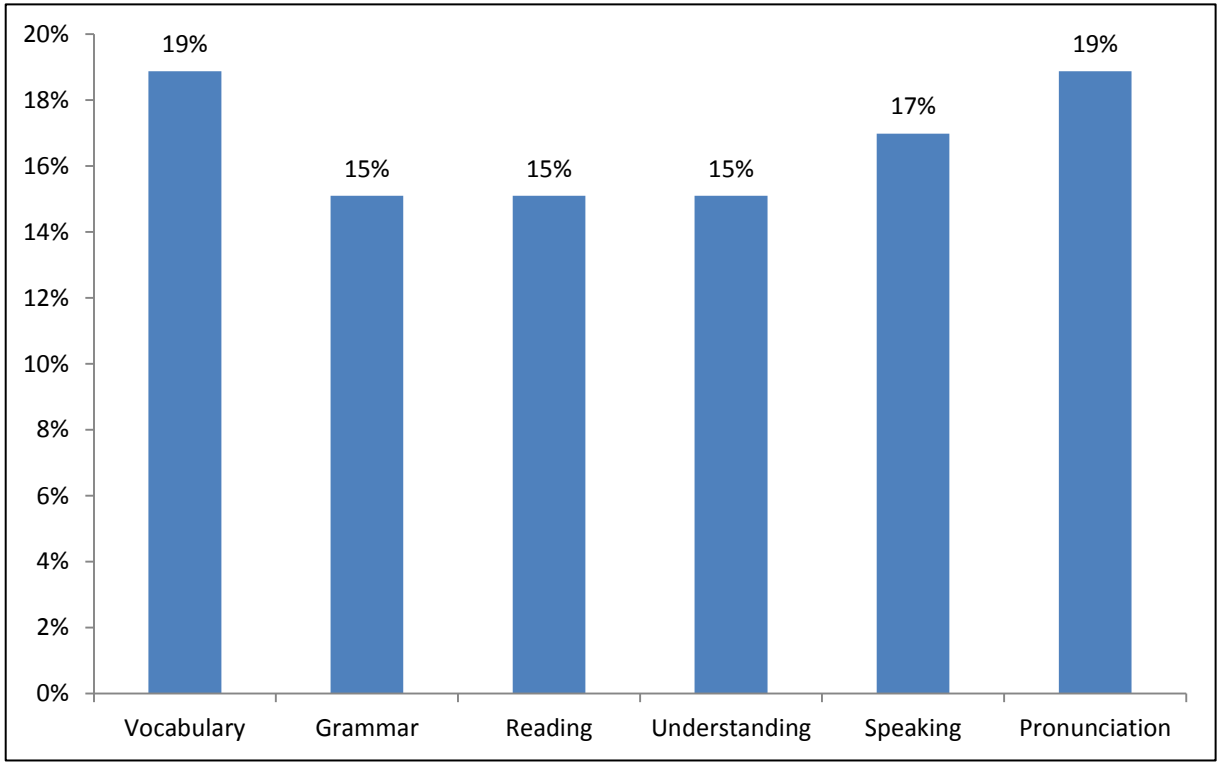



Graphical representation of the results.

| Student | Score | Comment |
|---|---|---|
| 3 | Speak | Pronunciation. |
| 5 | Listen | Some pronouncing was made easier. |
| 7 | Listen | It helped hearing the pronunciation. |
| 8 | Speak | When you listen and speak, you learn more effectively as you actually learn to say the words as well. We did it to little for the apps to have an major effect on us. |
| 9 | Listen | Pronouncing the words were better understood. |
| 10 | Silent | Like small vocab. |
| 12 | Listen | The pronunciations. |
| 13 | Silent | Pictures. |
| 15 | Silent<br>Listen<br>Speak | Only certain words. Learned to recognise words. |
| 18 | | We only used the app once a week for a few minutes, I think if we had the opportunity to use it more it might have been more effective. |
| 20 | Listen | To pronounce words correctly. |

Scores given and comments made by students.

# 12. The apps helped me to improve my Sepedi skills in:

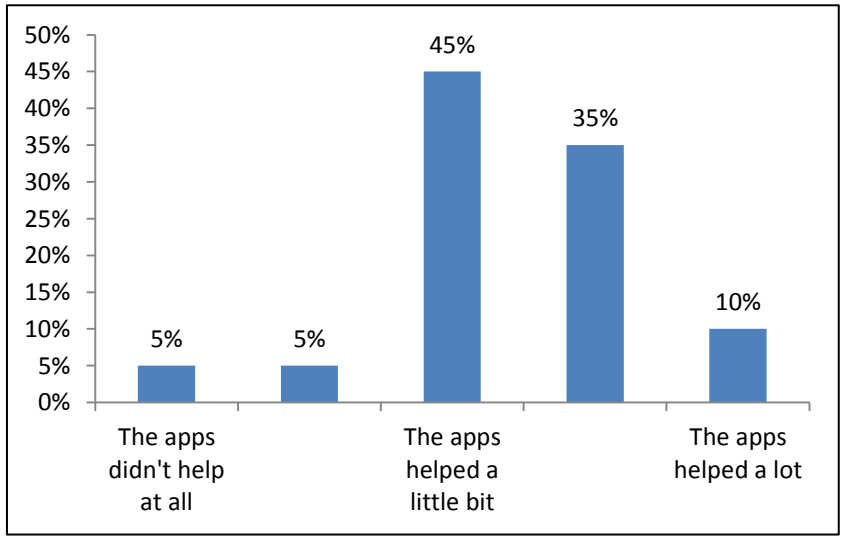



Graphical representation of results.

# 12. Please mark all that apply. The apps helped me to improve my Sepedi skills in:
## 12.1 Vocabulary

| | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| **Student** | **Vocabulary** | **The apps didn't help at all** | | **The apps helped a little bit** | | **The apps helped a lot** |
| 1 | x | | | | x | |
| 2 | x | | | x | | |
| 3 | x | | | x | | |
| 4 | x | | | | x | |
| 5 | x | | | | x | |
| 6 | x | | | x | | |
| 7 | x | | | x | | |
| 8 | x | | | x | | |
| 9 | x | | | | x | |
| 10 | x | | | | x | |
| 11 | x | | | x | | |
| 12 | x | | | | | x |
| 13 | x | | | | x | |
| 14 | x | | | | x | |
| 15 | x | | | x | | |
| 16 | x | | | x | | |
| 17 | x | | x | | | |
| 18 | x | x | | | | |
| 19 | x | | | | | x |
| 20 | x | | | x | | |
| **Total** | **20** | **1** | **1** | **9** | **7** | **2** |
| **%** | **100%** | **5%** | **5%** | **45%** | **35%** | **10%** |

Table containing the actual results.

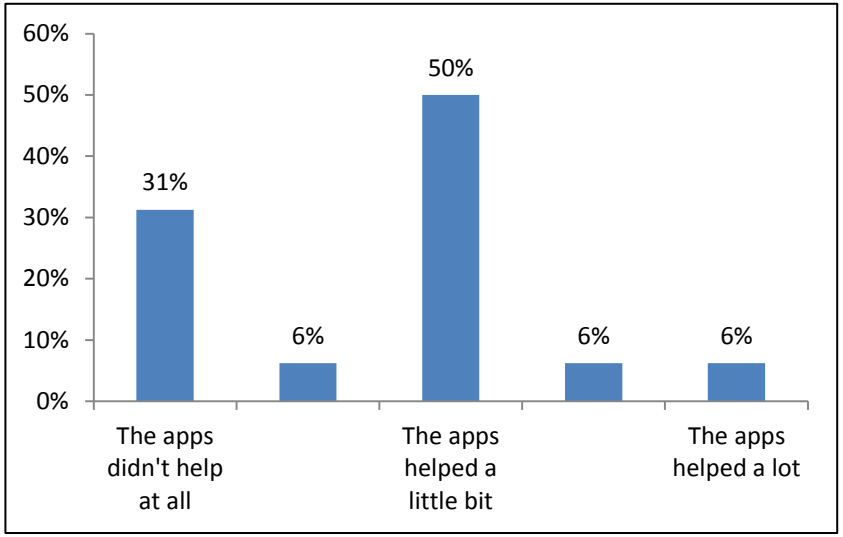



Graphical representation of the results.

# 12. Please mark all that apply. The apps helped me to improve my Sepedi skills in:
## 12.2 Grammar

| | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| **Student** | **Grammar** | **The apps didn't help at all** | | **The apps helped a little bit** | | **The apps helped a lot** |
| 1 | x | | | | x | |
| 2 | x | | | x | | |
| 3 | x | | | x | | |
| 4 | | | | | | |
| 5 | x | x | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | x | x | | | | |
| 9 | x | | | x | | |
| 10 | x | | | x | | |
| 11 | x | x | | | | |
| 12 | x | | | x | | |
| 13 | | | | | | |
| 14 | x | | x | | | |
| 15 | x | | | x | | |
| 16 | x | x | | | | |
| 17 | x | | | x | | |
| 18 | x | x | | | | |
| 19 | x | | | | | x |
| 20 | x | | | x | | |
| **Total** | **16** | **5** | **1** | **8** | **1** | **1** |
| **%** | **80%** | **31%** | **6%** | **50%** | **6%** | **6%** |

Table containing the actual results.

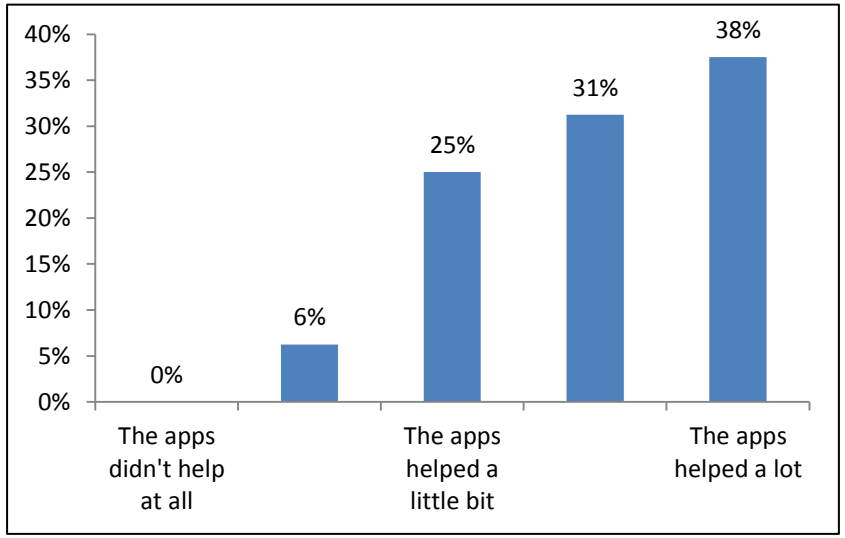



Graphical representation of the results.

# 12. Please mark all that apply. The apps helped me to improve my Sepedi skills in:
# 12.3 Reading

| | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| **Student** | **Reading** | **The apps didn't help at all** | | **The apps helped a little bit** | | **The apps helped a lot** |
| 1 | x | | | | x | |
| 2 | x | | | | x | |
| 3 | x | | | | | x |
| 4 | x | | | | x | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | x | | | | x | |
| 8 | x | | | x | | |
| 9 | x | | | | x | |
| 10 | x | | x | | | |
| 11 | x | | | x | | |
| 12 | x | | | | | x |
| 13 | | | | | | |
| 14 | x | | | | | x |
| 15 | x | | | | | x |
| 16 | x | | | x | | |
| 17 | x | | | x | | |
| 18 | x | | | | | x |
| 19 | x | | | | | x |
| 20 | | | | | | |
| **Total** | **16** | **0** | **1** | **4** | **5** | **6** |
| **%** | **80%** | **0%** | **6%** | **25%** | **31%** | **38%** |

Table containing the actual results.

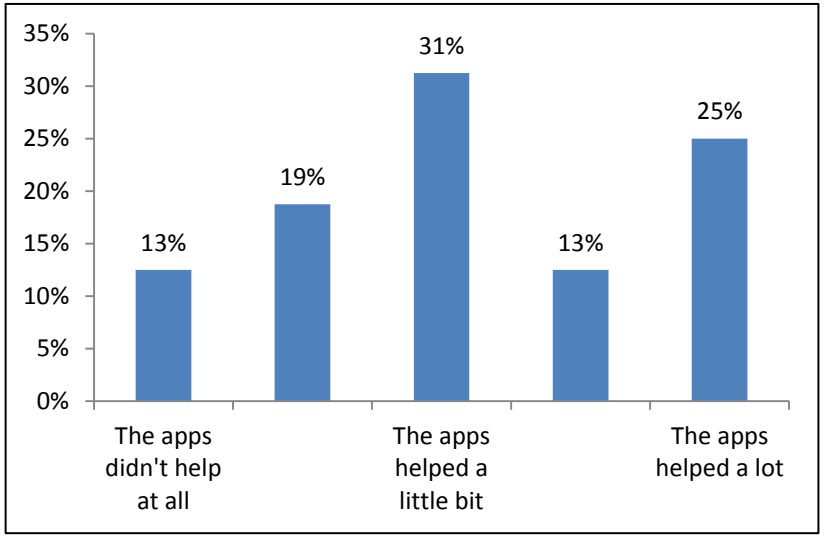



Graphical representation of the results.

# 12. Please mark all that apply. The apps helped me to improve my Sepedi skills in:
# 12.4 Understanding

| | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| **Student** | **Under-standing** | **The apps didn't help at all** | | **The apps helped a little bit** | | **The apps helped a lot** |
| 1 | x | | | | x | |
| 2 | x | | | | x | |
| 3 | x | | | x | | |
| 4 | x | | | | | x |
| 5 | | | | | | |
| 6 | x | | | x | | |
| 7 | | | | | | |
| 8 | x | x | | | | |
| 9 | x | | | | | x |
| 10 | x | | x | | | |
| 11 | x | | | x | | |
| 12 | x | | | | | x |
| 13 | | | | | | |
| 14 | x | | x | | | |
| 15 | x | | | x | | |
| 16 | x | | x | | | |
| 17 | x | | | x | | |
| 18 | x | x | | | | |
| 19 | x | | | | | x |
| 20 | | | | | | |
| **Total** | **16** | **2** | **3** | **5** | **2** | **4** |
| **%** | **80%** | **13%** | **19%** | **31%** | **13%** | **25%** |

Table containing the actual results.

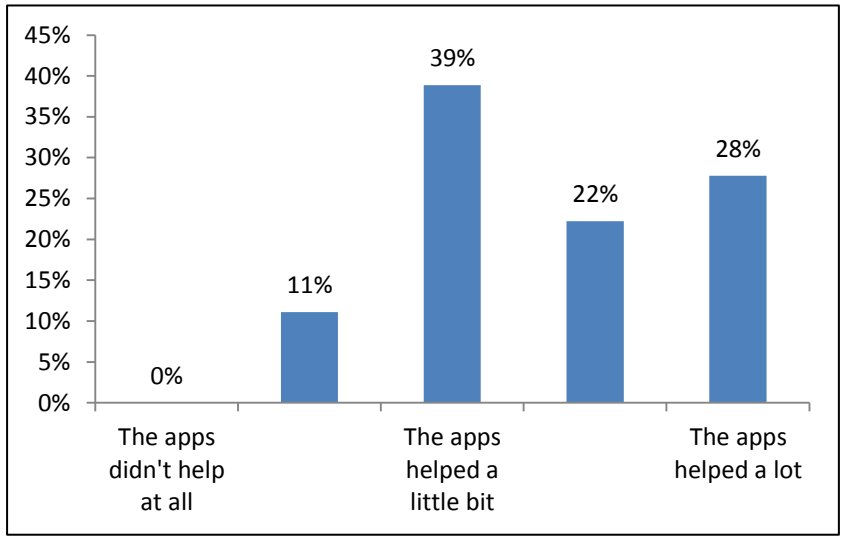



Graphical representation of the results.

# 12. Please mark all that apply. The apps helped me to improve my Sepedi skills in:
# 12.5 Speaking

| | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| **Student** | **Speaking** | **The apps didn't help at all** | | **The apps helped a little bit** | | **The apps helped a lot** |
| 1 | x | | | | x | |
| 2 | x | | x | | | |
| 3 | x | | | | | x |
| 4 | x | | | x | | |
| 5 | x | | | | x | |
| 6 | | | | | | |
| 7 | x | | | x | | |
| 8 | x | | | x | | |
| 9 | x | | | | | x |
| 10 | x | | | | x | |
| 11 | x | | | x | | |
| 12 | x | | | | | x |
| 13 | | | | | | |
| 14 | x | | | | | x |
| 15 | x | | x | | | |
| 16 | x | | | x | | |
| 17 | x | | | x | | |
| 18 | x | | | x | | |
| 19 | x | | | | | x |
| 20 | x | | | | x | |
| **Total** | **18** | **0** | **2** | **7** | **4** | **5** |
| **%** | **90%** | **0%** | **11%** | **39%** | **22%** | **28%** |

Table containing the actual results.

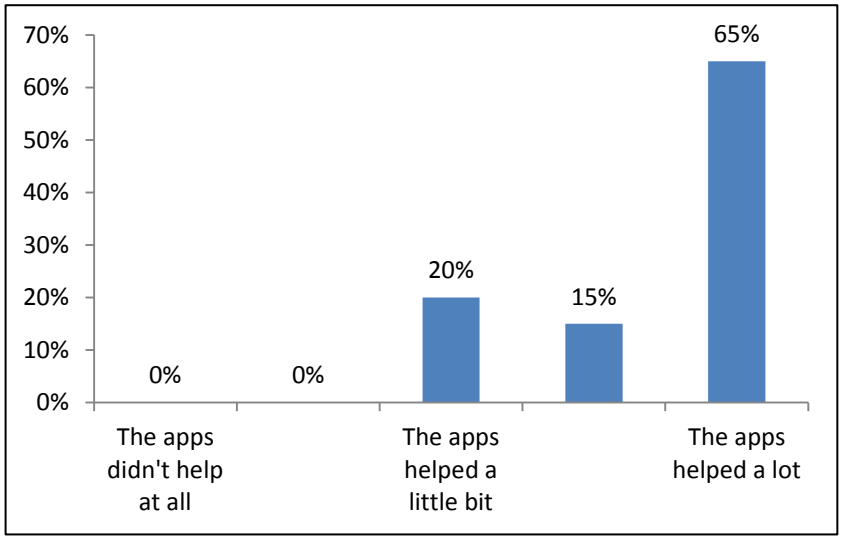



Graphical representation of the results.

# 12. Please mark all that apply. The apps helped me to improve my Sepedi skills in:
# 12.6 Pronunciation

| | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| **Student** | **Pronun-ciation** | **The apps didn't help at all** | | **The apps helped a little bit** | | **The apps helped a lot** |
| 1 | x | | | | x | |
| 2 | x | | | | x | |
| 3 | x | | | | | x |
| 4 | x | | | | x | |
| 5 | x | | | | | x |
| 6 | x | | | | | x |
| 7 | x | | | x | | |
| 8 | x | | | | | x |
| 9 | x | | | | | x |
| 10 | x | | | | | x |
| 11 | x | | | | | x |
| 12 | x | | | | | x |
| 13 | x | | | x | | |
| 14 | x | | | | | x |
| 15 | x | | | | | x |
| 16 | x | | | x | | |
| 17 | x | | | x | | |
| 18 | x | | | | | x |
| 19 | x | | | | | x |
| 20 | x | | | | | x |
| **Total** | **20** | **0** | **0** | **4** | **3** | **13** |
| **%** | **100%** | **0%** | **0%** | **20%** | **15%** | **65%** |

Table containing the actual results.

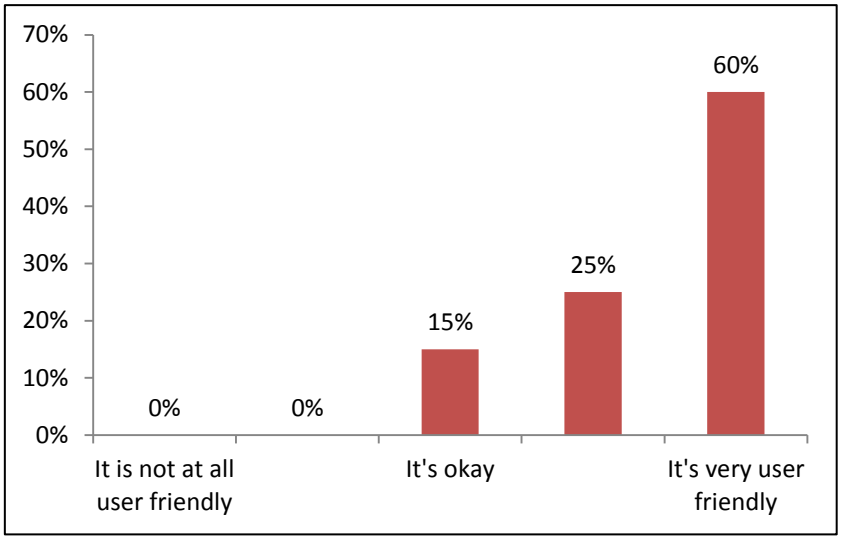



Graphical representation of the results.

# 13. What did you think of the layout in terms of user friendliness?

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Student** | **It is not at all user friendly** | | **It's okay** | | **It's very user friendly** |
| 1 | | | | x | |
| 2 | | | | | x |
| 3 | | | | | x |
| 4 | | | | x | |
| 5 | | | | | x |
| 6 | | | | | x |
| 7 | | | | | x |
| 8 | | | | | x |
| 9 | | | | x | |
| 10 | | | | | x |
| 11 | | | x | | |
| 12 | | | | | x |
| 13 | | | | x | |
| 14 | | | | | x |
| 15 | | | | | x |
| 16 | | | | x | |
| 17 | | | x | | |
| 18 | | | | | x |
| 19 | | | x | | |
| 20 | | | | | x |
| **Total** | **0** | **0** | **3** | **5** | **12** |
| **%** | **0%** | **0%** | **15%** | **25%** | **60%** |

Table containing the actual results.




Graphical representation of the results.

| Student | Score | Comment |
|---|---|---|
| 3 | 5 | I like it. |
| 5 | 5 | It is easy to read an follow any instructions |
| 7 | 5 | Easy to use. |
| 8 | 5 | The instructions are clear and easy to understand. |
| 9 | 4 | The double meaning words confused me. |
| 10 | 5 | It was easy to use. |
| 13 | 4 | Easy to use. |
| 18 | 5 | It was simple and very easy to use. You could find everything very easily. |
| 20 | 5 | It was very easy to use. |

Scores given and comments made by students.

# 14. What else would you like to see in the app?

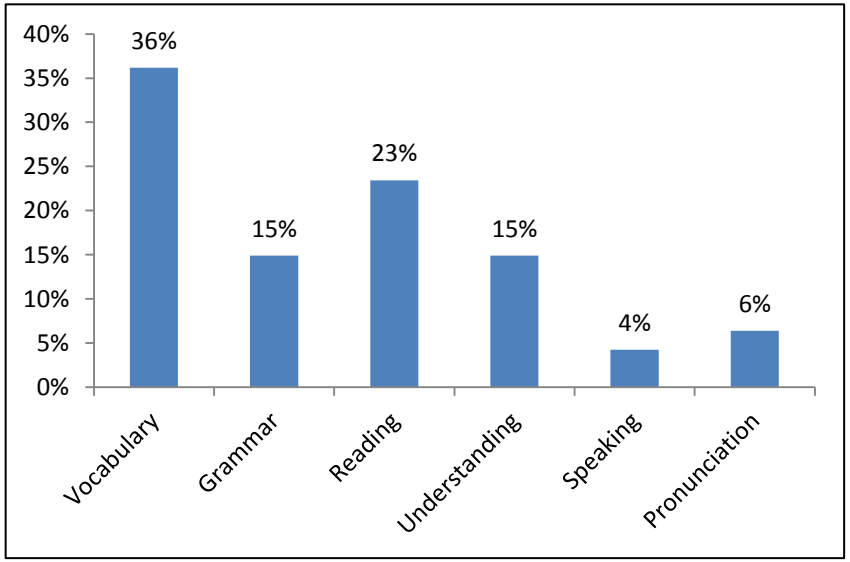
| Student | Answer |
|---|---|
| 1 | More examples. |
| 2 | |
| 3 | |
| 4 | More sections on medical things. |
| 5 | |
| 6 | |
| 7 | |
| 8 | Sentence construction as well as an advance skill in Sepedi. |
| 9 | Small tutorial before each questionare. |
| 10 | What it has now. |
| 11 | More pictures. |
| 12 | The app where you speak and they automatical answer you whether you are correct or wrong. |
| 13 | Percentages. |
| 14 | |
| 15 | Maybe why your answer is correct. |
| 16 | A demo or lesson before "testing" the user's knowledge. |
| 17 | |
| 18 | More words not just body parts. |
| 19 | Conservations where you talk and the app is answering back. |
| 20 | |

Students' actual answers on question 14.

# 15. The SILENT app helped me to improve the following Sepedi skills:

| Student | Vocabulary | Grammar | Reading | Under-standing | Speaking | Pronun-ciation |
|---|---|---|---|---|---|---|
| 1 | | | x | | | |
| 2 | x | | x | | | |
| 3 | x | x | x | x | x | x |
| 4 | x | | x | x | | |
| 5 | x | | | | | |
| 6 | x | | | x | | x |
| 7 | x | x | x | x | | |
| 8 | x | | | | | |
| 9 | x | | | x | x | x |
| 10 | x | x | | | | |
| 11 | x | | | | | |
| 12 | | x | x | | | |
| 13 | x | | | x | | |
| 14 | x | | | | | |
| 15 | x | x | x | | | |
| 16 | x | | x | | | |
| 17 | x | | | | | |
| 18 | | | x | | | |
| 19 | x | x | x | x | | |
| 20 | x | x | x | | | |
| **Total** | **17** | **7** | **11** | **7** | **2** | **3** |
| **%** | **36%** | **15%** | **23%** | **15%** | **4%** | **6%** |

Table containing the actual results.

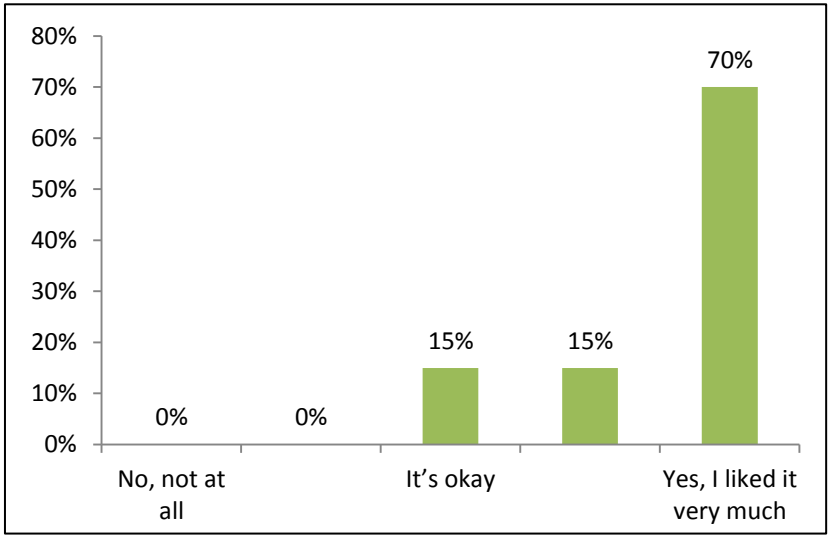



Graphical representation of the results.

# 16. Did you like hearing the correct pronunciation of the word/phrase immediately after getting an answer correct?

| Student | No, not at all | | It's okay | | Yes, I liked it very much |
|---|---|---|---|---|---|
| 1 | | | | x | |
| 2 | | | | x | |
| 3 | | | | | x |
| 4 | | | | | x |
| 5 | | | | | x |
| 6 | | | | | x |
| 7 | | | | | x |
| 8 | | | | | x |
| 9 | | | | | x |
| 10 | | | | x | |
| 11 | | | | | x |
| 12 | | | | | x |
| 13 | | | x | | |
| 14 | | | x | | |
| 15 | | | | | x |
| 16 | | | | | x |
| 17 | | | x | | |
| 18 | | | | | x |
| 19 | | | | | x |
| 20 | | | | | x |
| **Total** | **0** | **0** | **3** | **3** | **14** |
| **%** | **0%** | **0%** | **15%** | **15%** | **70%** |

Table containing the actual results.




Graphical representation of the results.

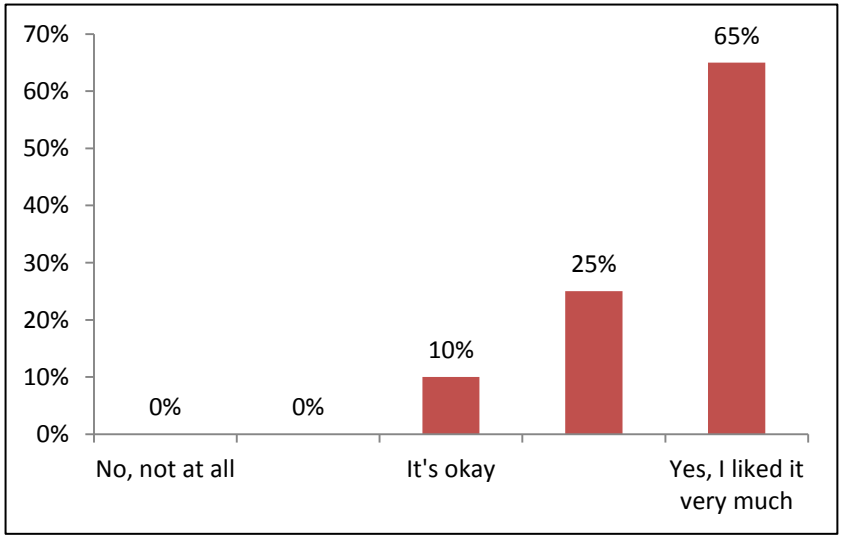
| Student | Score | Comment |
|---|---|---|
| 3 | 5 | It good to kno pronunciation. |
| 4 | 5 | Helped to understand the word. |
| 5 | 5 | It makes it easier to read the word. |
| 7 | 5 | Helps with understanding. |
| 8 | 5 | You are able to hear it and not only read it, thus making it easier to understand if somebody would talk it. |
| 9 | 5 | learning the word while listening helps. |
| 10 | 4 | For it is easy to hear the right answer. |
| 12 | 5 | Improve the pronunciation skills. |
| 13 | 3 | It was fun. |
| 14 | 3 | Would want to know if I said it correctly. |
| 15 | 5 | Helps you remember it. |
| 16 | 5 | We did not focus on pronunciation in class, I appreciated learning the word while seeing the word. |
| 18 | 5 | It helped a lot to hear the words and then having to say it yourself. |
| 19 | 5 | It's help by correcting me if I pronounce the word wrong. |
| 20 | 5 | Helped me to speak better. |

Scores given and comments made by students.

# 17. After listening to the pronunciation of the word, did you like having the option of listening to the pronunciation as many times as you like?

| Student | No, not at all | | It's okay | | Yes, I liked it very much |
|---|---|---|---|---|---|
| 1 | | | | x | |
| 2 | | | | | x |
| 3 | | | | | x |
| 4 | | | | x | |
| 5 | | | | x | |
| 6 | | | | | x |
| 7 | | | | | x |
| 8 | | | | | x |
| 9 | | | | | x |
| 10 | | | x | | |
| 11 | | | | | x |
| 12 | | | | | x |
| 13 | | | | x | |
| 14 | | | | | x |
| 15 | | | | | x |
| 16 | | | | x | |
| 17 | | | x | | |
| 18 | | | | | x |
| 19 | | | | | x |
| 20 | | | | | x |
| **Total** | **0** | **0** | **2** | **5** | **13** |
| **%** | **0%** | **0%** | **10%** | **25%** | **65%** |

Table containing the actual results.




Graphical representation of the results.

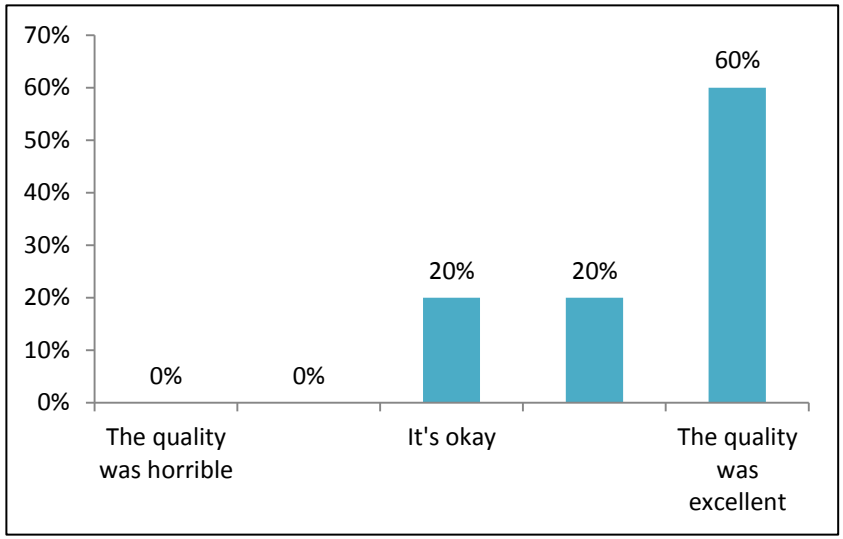
| Student | Score | Comment |
|---|---|---|
| 3 | 5 | For in case you struggle. |
| 5 | 4 | Anything you can't remember you can go back and listen to again. |
| 7 | 5 | Some words are difficult, so to hear it more than once helped a lot. |
| 8 | 5 | This will help you to memorise it and not only to hear it once and then forget it. |
| 9 | 5 | Repeating helps memorising. |
| 10 | 3 | It would be helpful. |
| 12 | 5 | It was where I got the real pronunciation of the word. |
| 13 | 4 | Helps with learning. |
| 16 | 4 | It helped me to listen to different sections/syllables of the word. |
| 18 | 5 | It gives you time to practice the word until you get the right pronunciation. |
| 20 | 5 | You don't get it the first time. |

Scores given and comments made by students.

# 18. What did you think of the quality of the sound clips that pronounced the words and phrases?

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Student** | **The quality was horrible** | | **It's okay** | | **The quality was excellent** |
| 1 | | | | x | |
| 2 | | | | | x |
| 3 | | | | x | |
| 4 | | | | | x |
| 5 | | | | | x |
| 6 | | | | | x |
| 7 | | | x | | |
| 8 | | | | | x |
| 9 | | | | | x |
| 10 | | | | | x |
| 11 | | | x | | |
| 12 | | | | | x |
| 13 | | | | x | |
| 14 | | | x | | |
| 15 | | | | | x |
| 16 | | | | x | |
| 17 | | | x | | |
| 18 | | | | | x |
| 19 | | | | | x |
| 20 | | | | | x |
| **Total** | **0** | **0** | **4** | **4** | **12** |
| **%** | **0%** | **0%** | **20%** | **20%** | **60%** |

Table containing the actual results.




Graphical representation of the results.

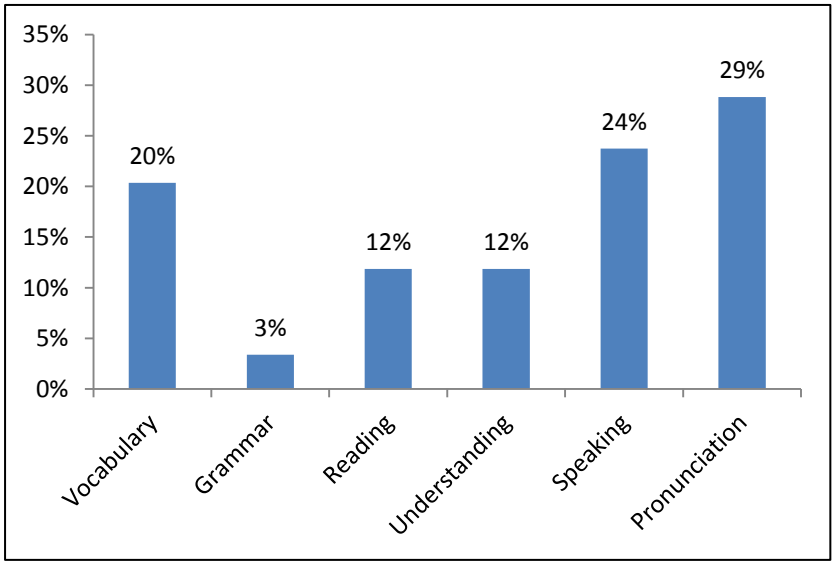
| Student | Score | Comment |
|---|---|---|
| 3 | 4 | Device might have an influence. |
| 4 | 5 | Could hear clearly. |
| 7 | 3 | Bit soft and unclear sometimes. |
| 8 | 5 | The quality was clear and good. You can hear the first time what is said. |
| 9 | 5 | It was clear. |
| 10 | 5 | You can hear well what is said. |
| 12 | 5 | It was very good and soft. |
| 13 | 4 | It was loud and clear. |
| 14 | 3 | Not so clear. |
| 15 | 5 | Could hear clearly. |
| 16 | 4 | I would have preferred the same speaker throughout. |
| 18 | 5 | You could hear properly what they were saying. |
| 19 | 5 | Sound is loud and very clear. |
| 20 | 5 | You could hear it clearly. |

Scores given and comments made by students.

# 19. The LISTEN app helped me to improve the following Sepedi skills:

| Student | Vocabulary | Grammar | Reading | Under-standing | Speaking | Pronun-ciation |
|---|---|---|---|---|---|---|
| 1 | | | | x | | |
| 2 | | | | | x | x |
| 3 | x | x | x | x | x | x |
| 4 | | | | x | x | x |
| 5 | | | x | | x | x |
| 6 | x | | x | | | x |
| 7 | x | | | x | x | x |
| 8 | x | | | | | x |
| 9 | x | | | | x | x |
| 10 | | | | x | | |
| 11 | x | | | | | x |
| 12 | x | | | | x | x |
| 13 | x | | | | x | x |
| 14 | | | x | | | x |
| 15 | x | x | x | x | x | x |
| 16 | x | | x | | x | x |
| 17 | x | | | | x | |
| 18 | | | x | | x | x |
| 19 | | | | x | x | x |
| 20 | x | | | | x | x |
| **Total** | **12** | **2** | **7** | **7** | **14** | **17** |
| **%** | **20%** | **3%** | **12%** | **12%** | **24%** | **29%** |

Table containing the actual results.

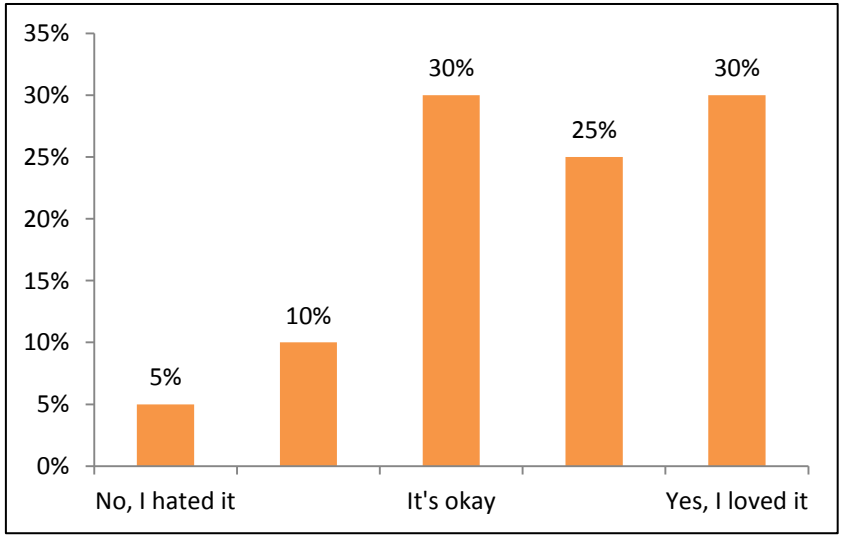



Graphical representation of the results.

# 20. Did you like being able to practice speaking?

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Student** | **No, I hated it** | | **It's okay** | | **Yes, I loved it** |
| 1 | | | | x | |
| 2 | | | | x | |
| 3 | | | | x | |
| 4 | | | | x | |
| 5 | | | x | | |
| 6 | | | x | | |
| 7 | | x | | | |
| 8 | | | | | x |
| 9 | | | | x | |
| 10 | | | x | | |
| 11 | | | x | | |
| 12 | | | | | x |
| 13 | | | x | | |
| 14 | | | | | x |
| 15 | | | | | x |
| 16 | x | | | | |
| 17 | | x | | | |
| 18 | | | x | | |
| 19 | | | | | x |
| 20 | | | | | x |
| **Total** | **1** | **2** | **6** | **5** | **6** |
| **%** | **5%** | **10%** | **30%** | **25%** | **30%** |

Table containing the actual results.




Graphical representation of the results.

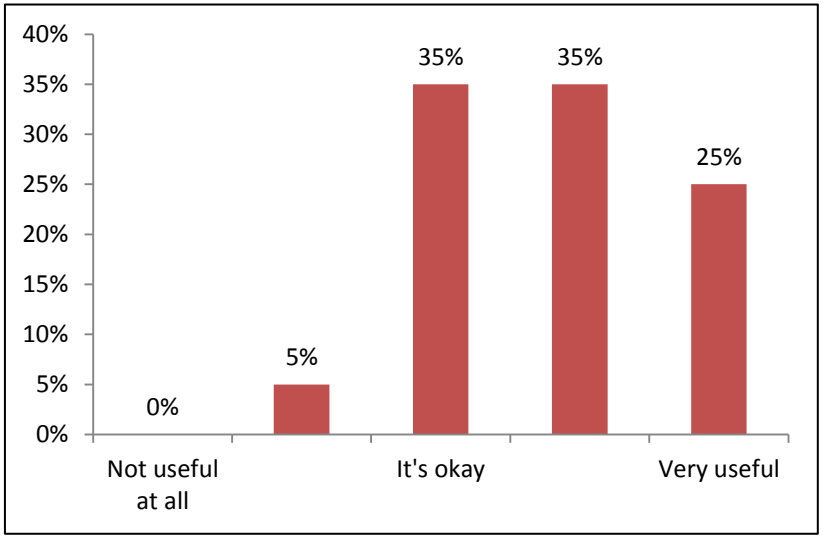
| Student | Score | Comment |
|---|---|---|
| 3 | 4 | Nice to say. |
| 5 | 3 | I think that you can actually just practise the word out loud, without recording it. |
| 6 | 3 | Don't like that they play my voice back. |
| 7 | 2 | Feel self-concious in room with others. |
| 8 | 5 | You learn more effectively to speak the words than you would through only hearing it. |
| 9 | 4 | It helps with understanding. |
| 10 | 3 | I would like my own private area. |
| 12 | 5 | Improved the communication skills. |
| 13 | 3 | Difficult. |
| 15 | 5 | Made you comfortable with speaking the language. |
| 16 | 1 | I did not feel like I know enough about pronunciation at this point to be ready to pronounce correctly. |
| 18 | 3 | I liked to speak the word after hearing the correct way of saying it. |
| 19 | 5 | To improve my Sepedi language. |
| 20 | 5 | Helped me to speak the language better. |

Scores given and comments made by students.

# 21. Did you find speaking your answers useful?

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Student** | **Not useful at all** | | **It's okay** | | **Very useful** |
| 1 | | | | x | |
| 2 | | | | x | |
| 3 | | | | | x |
| 4 | | | x | | |
| 5 | | | | x | |
| 6 | | | x | | |
| 7 | | | | x | |
| 8 | | | | | x |
| 9 | | | | x | |
| 10 | | | | x | |
| 11 | | | x | | |
| 12 | | | | | x |
| 13 | | | | x | |
| 14 | | | x | | |
| 15 | | | | | x |
| 16 | | | x | | |
| 17 | | x | | | |
| 18 | | | x | | |
| 19 | | | | | x |
| 20 | | | x | | |
| **Total** | **0** | **1** | **7** | **7** | **5** |
| **%** | **0%** | **5%** | **35%** | **35%** | **25%** |

Table containing the actual results.




Graphical representation of the results.

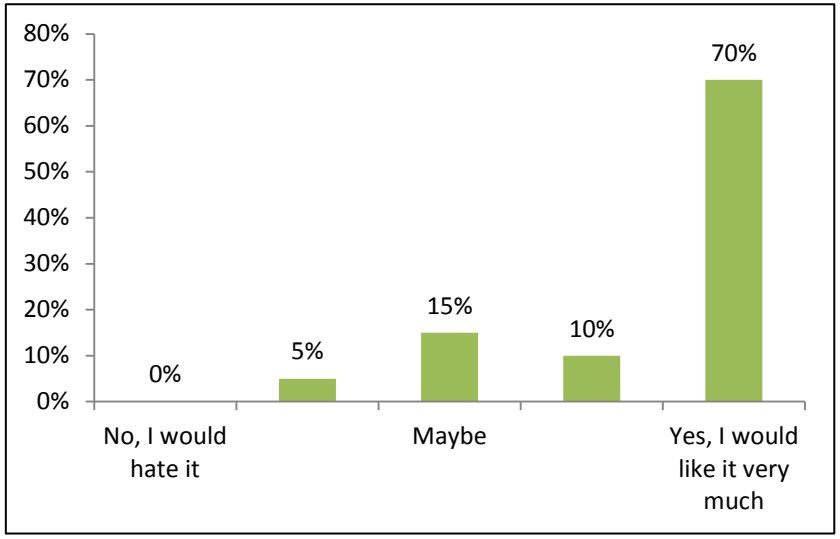
| Student | Score | Comment |
|---|---|---|
| 4 | 3 | Would like phonetics to help me pronounce. |
| 7 | 4 | But didn't know if pronounced correctely. |
| 8 | 5 | You learn to pronunciate it correctly and understand it better. |
| 9 | 4 | Yes hearing while thinking and speaking out loud sets the memorising + understanding into play. |
| 10 | 4 | It was useful. |
| 13 | 4 | Helped. |
| 14 | 3 | Not know if it's [correct]/[incorrect]. |
| 15 | 5 | It is another way of learning. |
| 16 | 3 | It felt unnatural and did not help because I would listen to the clip then record before I forgot the pronunciation. |
| 18 | 3 | It helped to say the words a loud but you did not know if what you were saying was right. |

Scores given and comments made by students.

# 22. Would you like the app to give you feedback on your pronunciation?

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Student** | **No, I would hate it** | | **Maybe** | | **Yes, I would like it very much** |
| 1 | | | | x | |
| 2 | | | | x | |
| 3 | | | | | x |
| 4 | | | | | x |
| 5 | | | | | x |
| 6 | | | | | x |
| 7 | | | | | x |
| 8 | | | | | x |
| 9 | | | | | x |
| 10 | | | x | | |
| 11 | | | | | x |
| 12 | | | | | x |
| 13 | | | x | | |
| 14 | | | | | x |
| 15 | | | | | x |
| 16 | | | | | x |
| 17 | | x | | | |
| 18 | | | | | x |
| 19 | | | | | x |
| 20 | | | x | | |
| **Total** | **0** | **1** | **3** | **2** | **14** |
| **%** | **0%** | **5%** | **15%** | **10%** | **70%** |

Table containing the actual results.




Graphical representation of the results.

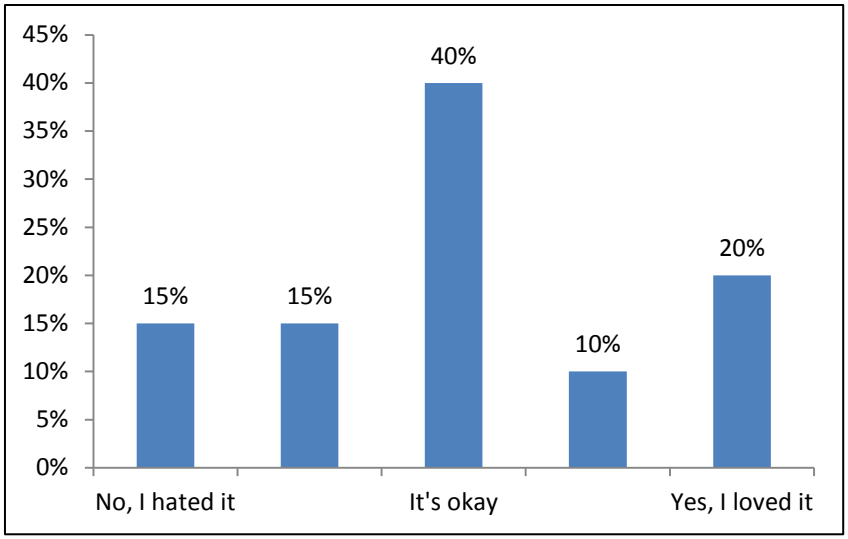
| Student | Score | Comment |
|---|---|---|
| 3 | 5 | It would help alot. |
| 7 | 5 | Would help to have clarity over pronunciation. |
| 8 | 5 | Then you would be able to evaluate yourself on whether or not you are pronunciating it correctly. |
| 9 | 5 | Maybe I am unaware of errors. |
| 10 | 3 | But must not be a lecture on what you did wrong. |
| 13 | 3 | Yes. |
| 14 | 5 | To see if it is [correct]/[incorrect]. |
| 15 | 5 | Yes to promote learning and to know if you're correct. |
| 16 | 5 | I would like feedback to improve. |
| 18 | 5 | You would then know if you are saying it correctly or not. |
| 20 | 3 | Would be interesting to see. |

Scores given and comments made by students.

# 23. Did you like listening to your own pronunciation of the words?

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Student** | **No, I hated it** | | **It's okay** | | **Yes, I loved it** |
| 1 | | | | x | |
| 2 | | | | x | |
| 3 | | | | | x |
| 4 | x | | | | |
| 5 | | x | | | |
| 6 | | | x | | |
| 7 | x | | | | |
| 8 | | | | | x |
| 9 | | x | | | |
| 10 | | | x | | |
| 11 | | | x | | |
| 12 | | | x | | |
| 13 | | | x | | |
| 14 | | | x | | |
| 15 | | | | | x |
| 16 | x | | | | |
| 17 | | | x | | |
| 18 | | | x | | |
| 19 | | | | | x |
| 20 | | x | | | |
| **Total** | **3** | **3** | **8** | **2** | **4** |
| **%** | **15%** | **15%** | **40%** | **10%** | **20%** |

Table containing the actual results.




Graphical representation of the results.

| Student | Score | Comment |
|---|---|---|
| 4 | 1 | No I said most of the words wrong. |
| 7 | 1 | Struggled to pronounce. |
| 8 | 5 | You can learn from your mistakes. |
| 9 | 2 | Its time consuming. |
| 10 | 3 | It helps. |
| 12 | 3 | Mine was not quite correct. |
| 13 | 3 | Time consuming. |
| 14 | 3 | Don't like hearing my own voice. |
| 15 | 5 | Hearing yourself helps learning. |
| 16 | 1 | It made me feel inadequate because I knew I didn't pronounce a word correctly but did not have knowledge to correct myself. |
| 18 | 3 | You could compare how you said it to the way the lady pronounced it, which was nice. |

Scores given and comments made by students.

# 24. What would the best uses of the speaking app be?

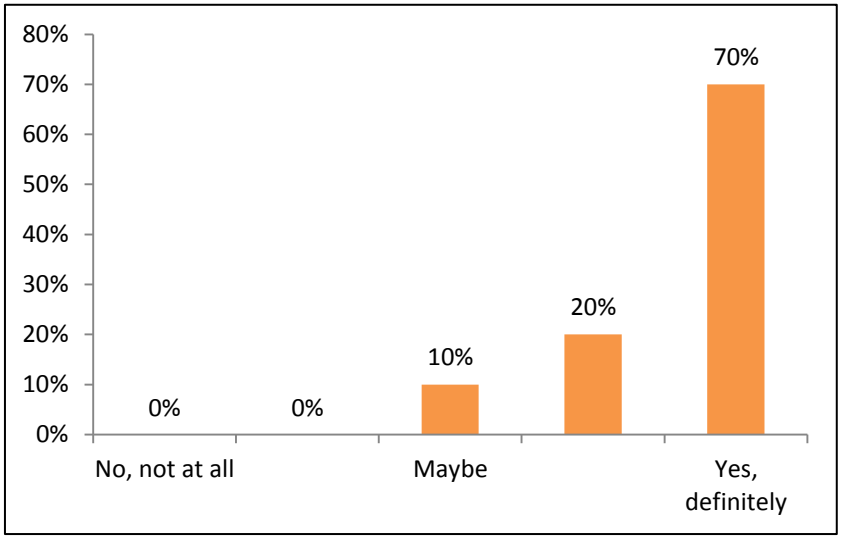
| Student | Answer |
|---|---|
| 1 | |
| 2 | Pronunciation. |
| 3 | You get to say the words. |
| 4 | To learn the speaking and pronunciation |
| 5 | It allows you to objectively judge your pronunciation of the words, |
| 6 | To learn to speak Sepedi correcty. |
| 7 | |
| 8 | Pronunciation. |
| 9 | Learning to pronounce, with preparing for oral test/speaches. |
| 10 | Pronunciation. |
| 11 | To learn pronunciation. |
| 12 | Communication skill with best words pronunciations. |
| 13 | Pronunciations. |
| 14 | Learn to pronounce. |
| 15 | For pronunciation of living language. |
| 16 | Practicing. |
| 17 | Pronunciation. |
| 18 | To record yourself and compare it with the way the lady spoke it. |
| 19 | |
| 20 | Pronunciation. |

Students' actual answers on question 24.

# 25. Do you think the app can assist with improving your pronunciation?

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Student** | **No, not at all** | | **Maybe** | | **Yes, definitely** |
| 1 | | | | x | |
| 2 | | | | x | |
| 3 | | | | | x |
| 4 | | | | | x |
| 5 | | | | | x |
| 6 | | | | x | |
| 7 | | | | | x |
| 8 | | | | | x |
| 9 | | | | | x |
| 10 | | | | | x |
| 11 | | | | | x |
| 12 | | | | | x |
| 13 | | | x | | |
| 14 | | | | | x |
| 15 | | | | | x |
| 16 | | | | x | |
| 17 | | | x | | |
| 18 | | | | | x |
| 19 | | | | | x |
| 20 | | | | | x |
| **Total** | **0** | **0** | **2** | **4** | **14** |
| **%** | **0%** | **0%** | **10%** | **20%** | **70%** |

Table containing the actual results.




Graphical representation of the results.

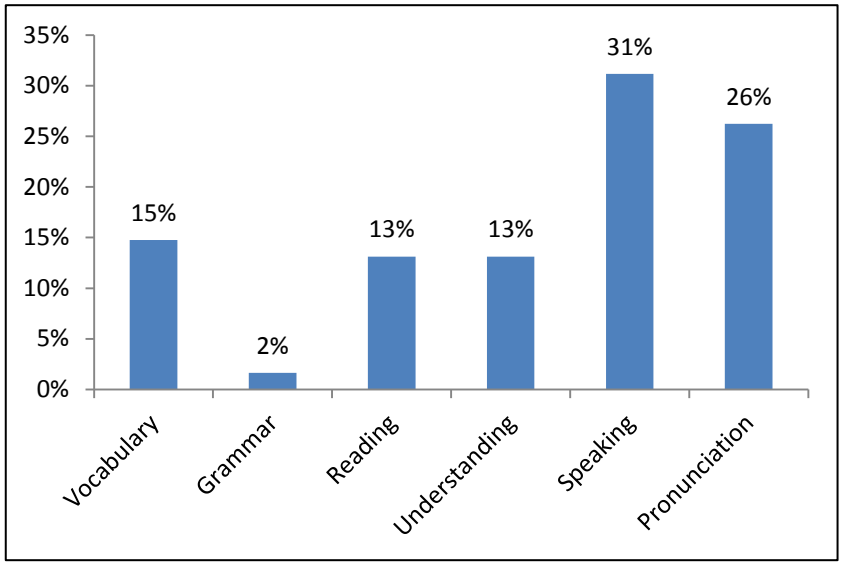
| Student | Score | Comment |
|---|---|---|
| 7 | 5 | Hearing the word helps with pronunciation. |
| 8 | 5 | Because you pronunciate the words. |
| 9 | 5 | Learning while listening and then pronouncing helps to understand + grasp. |
| 10 | 5 | It works well already. |
| 14 | 5 | You hear how it must sound but feedback on how you say it would be nice. |
| 15 | 5 | You speak what you see. |
| 16 | 4 | If it had feedback or details about how to pronounce, break words into syllables. |
| 18 | 5 | It would help with pronunciation as you could hear it and then practice saying it. |

Scores given and comments made by students.

# 26. The SPEAK app helped me to improve the following Sepedi skills:

| Student | Vocabulary | Grammar | Reading | Under-standing | Speaking | Pronun-ciation |
|---|---|---|---|---|---|---|
| 1 | | | | | x | |
| 2 | | | | x | x | x |
| 3 | x | x | x | x | x | x |
| 4 | | | | x | x | x |
| 5 | | | | x | x | x |
| 6 | x | | x | | x | x |
| 7 | x | | x | x | x | x |
| 8 | x | | | | x | x |
| 9 | x | | | x | x | x |
| 10 | | | | | x | x |
| 11 | | | x | | | x |
| 12 | | | | x | x | |
| 13 | | | | | x | |
| 14 | | | x | | x | x |
| 15 | x | | x | x | x | x |
| 16 | x | | x | | x | x |
| 17 | | | | | x | |
| 18 | | | | | x | x |
| 19 | x | | x | | x | x |
| 20 | x | | | | x | x |
| **Total** | **9** | **1** | **8** | **8** | **19** | **16** |
| **%** | **15%** | **2%** | **13%** | **13%** | **31%** | **26%** |

Table containing the actual results.

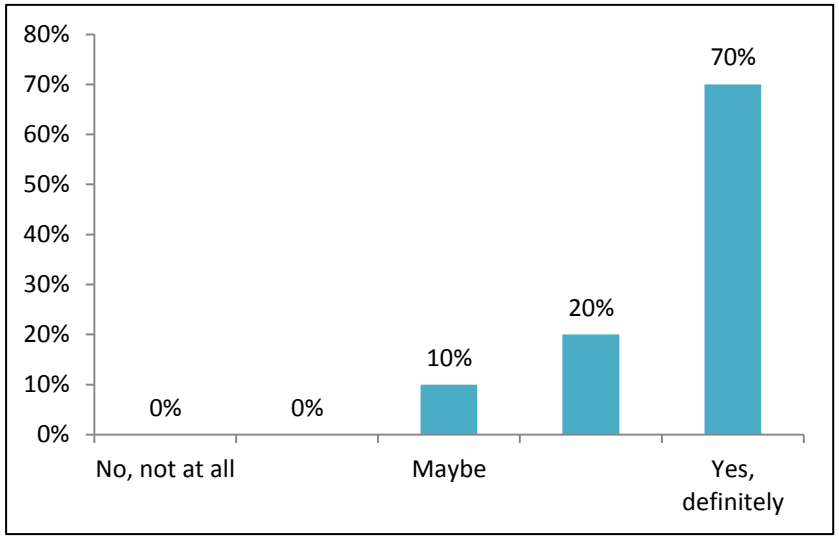



Graphical representation of the results.

# 27. If the apps are made available on the Google Play Store, would you:
# 27.1 Download them?

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Student** | **No, not at all** | | **Maybe** | | **Yes, definitely** |
| 1 | | | | x | |
| 2 | | | | x | |
| 3 | | | | | x |
| 4 | | | | | x |
| 5 | | | | | x |
| 6 | | | | | x |
| 7 | | | | | x |
| 8 | | | | | x |
| 9 | | | | | x |
| 10 | | | | | x |
| 11 | | | | | x |
| 12 | | | | | x |
| 13 | | | x | | |
| 14 | | | | | x |
| 15 | | | | | x |
| 16 | | | | x | |
| 17 | | | x | | |
| 18 | | | | | x |
| 19 | | | | | x |
| 20 | | | | x | |
| **Total** | **0** | **0** | **2** | **4** | **14** |
| **%** | **0%** | **0%** | **10%** | **20%** | **70%** |

Table containing the actual results.




Graphical representation of the results.

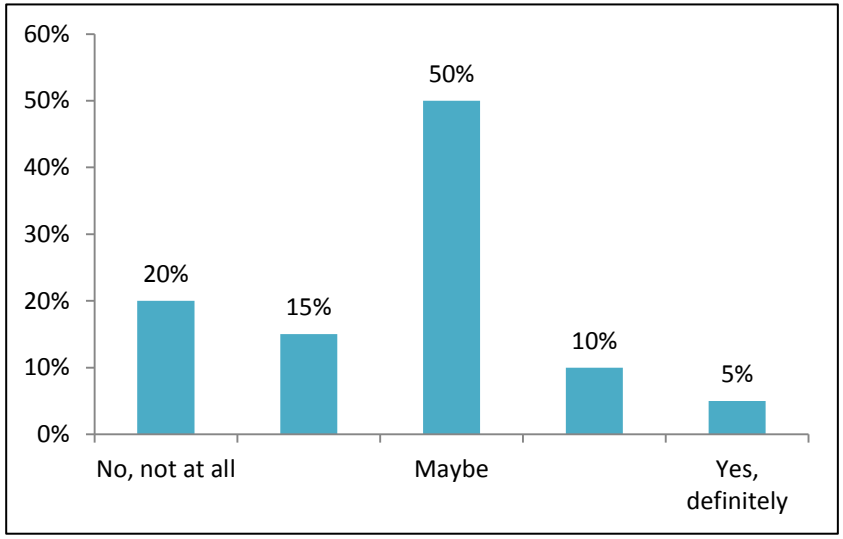
| Student | Score | Comment |
|---|---|---|
| 4 | 5 | Would help me to work with African client's if I forget the words. |
| 6 | 5 | Will use it in future + practice one day. |
| 7 | 5 | It helps a lot. |
| 8 | 5 | If I have the subject I would. It can test your knowledge before an exam and you can learn to communicate the basics. |
| 9 | 5 | Fun + helpful way of learning. |
| 10 | 5 | If I were in first year again. |
| 12 | 5 | It is more helpful to the Sepedi beginners. |
| 13 | 3 | Would maybe. |
| 14 | 5 | To improve my language. |
| 15 | 5 | Easy access. |
| 16 | 4 | If used consistently it would help. |
| 18 | 5 | It would be a useful app to many students. |
| 20 | 4 | Is very useful. |

Scores given and comments made by students.

# 27. If the apps are made available on the Google Play Store, would you:
# 27.2 Pay for them?

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Student** | **No, not at all** | | **Maybe** | | **Yes, definitely** |
| 1 | | | | x | |
| 2 | | x | | | |
| 3 | x | | | | |
| 4 | | | x | | |
| 5 | | | x | | |
| 6 | | | x | | |
| 7 | | | x | | |
| 8 | | | x | | |
| 9 | | | | x | |
| 10 | x | | | | |
| 11 | | | x | | |
| 12 | | | x | | |
| 13 | x | | | | |
| 14 | x | | | | |
| 15 | | x | | | |
| 16 | | x | | | |
| 17 | | | x | | |
| 18 | | | x | | |
| 19 | | | | | x |
| 20 | | | x | | |
| **Total** | **4** | **3** | **10** | **2** | **1** |
| **%** | **20%** | **15%** | **50%** | **10%** | **5%** |

Table containing the actual results.




Graphical representation of the results.

| Student | Score | Comment |
|---|---|---|
| 4 | 3 | If not too expensive. |
| 6 | 3 | Students are poor. |
| 7 | 3 | Determines how much I will use it. |
| 8 | 3 | People who don't need the app as a must to test knowledge could learn the same things from google using the woman to speak. |
| 9 | 4 | If it is a reasonable price. |
| 10 | 1 | I would not be using it all the time. |
| 12 | 3 | I can afford everything. |
| 15 | 2 | It is not a necessity, only a bonus to have. Will cope without it. |
| 16 | 2 | I would prefer an app with a demo before test, and feedback. |
| 18 | 3 | If it was not too high of a price then maybe. |
| 19 | 5 | I am willing to get one from the tutor's if they are selling it. |
| 20 | 3 | If it helps me, I would. |

Scores given and comments made by students.

# 28. Which application did you prefer using?

| | First Preference | | | Second Preference | | | Third Preference | | |
|---|---|---|---|---|---|---|---|---|---|
| **Student** | **Silent** | **Listen** | **Speak** | **Silent** | **Listen** | **Speak** | **Silent** | **Listen** | **Speak** |
| 1 | | | x | | | | | | |
| 2 | | | x | | x | | x | | |
| 3 | | | x | | x | | x | | |
| 4 | | x | | x | | | | | x |
| 5 | | x | | x | | | | | x |
| 6 | | x | | x | | | | | x |
| 7 | | x | | | | x | x | | |
| 8 | | | x | x | | | | x | |
| 9 | x | | | | x | | | | x |
| 10 | x | | | | x | | | | x |
| 11 | x | | | | x | | | | x |
| 12 | x | | | | | x | | x | |
| 13 | x | | | | x | | | | x |
| 14 | x | | | | | x | | x | |
| 15 | x | x | x | | | | | | |
| 16 | | x | | | | x | x | | |
| 17 | x | | | | x | | | | x |
| 18 | | x | | | | x | x | | |
| 19 | | x | x | | | | x | | |
| 20 | | x | | | | x | x | | |
| **Total** | **8** | **9** | **6** | **4** | **7** | **6** | **7** | **3** | **8** |
| **%** | **35%** | **39%** | **26%** | **24%** | **41%** | **35%** | **39%** | **17%** | **44%** |

Table containing the actual results.

# 28. Which application did you prefer using? (cont.)

| Student | App | Rank | Comment |
|---|---|---|---|
| 1 | Silent | | |
| | Listen | | |
| | Speak | 1 | Helps me to see how I pronounce words. |
| 2 | Silent | 3 | |
| | Listen | 2 | |
| | Speak | 1 | Targets most of the skills at once. |
| 3 | Silent | 3 | Grammar purpose |
| | Listen | 2 | Pronounciation of how |
| | Speak | 1 | Say it self |
| 4 | Silent | 2 | Helped with the pictures. |
| | Listen | 1 | It helped to learn the words |
| | Speak | 3 | Did not like to listen to my own voice. |
| 5 | Silent | 2 | |
| | Listen | 1 | The listen one gives you an advantage over just reading the words, but you don't have to record your voice. |
| | Speak | 3 | |
| 6 | Silent | 2 | Good for initial learning |
| | Listen | 1 | Helps to hear and read it. |
| | Speak | 3 | No feedback |
| 7 | Silent | 3 | It only helps with vocab and grammer. |
| | Listen | 1 | Helps with pronounciation as well. |
| | Speak | 2 | Bit self-concious about pronouncing, but will be best app as it is seeing, hearing and speaking the word. |
| 8 | Silent | 2 | This is effective if you want to use it in the library where it is quite. |
| | Listen | 3 | It's boring to only listen and not speak back. |
| | Speak | 1 | You learn to pronunciate as well as understand it better. |
| 9 | Silent | 1 | Learning first always helps |
| | Listen | 2 | Listening helps to set in motion what was learned. |
| | Speak | 3 | Helping to memorise and understand what learned lastly. |
| 10 | Silent | 1 | It was easy |
| | Listen | 2 | Was good to listen. |
| | Speak | 3 | It was a bit hard. |

Scores given and comments made by students.

# 28. Which application did you prefer using? (cont.)

| Student | App | Rank | Comment |
|---|---|---|---|
| 11 | Silent | 1 | I learned the most |
| | Listen | 2 | Help you to read the work |
| | Speak | 3 | Didn't like having to record myself. |
| 12 | Silent | 1 | It only teaches the grammar no communication skill |
| | Listen | 3 | Improve pronounciation of words |
| | Speak | 2 | Boost the confidence only. |
| 13 | Silent | 1 | Helped. |
| | Listen | 2 | Difficult |
| | Speak | 3 | Time consuming. |
| 14 | Silent | 1 | Boring to just choose. |
| | Listen | 3 | Nice to hear how it is suppose to be pronounced |
| | Speak | 2 | Nice to hear your pronounciation. |
| 15 | Silent | 1 | Mostly improved grammar. |
| | Listen | 1 | Helps you get to know and get used to it. |
| | Speak | 1 | Helps you with pronunciation |
| 16 | Silent | 3 | I tended to guess answers. |
| | Listen | 1 | It helped to hear correct pronunciation while seeing the word. |
| | Speak | 2 | Including speech while reading is a good way to commit to memory |
| 17 | Silent | 1 | Learning. |
| | Listen | 2 | Help me to speak.. |
| | Speak | 3 | Struggle to speak. |
| 18 | Silent | 3 | It sort of became a guessing game |
| | Listen | 1 | It helped to listen to the words |
| | Speak | 2 | Could listen to it, record yourself and then compare it. |
| 19 | Silent | 3 | Only help by improving reading. |
| | Listen | 1 | Help by improving reading, understanding |
| | Speak | 1 | Help by improving understanding, pronunciation, reading |
| 20 | Silent | 3 | Vocabulary. |
| | Listen | 1 | Pronunciation. |
| | Speak | 2 | Pronunciation. |

Scores given and comments made by students.

# APPENDIX F

# Results: Pre- and Post-test

# Pre- and Post-test Results

| Student | Pre-Test /48 | % | Post-Test /48 | % | Student | Pre-Test /48 | % | Post-Test /48 | % |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 15 | 31.3% | 14 | 29.2% | 19 | 3 | 6.3% | 19 | 39.6% |
| 2 | 6 | 12.5% | 7 | 14.6% | 20 | 7 | 14.6% | 36 | 75.0% |
| 3 | 7 | 14.6% | 6 | 12.5% | 21 | 7 | 14.6% | 6 | 12.5% |
| 4 | 10 | 20.8% | 11 | 22.9% | 22 | 8 | 16.7% | 9 | 18.8% |
| 5 | 10 | 20.8% | 11 | 22.9% | 23 | 11 | 22.9% | 13 | 27.1% |
| 6 | 8 | 16.7% | 9 | 18.8% | 24 | 12 | 25.0% | 6 | 12.5% |
| 7 | 11 | 22.9% | 8 | 16.7% | 25 | 8 | 16.7% | 10 | 20.8% |
| 8 | 10 | 20.8% | 14 | 29.2% | 26 | 7 | 14.6% | 9 | 18.8% |
| 9 | 12 | 25.0% | 22 | 45.8% | 27 | 8 | 16.7% | 11 | 22.9% |
| 10 | 7 | 14.6% | 10 | 20.8% | 28 | 6 | 12.5% | 13 | 27.1% |
| 11 | 4 | 8.3% | 11 | 22.9% | 29 | 11 | 22.9% | 12 | 25.0% |
| 12 | 16 | 33.3% | 31 | 64.6% | 30 | 7 | 14.6% | 11 | 22.9% |
| 13 | 8 | 16.7% | 12 | 25.0% | 31 | 7 | 14.6% | 9 | 18.8% |
| 14 | 9 | 18.8% | 8 | 16.7% | 32 | 13 | 27.1% | 21 | 43.8% |
| 15 | 11 | 22.9% | 12 | 25.0% | 33 | 9 | 18.8% | 10 | 20.8% |
| 16 | 8 | 16.7% | 12 | 25.0% | 34 | 7 | 14.6% | 2 | 4.2% |
| 17 | 5 | 10.4% | 9 | 18.8% | 35 | 5 | 10.4% | Did not write | 0.0% |
| 18 | 10 | 20.8% | 14 | 29.2% | 36 | 5 | 10.4% | Did not write | 0.0% |

Table containing actual results from the pre- and post-tests.

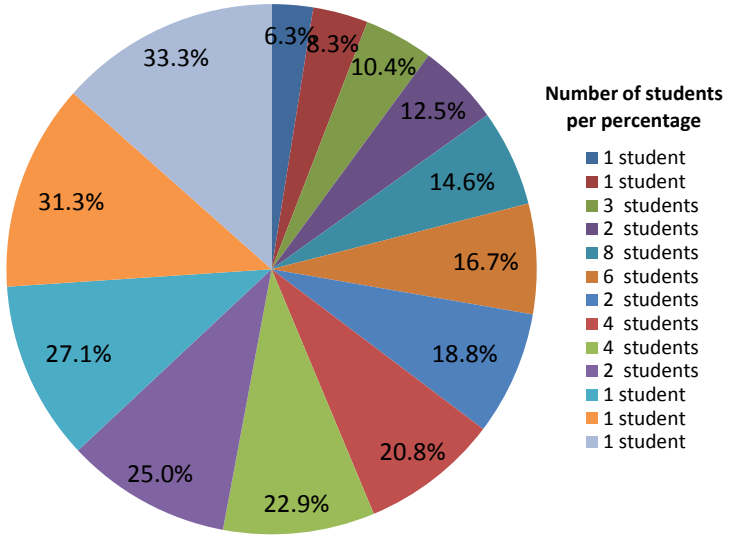
| | |
|---|---|
| Pre-Test Average | 17.8% |
| Post-Test Average | 25.6% |
| Difference | 7.8% |

The averages achieved on the pre- and post-tests
and the difference between the two results

# Pre-test Results

| Percentage scored on pre-test | Number of students |
|---|---|
| 6.3% | 1 |
| 8.3% | 1 |
| 10.4% | 3 |
| 12.5% | 2 |
| 14.6% | 8 |
| 16.7% | 6 |
| 18.8% | 2 |
| 20.8% | 4 |
| 22.9% | 4 |
| 25.0% | 2 |
| 27.1% | 1 |
| 31.3% | 1 |
| 33.3% | 1 |
| **Total** | **36** |

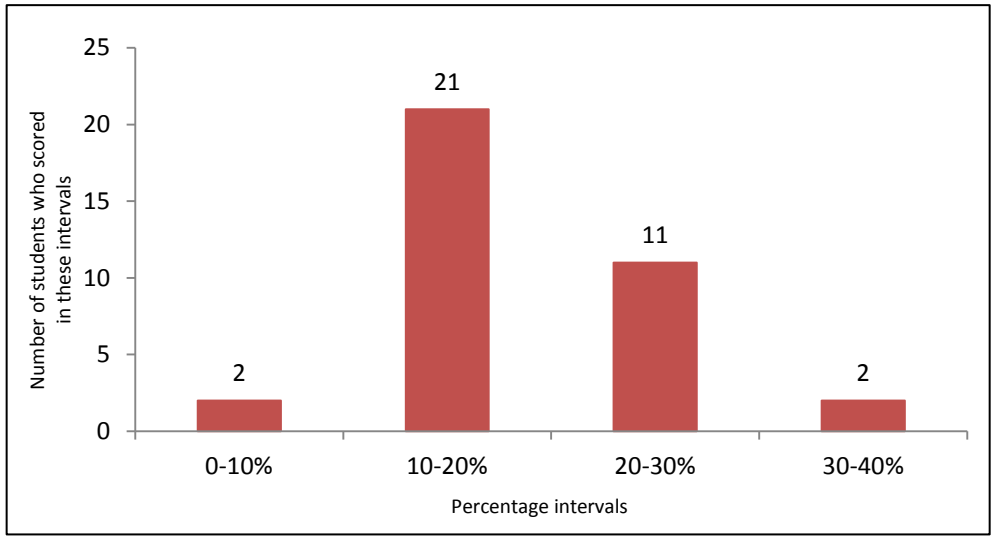
The percentages the students scored in the pre-test.




A graphical representation of the percentages the students scored.

| Percentage intervals | Number of students |
|---|---|
| 0-10% | 2 |
| 10-20% | 21 |
| 20-30% | 11 |
| 30-40% | 2 |
| **Total** | **36** |

The percentage intervals the students scored in.

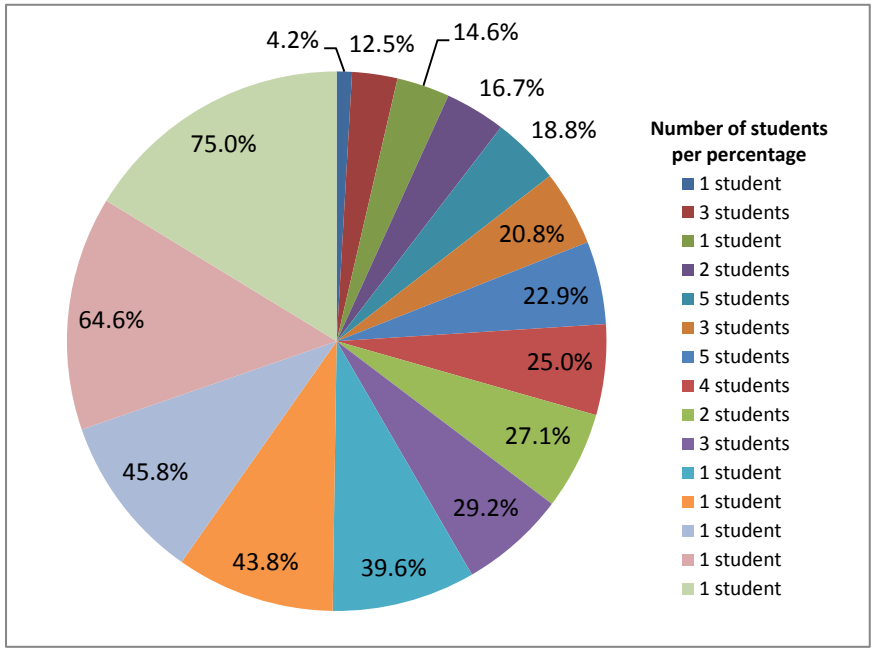



A graphical representation of the percentage intervals the students scored in.

# Post-test Results

| Percentage scored on post-test | Number of students |
|---|---|
| 4.2% | 1 |
| 12.5% | 3 |
| 14.6% | 1 |
| 16.7% | 2 |
| 18.8% | 5 |
| 20.8% | 3 |
| 22.9% | 5 |
| 25.0% | 4 |
| 27.1% | 2 |
| 29.2% | 3 |
| 39.6% | 1 |
| 43.8% | 1 |
| 45.8% | 1 |
| 64.6% | 1 |
| 75.0% | 1 |
| **Total** | **34** |

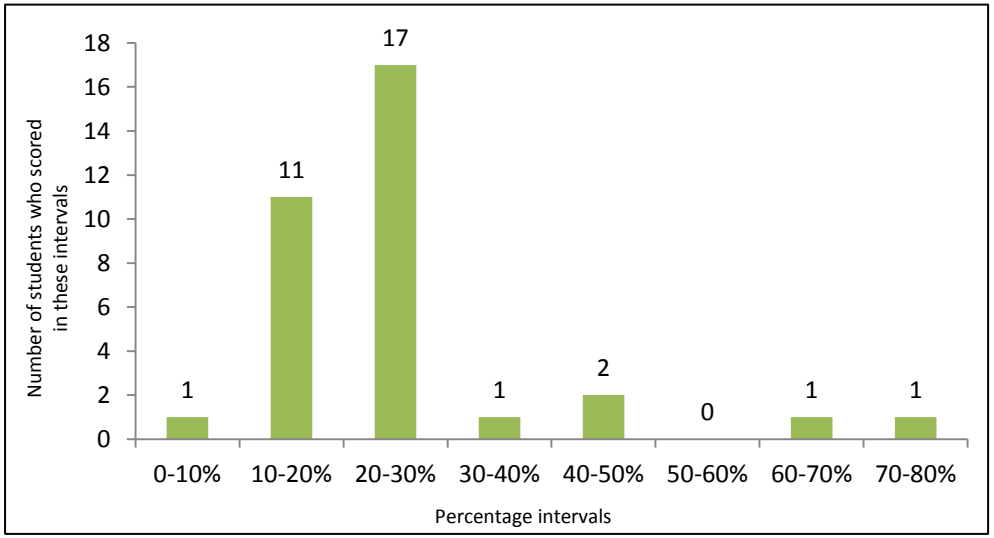
The percentages the students scored in the pre-test.




A graphical representation of the percentages the students scored.

| Percentage intervals | Number of students |
|---|---|
| 0-10% | 1 |
| 10-20% | 11 |
| 20-30% | 17 |
| 30-40% | 1 |
| 40-50% | 2 |
| 50-60% | 0 |
| 60-70% | 1 |
| 70-80% | 1 |
| **Total** | **34** |

The percentage intervals the students scored in.




A graphical representation of the percentage intervals the students scored in.

# APPENDIX G

## Publication

ISCA Archive
http://www.isca-speech.org/archive

Language Teaching, Learning and Technology (LTLT-2015)
Leipzig, Germany
September 4, 2015

# A Mobile Vocabulary Acquisition Application for Health Science Students: a Proposed Study

*Ilana Wilken*[1], *Febe de Wet*[1] *& Elsabé Taljard*[2]

[1]Human Language Technology Research Group, Meraka Institute, CSIR, Pretoria, South Africa
[2]Department of African Languages, University of Pretoria, Pretoria, South Africa
IWilken@csir.co.za, FDWet@csir.co.za, Elsabe.Taljard@up.ac.za

## Abstract

Communication plays a vital role in everyday life and in some situations multilingual communication is a necessity. The South African constitution recognises 11 official languages. Multilingual communication therefore occurs almost everywhere, like at hospitals and in clinics. When the need arises for someone (who does not speak a global language like English) to seek medical attention in South Africa, it becomes a challenge to find a health practitioner that speaks their first language. This study aims to develop and evaluate the use of a mobile application designed for supplementary Northern Sotho language learning by health science students.

**Index Terms**: mobile-assisted language learning, human-computer interaction, user experience

## 1. Introduction

South Africa is home to eleven official languages and although it is expected of medical professionals to communicate in the languages of the area where they work [1] few of them do [2]. Communication barriers and the associated challenges experienced by health professionals are widely documented in South Africa's health care sector [3, 4, 5, 6]. Health professionals hardly ever speak their patients' first languages. This communication barrier is especially problematic in the rural communities of South Africa [7]. Medical students often start working in areas other than those they grew up in, so they have to learn another language to function in professionally, and this is sometimes challenging [1].

Language acquisition consists of three language subsystems: grammar, phonology and vocabulary [8]. Even though vocabulary is of vital importance in language acquisition, teachers often neglect it and rather focus on grammar and phonology [8]. It has been claimed that there is an increased chance of communicating in a foreign or second language if the speaker knows well-chosen basic vocabulary in the target language than when they have mastered the language's grammar [8]. This is especially true of communication in a specific domain. The domain in which a medical practitioner and a patient find themselves in, adjusts the size of the vocabulary to that which is relevant for the situation. For example, when discussing a patient's broken leg, the only vocabulary the health professional will need is vocabulary relating to the patient's leg and the procedures around it. The language learning issue is addressed to some extent by South African universities through teaching health science students an additional language.

Mobile applications can be seen as extensions for learning in new and different environments and this in turn allows language acquisition not to be limited to the classroom [9]. This can be a big advantage for busy students who can use portable devices to learn whenever they have free time available [9]. Mobile applications combine different elements to achieve the goal of supplementing traditional learning methods. Two of these elements are addressed in this study: 1) mobile assisted language learning and 2) human language technologies.

### 1.1. Mobile assisted language learning

Mobile assisted language learning (MALL) is a subarea of mobile learning (mLearning) [10]. Even though scholars are not in agreement about whether *mobile* means the mobility of the technologies or the mobility of the learner, it is often stressed that it refers to the mobility of the learning content [11]. Computer assisted language learning (CALL) on the other hand takes place when students or learners use computers during a language course [12].

Although many commonalities between MALL and CALL are observed, it has to be noted that there is a difference between the two. MALL differs from CALL because it can be used in personal and portable devices and it enables students or learners to learn in new and spontaneous ways [11].

### 1.2. Human Language Technologies

Human language technologies (HLTs) have the goal of getting computers to perform useful tasks involving human language [13]. Two of these tasks include improving human-human communication and the processing of text or speech [13]. Text-to-speech synthesis (TTS) and automatic speech recognition (ASR) are two elements of HLT that are relevant to this study. TTS systems automatically generate speech from text input [14] and ASR systems recognise the user's speech and responds accordingly [15]. HLT is used within MALL programmes to enhance the technology and offers learners an environment in which they can use multi-media to learn a new language.

South Africa's languages can all be regarded as being under-resourced in terms of developing HLTs [16]. Even South African English can be classified as an under-resourced accent of English [17]. The situation is much worse for the indigenous languages that cannot leverage on existing resources in other languages [17]. A special effort has therefore been made to collect resources and to develop basic HLTs for all 11 languages [18, 19]. The ASR and TTS systems developed for Northern Sotho are used in this study.

## 2. Previous work

There is a large number of MALL applications on the internet. These applications range from basic to advanced language learning (like DuoLingo [20] and Babbel [21]), to domain focused applications (like Mobile Xhosa [22]). DuoLingo is a mobile application for European languages. Users get to learn a new language in an entertaining way through grammar, writing, listening and speaking exercises. Babble is an application similar to DuoLingo, but only the first lesson of each category is free. Users need to purchase new lessons if they want to continue using the application. Mobile Xhosa is also a mobile application, but its focus is mainly on teaching Xhosa to medical professionals in South Africa to assist them when they communicate with patients who can only speak Xhosa. The application provides users with basic medical phrases with translations in English and Xhosa, as well as a translator to translate other words or phrases into English or Xhosa.

## 3. The proposed study

Northern Sotho is one of South Africa's official languages and the University of Pretoria offers a Northern Sotho language learning course to students in the health care sciences. As mentioned previously, language learning applications with the same goal in mind already exist, but to the authors' best knowledge, none exists for Northern Sotho in the health domain. This was the biggest motivation behind this study. Because of the need for a set of specialised vocabulary items suited for specific purposes and situations in which the students will function, a MALL application was developed for the health domain. The application focuses only on the vocabulary subsystem of language acquisition and health science students can use the application to practice their Northern Sotho skills that involve vocabulary. A content management system (CMS) was also developed which is used to register users, upload lessons, assign specific lessons to specific users, and to store any data recorded by the user.

### 3.1. The application

One application was developed, but with three different modes. The application was developed for tablets using the Android operating system. The modes are:

- Silent (vocabulary acquisition without TTS or ASR)
- Listen (vocabulary acquisition with TTS)
- Speak (vocabulary acquisition with TTS and ASR)

The application is able to work with or without internet access. Internet access is only needed when a user logs in for the very first time in order to download the lessons to the device. Once a lesson has been completed and an internet connection is detected, the data on the device is sent to a database.

#### *3.1.1. Functional description of the application*

The basic functionality of all three modes of the application are the same, as described under *Silent mode*.

**Silent mode**

This mode only has the basic functionality of the application. As can be seen in Figure 1, the user sees a question (a word or a phrase) in English and this is supported by an image. Three Northern Sotho translations of the English word or phrase are given as possible answers. The user will then have to choose an answer. The user gets two chances to answer correctly. If they fail to do this, the correct answer is shown and the application proceeds to the next question. Figures 2 and 3 show the feedback given to a user when they get the answer incorrect and correct, respectively.

Figure 1: An example of a question.

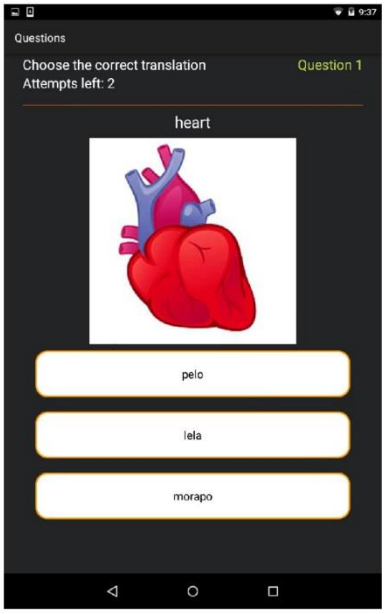



Figure 2: The feedback given to a user when the incorrect answer was chosen.

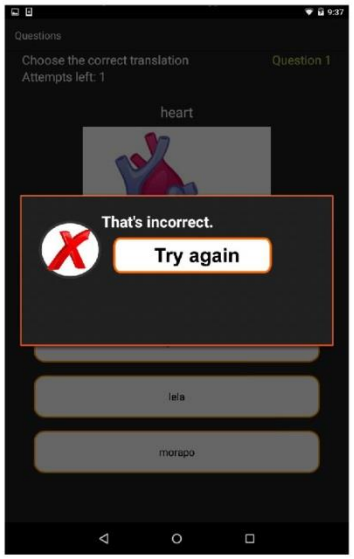
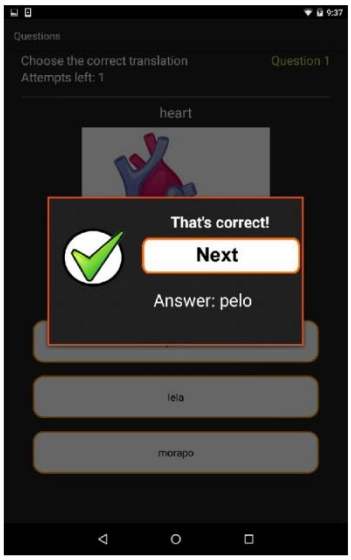


Figure 3: The feedback given to a user when the correct answer was chosen.




**Listen mode**

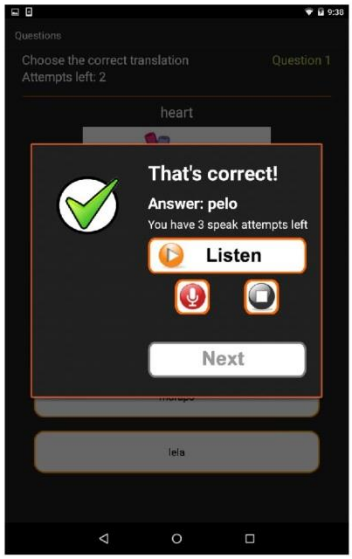
This mode has an extra functionality where the pronunciation of the correct answer is automatically played by means of pre-rendered Northern Sotho TTS, as shown in Figure 4, as soon as a user gets an answer correct. When a user has unsuccessfully attempted to answer the question two times, the user will still get the opportunity to listen to the audio of the question. This forces the user to listen to the audio at least once, after which they will also have the opportunity to listen to the pronunciation as many times as they like by pressing the 'Listen' button.

Figure 4: The screen a user sees after getting an answer correct in the Listen mode.


**Speak mode**

This mode has a second extra feature in the form of ASR, along with the TTS pronunciation. As indicated by Figure 5, with the ASR functionality, the user has an opportunity to practice their pronunciation of the answer. After getting a question correct, the user gets three attempts to correctly pronounce the word or phrase. If the user gets the pronunciation correct, the application moves on to the next question. If after three attempts the user has not pronounced the word or phrase correctly, the application automatically moves on to the next question. Again, even when a user has unsuccessfully attempted to answer the question two times, the user will still get the opportunity to listen to the audio of the question and to pronounce the word or phrase.

Figure 5: The screen a user sees after getting an answer correct in the Speak mode




### *3.1.2. Text-to-speech*

The TTS 'voice' that was used was developed by the HLT Research Group at the Meraka Institute of the CSIR in Pretoria, South Africa [1]. Because the application is functional without internet access, it was decided to use pre-rendered TTS audio files that will be downloaded with the lessons and stored on the device. TTS was also chosen because it offers flexibility when new pronunciations have to be added to the system, as a voice artist doesn't have to go to a recording studio to record new words. The TTS is also used to provide the users with a target pronunciation and to practice their listening skills, because first language speakers are not always readily available to listen and speak to.

### *3.1.3. Automatic speech recognition*

The Northern Sotho ASR system was developed by the HLT Research Group at the Meraka Institute of the CSIR in Pretoria, South Africa. The system is fully functional and is used in the application. The main aim of the ASR is to elicit spoken

[1] http://www.qfrency.com/

output. A global form of feedback is given in terms of judging whether an utterance is correct or incorrect in its entirety, but no feedback is given on the pronunciation itself. The application's purpose is thus to provide the students with an opportunity to practice their oral skills, which is not always possible in class due to time constraints and students are often too shy to speak in front of their peers.

The Northern Sotho ASR system that is used in this study was developed using speech produced by native speakers of the language [23]. It is well-known that non-native speech is more difficult to process accurately using ASR than native speech [24]. The recognition library will thus be restricted in order to make the ASR in this application more sufficiently robust. Very few resources are available for Northern Sotho itself and there is currently no speech data available for non-native speakers or learners of the language. It was therefore decided to capture all the speech input that will be produced by the users during application usage. The data can be used to improve the automatic recognition of the non-native speech for subsequent versions of the application and to start investigating the possibility to enhance the *speak mode* of the application by providing feedback on the users' pronunciation.

#### *3.1.4. Scoring*

It was decided to include scoring in the application as a method of keeping track of a user's progress, as well as to motivate a user to keep using the application. There are two scores in the application: a score for the number of times the user correctly selected the correct Northern Sotho answer for the English question; and a score for the number of times the user correctly pronounced the word or phrase on their first attempt.

### 3.2. Content management system

The CMS provides a platform for lecturers, teachers, researchers, etc. (known as administrators) to upload content that will be used in the application. An administrator can register users, create groups for each class, upload lessons (including graphics and the pre-rendered TTS audio files) and view all data related to the application. This data includes the usage statistics of the application as used by the users, as well as the utterances made by the users when using the speak mode. The statistics can be viewed in an easy-to-read format. With the statistics, the administrators can control which users have completed lessons, which lesson(s) users are struggling with, how many times a user has done a particular lesson, etc. An administrator can also listen to all the audio files that were recorded by the users.

#### *3.2.1. Content*

The content used for this application is the same content the students are given in their lessons during lectures. It was decided to only use the vocabulary and phrase list given in the course study material as it is suitable to transfer to the application environment, and because the main focus of the study is on vocabulary acquisition. The content was received in the form of a vocabulary list which was divided into categories matching the different medical courses the students are enrolled for (e.g. dietetics, nursing, etc.). The lists were combined into one list, which was then divided into different sections/lessons, namely body parts, internal organs, food, etc. The graphics are of a high quality and match all the words and phrases, in order to strengthen the impact of a lesson.

### 3.3. Connectivity

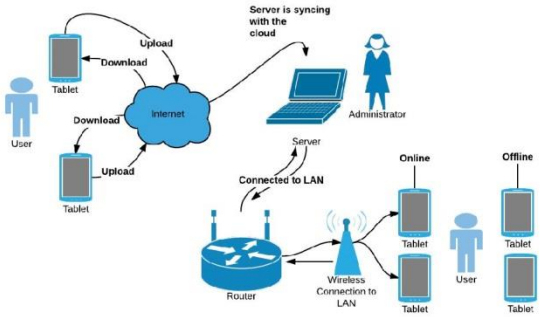
Broadband connectivity is not yet available in most places across South Africa, and thus it was decided to design the application in such a manner that it only uses intermittent internet access. Therefore TTS and ASR are able to function offline. Figure 6 is a representation of the connectivity between the CMS, the internet and the application on a device.

The CMS is accessible on the internet. This is where the administrators can upload new lessons, register new users, etc. When a device is connected to the internet (online), all the content allocated to a specific user is accessed directly from the CMS and is pulled onto the device. Once a lesson has been completed, all results and data are sent directly to the CMS where it can be viewed by the administrators.

A solution to working online when there is no formal internet connection, is by means of a laptop that is used as a server. All the data that is on the CMS is synchronised with the laptop. Together with a router, the laptop creates a closed wireless connection. The users can use the devices and complete lessons like they would if were they online. All data is sent to the server, which after being synchronised with the internet, sends all data to the CMS.

When a device is completely offline a user can still use the application and complete lessons, given that they have logged in at least once when connected to the internet. This is necessary because the lessons have to be downloaded onto the device. Once the user has completed a lesson, all the results and data are stored on the device. As soon as the device detects an internet connection when the user logs in again, the results and data will automatically be sent to the CMS.

Figure 6: A representation of the connectivity between the CMS, the internet and the application.




### 3.4. User tests

A successful efficiency evaluation is difficult to do in these circumstances because a multitude of factors could have an influence on the students' development. Thus effectiveness will not be evaluated during this study. The students will however write vocabulary tests before and after the evaluation period, but this cannot be seen as rigorous evaluation on progress because of the many influencing factors present during such a study.

The students that will participate in this study will be first language Afrikaans and English speakers and all the students will be provided with the exact same hardware. The main focus of this study will be on evaluating user experience. At the end

of the evaluation the usage statistics collected by the system and the answers received through the questionnaires will be compared. In order to evaluate the user experience, the students will use the application once a week for twelve weeks in class as a supplementary tool to their formal studies. After twelve weeks, the students will complete a user experience questionnaire and in the following week, a focus group discussion will be held. The results will be used to not only determine whether or not the application has a place in the classroom as a supplementary learning tool, but also to establish if the students prefer one mode of the application above another.

The questionnaire consists of open- and close-ended questions, and are asked to collect feedback on the user friendliness of the application, as well as the preference the students have to one mode of the application above another. The user experience questions include questions about the users' first impression of the application, whether or not the application was easy to use, what they liked most and least about the application, what they would change, whether or not they would recommend the application to other Northern Sotho students, etc. The user preference questions include questions about which mode do they think helped them most with their vocabulary, reading, speaking, and grammar skills, which mode they preferred overall, etc. All the answers to the questionnaire's questions will also be used to improve future versions of the application.

## 4. Conclusion

The application's main aim is to act as a supplementary tool for students learning a new language, and not to replace their current learning material and methods. The user study will be done in collaboration with the lecturer of the language course in order to maximise its impact.

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