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Implementation of intelligent tutoring systems to speed up the reading ability at foundation phase in Johannesburg schools

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Implementation of Intelligent Tutoring Systems to Speed up the Reading Ability at Foundation Phase in Johannesburg Schools



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A research report submitted to the University of the Witwatersrand in partial fulfilment of the requirements for the Master of Education Degree (MEd).

June 2022

Declaration

I hereby declare that this research report is my own work. It has been submitted exclusively to the University of the Witwatersrand in partial fulfilment of the requirements for the Masters in Education Degree (MEd).

The school of education ethics committee constituted under the university human research ethics committee (Non-Medical) has approved this research project unconditionally on the **7th of February 2022** issuing a clearance of certificate, protocol number: **2021ECE090M**

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13 June 2022

Abstract

In South Africa, early literacy among learners in the foundation phase is still a struggle. The majority of students, particularly in rural and township schools, continue to graduate from the foundation phase unable to read meaningfully to the grade's expectation standard. Despite government and non-governmental intervention to enhance reading in Grades 1–3, there has been minimal progress, particularly in rural and township schools (Cilliers & Bloch, 2018). This is a qualitative study using purposive sampling method to get ten (10) Foundation teachers who will be the paticipants. This is a case study within Johannesburg schools. The aim of the study is to design a conceptual Intelligent Tutoring System that will assist both English Home Language (HL) as well as English First Additional (FAL) learners to improve their reading abilities within their expected grade's standard. It uses ITS as a conceptual model. Reading development and instruction covers a wide range of language foundations, including speech sounds/phonology, spelling patterns/orthography, word meaning/semantics, grammar/syntax, and word construction patterns/morphology. All of these factors help to build a strong foundation for reading comprehension and fluency (NEEDU, 2013)

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Chapter One: Background of the Study

1.1. Chapter Overview

Early literacy among learners in the foundation phase is still a major challenge in South Africa. The majority of kids continue to graduate from the foundation phase unable to read meaningfully to the grade's anticipated standard, particularly in rural and township schools. This issue will then continue to negatively impact that learner's reading abilities as they progress forward in their educational career. Despite government and non-governmental intervention to enhance reading in Grades 1–3, there has been minimal progress, particularly in rural and township schools (Cilliers & Bloch, 2018). The National Education Evaluation & Development Unit (NEEDU, 2013) states that "no one would dispute that South African schools are performing below expectations" (p. 20) particularly in reading. Reading is the foundation of literacy, which begins with the capacity to comprehend and decode spoken and written words. Reading instruction covers a wide range of language foundations, including speech sounds/phonology, spelling patterns/orthography, word meaning/semantics, grammar/syntax, and word construction patterns/morphology. All of these factors serve as crucial building blocks for the development of reading comprehension and fluency.

Hamilton and Glascoe (2006), as cited in (Rivera & Aggabao, 2020) explains the observation that "at least one in five children has significant difficulty [with] learning to read" and due to these difficulties, they will fall behind and be unable to successfully reach the level their peers are on (p. 115). There is no mention of where this was witnessed. Given this information, it is critical that students receive the assistance they require in order to face the enormous hurdles that lie ahead of them. It's worth noting that, while many students are identified with a reading or learning disability, many more go untreated and unrecognized throughout their schooling careers (Yaseen (2013) as cited in Rivera & Aggabao (2020). Hamilton & Glascoe (2006) go on to say that most students who have reading issues in school are unable to catch up with their peers, demonstrating the necessity of early development of reading ability in young students. This importance is further illustrated by the fact that "[a] child's third-grade reading ability is reasonably predictive of overall long-term academic achievement" (p. 2079).

According to Lloyd (1978), this information was discovered through a study that revealed that some learners' challenges in school began in grades one to three. There are five aspects, or more specifically determinants, that are “independently related to the dropout process” which seem to assist in predicting learners’ success or failure rate. These aspects include “achievement”, “socio-economic status”, “family characteristics”, “nonpromotion” and “absenteeism” (p. 1194). Out of these five aspects, four of them were found to link to either the graduation or dropout of these learners in sixth grade (Lloyd, 1978, p. 1194).

1.2. Problem Statement

Learners who have completed the basic phases of their education (i.e. moving from grade 3 to grade 4) are having difficulty transitioning to the reading level of a higher grade. Within South Africa, there is close to 80% of grade 4 learners that are unable to read (Fesi, 2018), as cited in Fesi & Makeleni, 2020, p. 228). It is understood that “the reading culture in Africa is poor or simply does not exist” (Fesi & Makeleni, 2020, p. 228). This trend has been fuelled by the automatic promotion of students from one grade to the next, despite their learning challenges. Teachers in higher grades are under a lot of stress because they have to teach these students how to read and write. The solution to this challenge is to use the benefits of information technology to create a digital tool that can assist students in improving their reading ability in early grades. Ahmad (2015), as cited in Fesi & Makeleni (2020) explains that educators can use both digital and visual resources to help students improve their reading ability and comprehension. They go on to discuss how teachers use technology to help students who are struggling with reading. Many teachers remark that they use technology to help their students since this new method often provides them with the extra exposure and support they require. (Fesi & Makeleni, 2020).

In South African schools, there is an urgent need to build a tool capable of consistently delivering an objective tool to identify an acceptable text ordering throughout the school year based on learner comments on their difficulties in understanding a particular text. This study will be focusing on only Johannesburg schools. This feedback might be used to reliably evaluate a learner's reading capacity in a consistent manner across educational contexts, allowing a teacher to find texts that are similar to the learner's level or somewhat more hard in order to enable gradual increases over time. This type of tool is likely to be most useful to

learners and educators whose first language is not English and who may struggle to determine the level of difficulty a piece of text represents. Such a tool would be able to assist instructors in attaining long-term developmental improvements that would have a positive impact on students' later school years. The envisioned tool that seems to be appropriate in reducing reading difficulties to early graders is that of Intelligent Tutoring Systems (ITS). ITS are "computer learning environments that help students master knowledge and skills by implementing intelligent algorithms that adapt to students at a fine-grained level and that instantiate complex principles of learning" (Graesser et al., 2018). ITS works with one learner at a time as learners have different learning needs at different times. This tool would give each learner their own personalised feedback and assistance. The explanation of how the ITS work will be explained in detail in the literature review section.

1.3. Aim

This study aimed at designing a conceptual Intelligent Tutoring System that will assist both English Home Language (HL) as well as English First Additional (FAL) learners within public Johannesburg schools to improve their reading abilities within their expected grade's standard. This was expected to help foundation phase literacy teachers in being able to easily and quickly select an appropriate reader for each of their learners to read.

1.4. Research Question

To what extent can an ITS assist foundation phase English teachers to improve their learners' reading abilities?

1.5. Sub Questions

- What is the current practice of teaching literacy in foundation phase in public schools?
- What type of resources are used when teaching literacy in foundation phase in public schools?
- How can Intelligent Tutoring Systems benefit learners to read at their expected grade standard?

1.6. Significance of the Research Project

This research examines the benefits and drawbacks of various technologies and apps that are making their way into the educational arena. The study's purpose is to scale up ITS development in schools so that students can read to the grade-level expectations. Furthermore, technology aids active learning, particularly inquiry-based or experiential learning.

1.7. Structure of Research Project

Chapter One: This chapter will be focusing on the overall nature and scope of the research project in order for the reader to familiarise themselves with the research at hand. This chapter includes the headings; *Problem Statement, Aim, Research Question, Sub Questions, Significance of the Study and; Structure of the Research Project*.

Chapter Two: This chapter includes the literature review, which looks at many of the relevant pieces of literature for this research study, in order to give a well-rounded, fleshed out background of the research topic. This chapter includes the headings; *Getting Learners Reading*, *Parental Involvement, Reading Difficulties in Learners and; Automatic Promotion of Learners from one Grade to the Next.*

Chapter Three: This chapter involves looking at the research project's conceptual framework model. This is the model in which the research project is based off of. This chapter includes the headings; *ITS*, *Artificial Intelligence and Education, The Process of Learning to Read and; Who has Reading Difficulties?*

Chapter Four: This chapter does include the methodology of the research study. The methodology involves the processes taken in order to find, collect and analyse the data. This chapter includes the headings; *Research Paradigms, Research Methodology and Design-Define Methodologies, Research Design, Participants and Research Sites, Data Collection Instrument, Data Analysis and; Ethical Considerations.*

Chapter Five: This chapter includes the data presentations, analyses as well as discussions. It will be looking at specific themes that have arisen during the data collection process. This chapter includes the headings; *Findings and their Relevance to the Study and; Discussion of Themes.*

Chapter Six: This chapter includes the study summary, concluding remarks as well as recommendations for this research topic. This chapter uses the headings; *Limitations of the Research Project and; Recommendations for Future Research*

Chapter Two: Literature Review

2.1. Chapter Overview

This section of the project will look into the numerous factors that influence and affect foundation phase students' reading abilities and capabilities. The first half of this chapter will look at how students can be motivated to read and how they can be taught to do so. It illustrates how there is more to teaching reading than just the act of reading, and how motivation and inspiration are important elements of the lesson.

A separate section examines the fundamental characteristics and notions of reading. This covers phonics and learning problems, among other things. Teachers must take these factors into account while teaching young learners to read. Young learners cannot be assisted unless they grasp the fundamentals of what reading is and how it is learned. This chapter focuses on how these young learners' confront their reading difficulties each and every day. In addition, the procedure by which a foundation phase learner is promoted to the next grade, regardless of their talents or achievements is also discussed in this literature review chapter. This topic is important to the study because it demonstrates the weaknesses and gaps in South Africa's educational system. Intelligent teaching systems are the final concept examined in this literature analysis. For this research project, this tool was chosen. The knowledge model, the student model, the pedagogical model, and the user interface model are the four key aspects of the tool. These four models are crucial for designing and developing a successful Intelligent Tutoring Model (ITS).

2.2. Getting Learners Reading

Leland et al. (2018) explain that one of the most important aspects of language education is for the learner to enjoy the process and overall experience. It is also extensively stated how a different type or genre of book might cause a learner to become suddenly interested in learning to read. An example was given of a learner who despised reading and avoided it in anyway possible. Once he was much older and started reading the first of the *Harry Potter* books (Rowling, 2009), he was invested in the story, the scenes and characters and therefore wanted to read more about it. Due to the series not being produced quickly enough, in comparison to his reading speed, this novice reader began exploring books that were similar

in genre and became completely invested in these various stories. From this brief and simple example, it can be seen that there is significant importance in allowing the learners in foundation phase classes to have an opinion and selection in book choices. Allowing kids to read a variety of books, even if they aren't on the recommended list, is also crucial because it can help them develop a love of reading. It is important to note here that these books must still be age appropriate but do not need to conform to what every other learner is learning to read.

All classrooms should be well-stocked with a diverse range of book kinds, genres, and topics to ensure that students can choose books that suit their interests. This selection can include books that "challenge the status quo" and not solely books that are straight-forward and clear cut. This is because it's important that learners, even the younger ones, are exposed to a variety of topics and thought-provoking teacher and/or peer discussions afterwards. By exposing them to these kinds of thought-provoking content will help create critical thinkers in the future (Leland et al., 2018). It is suggested that teachers should consider whether their lessons are developing motivated and passionate readers. Reflecting on past lessons is a good way to improve future ones. The enjoyment of reading should extend to the home environment, with the learner's friends and family getting actively involved. By watching others in their home environment read for pleasure, these young learners will be inspired to do the same – this uses the theory of vicarious learning (Bandura, 1965).

Allowing for debate and informal dialogue about the plotline and characters after the learner has participated in the selected book is a useful technique for a teacher to measure a learner's reading comprehension. From seeing the learner's emotional reaction to the book, whether they loved it or hated it, will signal to the teacher that they "have created an engaged [and passionate] reader" (p. 36). It is important to note here that the learners do not have to love a story in order to be a passionate reader as passionate and enthusiastic readers do not always enjoy everything they read. It is about the learner having the skills to read something and explain why it is they either liked or disliked it. It is also mentioned that the teacher's perspective on reading is significant and plays a critical part in the teaching of reading (Leland et al., 2018). If the teacher does not believe that reading is beneficial and does not read themselves, then the learners may see this and learn from their example. Again, this relates

to the theory of vicarious learning, where a young child learns from what observing others around them (Bandura, 1965).

It is further stated that the Progress in International Reading Literacy Study (PIRLS) occurs every five years, in order to evaluate the "international trends in the reading comprehension of young students in their fourth year of schooling". With the covid epidemic in full swing, it was decided to make PIRLS 2021 an online and digital event. Learners will be more interested and driven to participate in the exercises accessible if reading activities are moved to a more digital setting. This digital version will offer a variety of short extracts with varying reading levels (Mullis & Martin, 2019). According to Sayukti et al. (2019), the reading framework focuses on creating independent and "self-directed readers" through a variety of reading activities (p. 180). An activity used was "independent reading" which involves a structed way of both guiding as well as supporting the readers as they learn to read on their own. This is done with the intention of creating strong and independent readers. Teachers should be actively involved in choosing their students reading books.

Fletcher-Campbell et al. (2009) explain that the process of learning to read has significant importance placed on the "phonological awareness" within each of the learners. This term refers to the learner's ability to understand as well as act on the concept that every word has its own "distinct and unique sequence of sounds" (p. 10). According to behavioural studies, numerous languages have demonstrated that phonological awareness at all three linguistic levels (syllable, onset and rime, phoneme) influences the acquisition of reading (p. 11). Fudge (1969) explains that a syllable functions to place "stress-elements" on words, which relates to how a person reads and emphasises the word's different sounds (p. 254). Onset and rime relate to how a word is broken up into a beginning and ending part. For example, the word "bean" would have the /b/ sound as the onset and the remainder of the word "ean" being the rime (Goswami & Mead, 1992, p. 153). It is explained that a phoneme "represent[s] the smallest meaningful speech elements" (Fletcher-Campbell et al., 2009, p. 24). A good example of this is the sound of /d/ in dog, dragon or domino. This small sound, or phoneme, has significant meaning for the overall word. In addition to this, Dixon (2010) explains that phonological awareness involves the individual's "ability to recognize differences and similarities in the sounds of language", instead of looking at what it means. According to Scarborough et al. (2001), as cited in Dixon (2010), phonological awareness has proven to

have “a causal relationship with English reading acquisition”, highlighting this significant affect on young learners’ reading abilities (p. 724). Dixon (2010) explains that “letter recognition is the single best predictor of later reading success for” first-language English speakers (p. 725). This emphasises the significance of providing additional aid to young learners with the first acquisition and understanding of letter symbols and letter sounds (grapheme-phoneme).

Fletcher-Campbell et al. (2009) explain that within English, the written symbols or letters used in the language is called the graphemes. As mentioned before, phonemes “represent the smallest meaningful speech elements”, such as the /k/ sound in cat, kite or karate (p. 24). These phonemes are what comprise the pronunciation of a word. Learners can find out what the word is and hence decode it by using the phonemes and graphemes. According to Fletcher-Campbell et al. (2009), decoding entails both knowing the meaning of the word on its own and in context. This is a crucial skill to have when learning how to read, as without it, comprehension and understanding will not occur. According to Fletcher-Campbell et al. (2009) here is also a figure added to demonstrate the connection between language comprehension and word recognition, in order to create a skilled and fluent reader. The learner's background knowledge, such as facts or understandings; vocabulary or words; language structures, such as grammar; verbal reasoning, such as metaphors; and literacy knowledge, such as book genres, make up the language comprehension. Word recognition is comprised of phonological recognition, which is made of phonemes; decoding, which is the breaking down of what those words mean; and sight recognition, which involves the learner being able to identify words that are familiar to them (Fletcher-Campbell et al., 2009). All these terms systematically “woven together” will create a fluent and skilled reader who has a great grasp of both “word recognition and text comprehension” (Fletcher-Campbell et al., 2009, p. 24).

2.3. Parental Involvement

Faires et al. (2000) explain that a child’s “first and primary teachers” are their parents or caregivers (p. 195). Parents have been acknowledged to play a significant role in creating the foundation for their children’s understandings, education and development. This is because before formal schooling, a child will spend most of their time in their home environment,

which has potential for lots of learning and development to take place. It is often misunderstood as to when young children first learn to read, often times people believe it occurs in grade one. This, however, is untrue. Young children are exposed to literacy through their parents in life before schooling, throughout their home life. Logan et al. (2019) explain that young children also learn a large amount of their vocabulary through exposure with others, not necessarily with parental figures. From this, we can see that children are very impressionable and tend to learn a lot from watching those around them. This relates closely to the theory of Bandura. His theory of vicarious learning explains that young children are able to and do learn from the individuals around them (Bandura, 1965). What this means for a young child is that if they see their family members reading a book often, they too will want to engage with a book or text. These habits that are formed are quite closely linked to the habits the parental figures have adopted themselves (Bandura, 1965).

Logan et al. (2019) explain that those parents who read a picture book with their children once a day "provide their children with exposure to an estimated 78,000 words each a year" (p. 383). With many children not being read to, there is a large gap created between those who are read to and those who are not. From this statement, we can see how the simple act of reading to your child every day can have a significant impact on their overall learning and development in later life. This action of reading to your children will also strengthen the habit of reading for when they are older.

It is explained that in grade one, teachers should be there "to facilitate reading instruction" rather than teach from basics (Faires et al., 2000, p. 196). This links closely to what was said previously about children not learning how to read from grade one only. This statement shows us that children do come into the classroom with their own knowledge and experiences of literacy and the world of reading, which should be taken into consideration when the teacher is showing the learners how reading works. What this also shows us is that the teachers are there to simply assist in the learners' learning journey as well as add to what these learners already know and the information they already possess.

2.4. Reading Difficulties in Learners

According to le Roux et al. (2014), reading challenges in a learner's early years of schooling can have a substantial detrimental impact on their "emotional development and learning experiences" in the short and long term (p. 656). This explains why reading issues should be addressed as soon as possible in order to save the learner from these emotional battles and challenges. Reading is not always a straight forward and simple skill to learn, especially for learners who do not get much support from their parents and families. It is therefore important for the teacher to notice when a learner is showing signs of reading difficulties in order to help them as quickly and smoothly as possible, in order to avoid these types of problems later on in the learner's life and educational career. Torgesen (2002) explains that when a learner with poor reading skills is confronted by a word they do not know, they will usually guess what the word means using the context or overall meaning of the text. We can see here the way a weaker reader may adapt their reading style in order to try and understand what it is they are reading. For a couple situations, this might be helpful for the learner but unfortunately, it is not a method or technique that a learner should lean on for help whenever possible. It is further explained that learners who begin their first grade year with a low amount of understanding of the phonological aspects of words are at a higher risk for developing reading difficulties (Torgesen, 2002). It is stated that the best way to avoid a learner having reading difficulties in their school career is to "insure that every child received high quality balanced reading instruction" while they are in the earlier grades at school (Torgesen, 2002, p. 13). From this we can see how significantly important the early years of education are for a young learner. If the learner does not receive appropriate education and lessons when young, then they are very likely to experience some form of difficulty in the future. These early years in school are critical in determining the learner's abilities in the future.

2.5. Automatic Promotion of Learners from one Grade to the Next

According to van der Berg et al. (2019), "grade retention" refers to when a learner fails to achieve to the standards of their grade (p. 7). As a result, the learner will remain in the same grade the next year with the hopes of improving and getting promoted to the next grade. This type of retention might make the learner feel punished for not meeting expectations that

year, which can have a variety of consequences. From this, we can see that grade retention can negatively impact a learner's well-being as well as their social and emotional state. These aspects are crucial for teachers to take into account when considering failing a learner. It is further explained that there is a significant issue of grade repetition within South Africa, especially within the higher age groups (van der Berg et al., 2019). It is likely that the learners in these higher grades are battling due to not being given appropriate assistance when they struggled in earlier grades. It is explained that when a student is forced to repeat a grade, a variety of factors are impacted, including the government and school, the child and society (van der Berg et al., 2019). In addition, it's stated that within the South African conditions, repetition of a grade is frequently "identified as the leading determinant of dropout" (p. 19). This is due to multiple factors, such as social and emotional impact as well as the learner's academic abilities. If a learner struggles in a grade and does not receive the appropriate assistance, they might not be able to catch up to their classmates and therefore drop out of school at a later point in their life.

Having to spend more money on a student who is repeating a year has an impact on the government and school systems, putting financial strain on the school. However, this may help to lower the expense of attempting to correct this learner's misunderstandings. As previously said, there are also plenty of unfavourable psychological factors to consider before denying a student the promotion of their grade. This decision, for example, is likely to have a detrimental impact on their self-esteem and motivation. In addition, by holding this learner behind, there is potential for them to fully understand the work and catch up with the rest of their peers. This is the situation teachers face when having to decide whether a learner is capable of progressing to the next grade or not (van der Berg et al., 2019). Van der Berg et al. (2019) state that according to the Western Cape, grade 3 repetition was seen as related to "substantial and statistically significant improvements in the language and maths scores", proving that this method can be useful and helpful for struggling learners (p. 20). AIED (Artificial Intelligence in Education) has the potential to drastically change the classroom and education. It is slowly being introduced into the schooling system and is being viewed "as a way of enhancing teacher training" (p. 10). This field is known to be both inventive and derivative. Artificial Intelligence in Education is explained as "developing AI-based tools [used] to support learning" as well as using these specific tools to attempt to understand the process

of learning (Holmes et al., 2019, p. 12). From this simple comment, it is clear that artificial intelligence provides us with a wide range of educational options. The use of artificial intelligence has potential of improving the teaching experiences of both the learner and teacher using it.

2.6. Concluding Remarks

This chapter focused on the elements that play a significant role influencing a foundation phase student's reading abilities. This includes, but is not limited to, a student's topic or subject preference, a diverse range of genres to choose from, the importance of parental involvement, the understanding of the structure of words (phonological awareness, onset and rime etc.) as well as the promotion of students from one grade to another. These elements are those which impact and affect the learner's ability to read for meaning.

This chapter does have gaps in it as there is limited information being showcased and discussed. An example of this is with the promotion structure within schools. It is important to note that not all schools promote their learners in the same way, which shows that this is a deep topic which needs to be discussed further. It is important to note these gaps in information as it allows the research to be as inclusive as possible, without generalizing all schools' processes.

Chapter Three: Conceptual Framework Model

3.1. Intelligent Tutoring Systems (ITS)

Almasri et al. (2019) explains that ITS are understood as software that's purpose is to provide "immediate and customized instruction or feedback to learners" (p. 21). This type of feedback and assistance can be adapted to that specific student's needs as well as be "consistent and scalable" (Xu et al., 2019, p. 4). This ITS can usually occur without a teacher to interfere. The purpose of this type of artificial intelligence tool is to be able to assist the "human instructor" with their tasks (p. 21). This type of system can assist teachers in the future by marking the tests and projects for them. This is a large timesaver and can help teachers put more of their effort and attention in creating engaging and helpful lessons for the learners. In addition, Alkhatlan & Kalita, (2018) explain that ITSs are applications which use artificial intelligence methods in order to create "intelligent tutors" who are completely aware of the exact type of individual that they are teaching and assisting (p. 2). These intelligent tools are aware of the type of learner they are teaching through a collection of intelligent systems, which will be discussed later on in this paper. These ITSs were created in an "attempt to adapt to [the] special needs of individual learners" (Alkhatlan & Kalita, 2018, p. 23). What this shows us is that there is a strong movement towards an educational system which is much more personalised for an individual learner's needs rather than the general class's needs and requirements. Without the use of artificial intelligence, this type of classroom and learning environment would be difficult, if not impossible, to create for a single human teacher.

Xu et al. (2019) explain that

Almasri et al., (2019) further explain that there are four basic sections to the ITS namely; the knowledge model, the student model, the pedagogical model as well as the user interface model. It is these models which assist the intelligent tool to understand who they are teaching and assisting, as well as how exactly they should help this learner. It is shown that the knowledge model, otherwise known as the domain model, consists of information about "the actual teaching material", including how the expert in this field carries out this knowledge and information (p. 22). The student's affective and cognitive understanding, as well as their

behaviour, are all included in the second model. This model in the ITS aims to create an accurate depiction of the learner who is using it so that it can reply to them efficiently and properly. The pedagogical model, otherwise known as the expert or teaching model, involves using the student model's information in order provide "the knowledge infrastructure [in order] to select and plan the teaching elements" efficiently (p. 22). The pedagogical model will choose an appropriate action to take, such as feedback to the student, as a reaction to the learner's action. Finally, the user interface model, otherwise known as communication model, is responsible for "the interaction between the user and the system" (p. 22). There are various ways that the interface model can do this. The user interface model can employ "graphic communication," which entails intelligent digital characters who guide and assist the learner in the digital world, or a more immersive virtual reality experience that immerses learners in a digital environment. The user interface model can also use social intelligence techniques to connect with the learner, such as "metabolic indicators," which can detect emotional responses through the learner's speech in a non-invasive way, or "speech cue recognition," which detects emotional responses through the learner's speech. Component interfaces, such as utilising the learner's input, can also be used in the user interface model. Finally, this model can detect particular sorts of dialogue and whose person is saying it using "natural language communication" (Almasri et al., 2019, p. 22). An ITS has a potential of working with one learner at a time because learners have diverse needs and the 'goal is to be sensitive to the idiosyncrasies of individual learners' (Graesser et al., 2018). ITS was created with a knowledge domain for computationally well-formed topics that contain verbal foundations like English Language and Mathematics.

There are three sub-models inside the student model that help to depict the learner's misunderstandings and confusions about the issue. The overlay model, perturbation model, and learner-based model are the three models. The overlay model aims to compare the learner's actions to those of a professional in this subject. This distinction between the two categories of people highlights the knowledge and abilities that the learner still has to acquire. The overlay model is perturbed with misunderstandings and errors, not merely to gain a reference of the proper model, but also to get a reference of the faults and mistakes. Finally, the learner-based model puts emphasis on the "process of knowledge acquisition", as this is likely where the errors and misunderstandings occur (Almasri et al., 2019, p. 22). The basic

purpose of ITSs (ITS) is to give one-on-one instructional supervision that is more effective than traditional computer-assisted training. It is comparable to the work of a private tutor in today's world, and it entails constructing and testing models of cognitive processes related to instruction. According to (Almasri et al., 2019) ITS consists of four interacting components:

- The student model, which represents the student's current state of knowledge;
- The pedagogical module, which includes relevant instructional measures based on the student model's content;
- The domain knowledge is represented by a knowledge model; and
- The user interface model, which enables ITS and the user to communicate effectively.

Orey & Nelson (1991) explains that there are four important parts of all types of ITSs; “the user interface”, “the learner model”, “the expert model” as well as “pedagogic knowledge” (p. 613). These four parts of ITS each play an important role together, in order to deliver “immediate and customized instruction or feedback to learners” (Almasri et al., 2019, p. 21). This type of system is created in order “to promote learning” through the use of “student cognitive and motivational states” (Xu et al., 2019, p. 5). Proving the importance of truly understanding the students which are being taught and assisted.

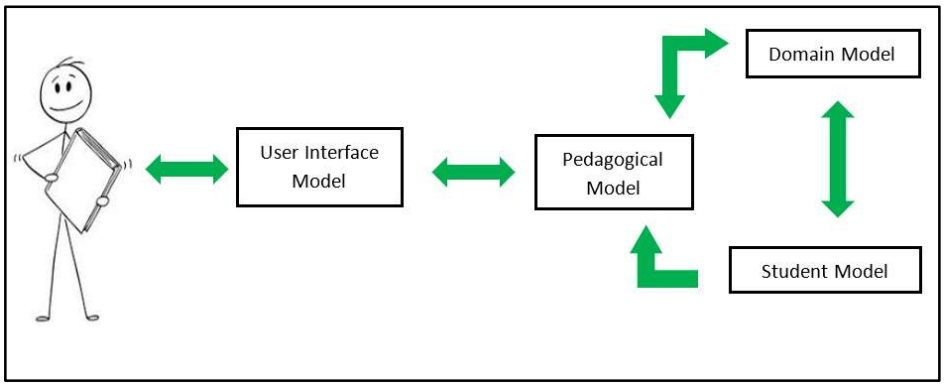


Figure 1: Intelligent Tutoring System (ITS)

EdTechXGlobal (2017) explains that the ITS is a completely automatic process, which does not require any human teacher input to work. As previously mentioned, this system is incredibly beneficial for a teacher as it gives them more time to focus their attention on creating helpful and engaging lessons for their class. Since this system is autonomous in nature, it allows the teacher to pay attention to the more crucial aspects of learning. This system allows for the

learner to receive immediate and personalised feedback, in order for them to be able to improve. EdTechXGlobal (2017) further states that in order for an ITS to give a learner feedback or assistance in what to do next or how to solve a problem, it must have "a stored knowledge of how to approach a problem". This directly shows this importance these different aspects of this system have, as previously discussed. What this shows is that this system requires to already have a rich background and history of the topic in order to give the learner the best advice or suggestion possible. This is something that the teacher may not have. This program is very complex in nature which allows for it to be as useful as possible, for both the teacher as well as the learner. After receiving the learner's input or answer, the ITS will then look back at its history and previously stored information on the topic in comparison to this learner's response. The system will then compare these two responses and see how much of a difference there really is between the official answer and the learner's response. This system will then take this comparison and diagnose what it believes the misunderstanding or misconception on behalf of the learner is, in order to know what to do next (EdTechXGlobal, 2017). According to Alkhatlan & Kalita (2018), it has been proven through various studies that in order to effectively assist a learner who is having some kind of learning difficulty, a lesson with a tutor and a singular student is most preferred. From this, we can see the importance and value a human tutor has in the education and learning area. Human tutors are known to be effective at their job as they are able to hint and suggest ideas for learners, rather than give the exact answers straight away. This is an important aspect that the ITS need to have in order to be similar to human tutors. In addition, Xu et al. (2019) explains that it was noted through their research that "ITSs produced a small but positive effect when compared to human tutoring", which highlighted the importance of using this tool (p. 25). From this piece of information, it can be seen that there is value in using ITSs to help young learners improve their literacy skills.

3.2. Artificial Intelligence and Education

Holmes, Bialik & Fadel (2019) explain that an artificial neural network is an artificial intelligence (AI) algorithm or process which is based on both "the structure and functions of biological neural networks" (p. 20). What this means is that it is a machine that is influenced by nerve connections within living organisms, for example in animal brains. According to

Wang (2019), there is no singular, perfect definition of the term Artificial Intelligence. This is because each definition has its own practical and theory-based values. However, these various definitions are not all equal in nature as some are better, more specific than others. It is explained that each researcher must select how they want to use this term in their work as there is no single way of using it. Anderson et al. (2018) explains that "creating high quality automated instruction requires expertise and money" (p. 36). What this shows us is that as human beings, we are far away from having automated instruction within our classrooms and learning environments. This shows us that we do have much more to work towards and improve. It is further explained that the richer children will be taught how to use artificial intelligence rather than have it be used on them. This proves to us that those with access to more resources will be more advantaged and be able to actively take part in their own learning and understandings. This shows the clear distinction between the wealthier class of people and the poorer individuals.

3.3. The Process of Learning to Read

Snowling (1998) explains that before a child learns to read, it is important to acknowledge that they have their own understandings and experiences beforehand, which could either assist or disadvantage them in understanding what they are reading. Every single learner that begins formal schooling has some kind of knowledge they bring with them, whether that be accurate or not. it is important that a teacher acknowledges this and works with the information the learner brings with them, rather than pretend that they have no understanding at all. The beginning reading-correlated experiences can begin in children as young as infants or toddler stage. These experiences are important but what is more important is the point where the child reaches the age where they are ready to start learning to read. Not every child is ready to begin reading at the same time, proving that there are no specific physical or mental ages that reading readiness takes place. Children learn to read and write years before schooling begins, through their experiences at home or at social places. The level of intelligence the child possesses usually does not make much of a difference when learning to read. To learn and understand the alphabet involves the child understanding that it filled with sounds, all following a specific system (Snowling, 1998). Once a child can understand that, then they can begin learning how to read for meaning and enjoyment. In

addition Ehri (2020) explains that two crucial goals that should be taken into consideration when teaching foundation phase learners how to read. These goals are that learners should be taught how to decode, or decipher, words that are unfamiliar to them. This is a skill which will help these foundation phase learners for the rest of their reading lives. The second of these two important goals is that the learner should be able to use their memory in order to remember the spellings of "familiar words bonded to their other identities" (p. 57). Once these two skills are put together, foundation phase learners will be able to read for meaning.

3.4. Who has Reading Difficulties?

According to Snowling (1998), the traditional types of reading difficulties have been "dyslexia" and "specific reading retardation" (p. 4). Rutter & Yule (1975) explain that terms used to explain reading difficulties generally come from unclear definitions and lack a rigidity when being used in contexts. The term *retardation* is used to characterise "a specific disability in reading" (p. 181). *Retardation* is a term that deals with a student under-achieving. This concept of under-achievement refers to the abilities the learner is expected to obtain according to both their physical age as well as intelligence quotient (IQ) level (Rutter & Yule, 1975). PIRLS (Progress in International Reading Literacy Study) was a study done in late 2005 until early 2006 where both learners in grade 4 and 5 were tested on their reading in English. This study included both the tests as well as questionnaires which were filled in by the students, their parents as well as the teachers and principals. There were 40 countries that got involved in this study, with 45 education systems between them (Howie & University of Pretoria, 2008) According to (Howie & University of Pretoria, 2008), a significant aspect that impacts South African students' learning is the language of which it is taught. The 2001 PIRLS study showed a strong correlation between "fourth grade reading achievement and home environments [which affected] almost every country" (p. 9). This data suggests that learners have a higher chance of successfully learning how to read if their parents engage in literacy activities before they even enter into school. Other than a "lack of subject matter knowledge" and resources, learners' motivational levels and self-perception were of utmost importance (Howie *et al.*, 2007). Now in 2021, the PIRLS study is being done through a digital medium. According to Mullis & Martin (2019) the focus and main purposes of the PIRLS 2021 study is "for literary experience, and to acquire and use information". According to Mullis & Martin

(2019), the decision to move PIRLS 2021 to an online platform was due to the concept that it could motivate learners to want to work as well as "increase operational efficiency" (p. 5). Moving this study to a more digital environment could allow more learners to be able to read for meaning as they are able to access and understand the work better.

3.5. Concluding Remarks

It can be seen here that if there is an implementation of the ITS model within classrooms, learners will be able to improve their reading abilities at a much faster and more consistent rate. This intelligent tool is capable of assisting foundation phase teachers in appropriately selecting readers for their young learners. Once teachers are selecting more age and level-appropriate books for their learners, there will be a big improvement. These learners will be more motivated to want to read more if they are experiencing their own successes from going through the process. It is important to note here that no actual implementation was made.

Chapter Four: Methodology

4.1. Chapter Overview

In this chapter, the methodology processes that were used will be explained in depth. This involves the use of the qualitative method. The reasoning for using the qualitative method in this research project was to shift the focus to being more orientated around the opinions and thoughts of the educators being interviewed. It was done in this manner as these educators were the target audience for the educational tool which was developed to assist them in selecting appropriate readers for their young learners.

4.2. Research Paradigms

A paradigm is a worldview that describes the nature of the world, one's place in it, as well as the range of possible interactions to the world and its components for the person who holds it (Denzin, 2008; Denzin & Lincoln, 2005). "It is a way of seeing the world," to put it another way (Mertens, 2014). The researcher is guided "in fundamental ontological and epistemological ways" (Guba & Lincoln, 1994). Different paradigms show different underlying ontologies, or philosophical assumptions, that attempt to answer the question. Furthermore, different paradigms have different epistemologies, which are philosophical assumptions about how knowledge might be gathered and used to address the problem at hand (Scotland, 2012). Because paradigms provide opinions on the rationale for research, the researcher is required to be specific about the techniques of data collection, observation, and interpretation. As a result, research paradigms define how knowledge is created and what truth is (McKenna, 2004). A paradigm is a collection of views that the researcher has and believes to be true concerning ontology and epistemology (Cohen et al., 2013). There are numerous types of research paradigms which can be selected as the main focus for research projects. Some of these being positivism, interpretivism, post-positivism or situated learning, for example. This section will be discussing these different types as well as which one was used in the research project.

4.2.1. Positivist Approach

The paradigm of Positivism is explained as "the attempt to apply to the affairs of man the methods and principles of the natural sciences" (Heather, 1976, p. 13). What this means is that there is a distinct focus on scientists using the methods of the natural sciences in order to investigate more into the social science realm. This idea takes the methodology of the natural science and attempts to use those in social science settings as well. According to Dewa (2019), the positivist approach focuses on knowledge that is collected through the use of the human senses, such as the act of observing (Collins, 2010). It is further explained that positivism believes that the use of the scientific method was the only way in order to find out the "truth and objective reality" (Chilisa & Kawulich, 2012, p. 7). This further proves the previous concept where these natural science (scientific) methods are being used to find out all truths. According to Phillips (2000), the term classical or Comtean positivism is linked to the French philosopher Auguste Comte. This type of positivism involves the direct connection to the human senses. According to Phillips (2000), Comte believed that all the knowledge we as human beings have is taken "through the senses" (p. 160).

4.2.2. Interpretivist Approach

The research paradigm of interpretivism disagrees with positivism's thoughts on methodology. The interpretivists believed and highlighted "the phenomenological perspective" of an individual's behaviour. Unlike positivists, the interpretivists believed that not all information comes to us through the use of our senses (Gage, 1989). Interpretivists also believed that human nature cannot be studied using scientific methods. Past researchers were thought to have "neglected meaning-perspectives", meaning that they did not view behaviours as having meaning, which played a role in the action being taken by the individual (Gage, 1989, p. 147). The research paradigm of interpretivism was chosen for this research project as it allowed the researcher to be able to interpret the data and information collected. This paradigm allowed for the researcher to question 'why?' and ask further questions while in the interviews. The interpretivist believed that schools play various roles, depending on the differing contexts (Feinberg & Soltis, 2009). By selecting the interpretivism paradigm, it allowed the researcher to delve deep into the topic and explore the different contexts and perspectives of the educators being interviewed.

4.2.3. Post-Positivist Approach

The paradigm of post-positivism took the approach of using the positive aspects of the interpretivism and positivism movement and used the majority's understanding and knowledge. By doing this, there is a much more multi-dimensional method being used here, as opposed to a singular, one-sided paradigm. The reasons for this paradigm being created was due to the positivism paradigm creating limitations on research (Dewa, 2019; Panhwar et al., 2017).

4.2.4. Situated Learning/Contextual Learning Approach

Constructivists believe that cognition is situation-dependent and dispersed rather than a product of minds (Lave, 1988). Contextual learning occurs organically in real-life situations, with cooperation and participation throughout the action. The acquisition of knowledge is a crucial part of the learning process. Situated learning theory is based on the concept of assignments being done "in real-world settings" and should not be removed or separated from that specific situation it is found in (Dewa, 2019; Kincheloe & Horn, 2007; Winn, 1993; UNESCO, 2002; Brown et al., 1989; Greeno et al., 1992). In addition, Dewa (2019) explains that "learned concepts are linked to the situation in which they are learned", showing us that not only does the skill being taught play a significant role, but so too does the environment in which it is taught (p. 77). From this, we can see the importance the role the environment plays, especially on young learners. It is important to note this information as it can be beneficial to teachers and educators.

4.3. Research Methodology and Design-Define Methodologies

The research makes use of the qualitative method. Qualitative research method is one which includes "direct [and] personal experience" of participants, which takes into account any observable mannerisms or behaviours (Peterson, 2019). This involved the direct contact with teachers on the topic of literacy within the foundation phase classroom. This methodology is one which is open-ended in nature, which gives the researcher more space to work in and "broaden the knowledge base" (Peterson, 2019, p. 148). This methodology is the best fit for this research project as it is looking at a very small group of individuals within society. The reasonings for the research project focusing on a very small group of teachers in the

interviews was to allow for an in depth and detailed analysis and investigation into the opinions and thoughts of these particular individuals. Bresler (2021) adds in that qualitative research focuses specifically on the "contextual description" of individuals (p. 64). This shows that qualitative research is a much more in-depth research methodology. It also proves that this research takes the individual's context and situation into consideration when making its analysis and discussions. Since this research project was the beginning of interacting with this concept, only a small group of teachers were necessary for interviewing.

Main Research Question:

How can an ITS assist foundation phase English teachers to improve their learners' reading abilities?

Sub-Questions of the Research Project*:*

- What is the current practice of teaching literacy in foundation phase in public schools?
- What type of resources are used when teaching literacy in foundation phase in public schools?
- What can ITS offers to benefit learners to read at their expected grade standard?

4.4. Research Design

The study utilized a case study to investigate and comprehend how ITS helps early graders enhance their reading skills. When a thorough inquiry is required, a case study is explored. This study looks at data that was obtained in a small area of Gauteng and is context-based with a small number of participants. Generally, a case study, investigates contemporary real-life phenomenon through detailed contextual. (Yin, 1984) defines case study as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used." (p. 23). This implies that a case study allows a researcher to investigate a phenomenon in a narrow geographic area through their daily activity and experiences. In addition to having a strong qualitative research design, Crick (2021) explains that academics should also be aware of "how they are contributing towards the existing body of knowledge" (p. 407). This is important to not only give a strong research

design but to also know how the current knowledge and understanding is being impacted by this new qualitative research project.

4.5. Participants and Research Sites

The participants in the study were foundation phase teachers who teach English as a home language. The participants in this study were not be individuals who teach English as a second language or as a home language. This research project took place using online interviews with the participants, either through Zoom or Teams. The schools selected were done by looking at their location. It was important for these schools to be in the same area of Johannesburg and not spread out around the city.

4.6. Data Collection Instrument

The research instrument used was purposive sampling, specifically of 5 teachers within the city of Johannesburg. The reason for selecting purposive sampling was for the researcher to be able to pick and choose specific participants that could have helpful information for this particular study. In addition, this research instrument was used as it allowed for teachers who were interested in partaking in the interviews to be selected (Campbell et al., 2020). Purposive sampling, also known as judgement sampling, entails the researcher having a clear notion of which individuals would be employed rather than relying on appropriate volunteers to come forward (Etikan, 2016). This data collection instrument was found to be very useful as it allowed the researcher to successfully find teachers who were interested to be involved in the interviews and to supply the researcher with information they required. Due to the COVID pandemic, irregular lockdowns were often occurring, which made data collection difficult to carry out. Interviews were carried out through the use of online telecommunications platforms, such as Zoom and Teams. The information gained from these interviews were transcribed and the original audio files deleted, in order to ensure that the teacher's identities were preserved.

4.7. Data Analysis

The data analysis was thematical in nature, as this used the feedback and responses received from the participants. Thematic analysis has a goal to understand the "patterns of meanings from data on lived experiences" (Sundler et al., 2019, p. 736). What this means is that the

researcher was able to detect similar themes being brought up and discussed amongst the various teacher interviews. The thematic analysis method was useful as it allowed the researcher to look for repetitive subjects which had "patterns of meaning (themes) across the data set" (Bazeley, 2009). By using this analysis method, the researcher was able to simplify the data into larger topics or themes, which was easier to process and analyse. The thematic analysis method is one which is flexible in nature. What this allowed the researcher to do was to select the best way to process and analyse the data in a way that fits the content best (Braun & Clarke, 2012).

4.8. Ethical Considerations

The ethics application form was submitted to the University of the Witwatersrand's ethics committee, which allows the researcher to access teachers from different schools. The participants used in the interviews were 5 (five) Foundation phase teachers who all taught literacy to their grade 3 students. These teachers' identities were kept confidential, they were named according to the order they were interviewed in (The first teacher was called Teacher A etc.). These pseudo names given to the teachers were used by the researcher in order to be able to refer directly to a specific teacher interviewed. The schools from which these teachers came were also kept strictly confidential. The schools were given pseudo names such as "School X" in order to keep their identity completely private. The information and data collected from the interviews were initially stored on a laptop that was password protected. Once these interviews were transcribed, however, the original videos and audio tapes were deleted to ensure the teacher and school's complete privacy. This was done to ensure that the teachers could not be recognized by either their face or voice.

4.9. Concluding Remarks

To conclude this chapter, the research methodology used was that of qualitative method. The reasoning for this was to focus the research project's attention on the opinions and thoughts of the teachers in the foundation phase. These teachers' thoughts are important because they are the specific target audience for this educational tool in order to teach their young learners how to read efficiently.

Chapter Five: Data Presentations, Analyses and Discussions

5.1. Chapter Overview

This chapter summarizes the results of all of the processes and methods detailed in the previous chapter that I used in the field to gather data for my research. The data collection l guiding processes was based on university laws found on the website. Respondents in this study were required to be familiar with the exercise's principles and processes in order to provide informed analytic and critical opinions based on the regulations.

This research project's problem statement focused on how young learners are graduating from the foundation phase of their schooling careers and are experiencing difficulties with reading at the level they are expected to. This is often the case where the learners are being pushed through to the next grade without having mastered the skills required in the previous year. These learners are said to fall through the cracks of the educational system and are unable to be helped easily and quickly (Fesi & Makeleni, 2020). This study aimed at creating a conceptual system, known as ITS, to assist these foundation phase teachers in selecting appropriate and useful books for their learners to read. The aim was to be able to create a tool which would help these teachers improve their learners' reading abilities by giving them appropriate books to read.

Table showing the composition of the foundation phase teachers who participated in the study. These participants were coded in the order in which they were interviewed (E.g. teacher A was interviewed first, teacher B second etc.)

Teacher Participants	School Names
Teacher A	School W
Teacher B	School X
Teacher C	School Y
Teacher D	School Z
Teacher E	School Z

5.2. Findings and their Relevance to the Study

As the study develops, 'new' and 'elaborated' reading difficulties emerge, which are synthesized in light of current literature and real-life instances, especially in contrast to successes to developed and developing nations. One of study's main goals is to highlight the need for appropriate transformation for learners to starting to read at an early age and develop home-grown solutions to academic issues. It is anticipated that all stakeholders will see the importance of bringing technology into teaching and learning and the role played by teachers to promote learning at early grades. It is intended that this research will spark ideas for more research, debate, and action for meaningful and practical development to alleviate reading challenges at early graders. The technique of methodically categorizing excerpts from qualitative data in order to uncover themes and patterns is known as qualitative coding (Braun & Clarke, 2012). It allows you to organize data that is unstructured or semi-structured, such as transcripts from in-depth interviews or focus groups, into themes and patterns for analysis. The coding discussed in this chapter include among other things:

- Parental involvement
- Resources
- Learners' emotions
- Professional help
- Knowledge and understanding of Intelligent Tutoring Systems (ITS)

5.3. Parental Involvement

The value of parental involvement in their children's academic and social development has long been recognized. The initial years of a child's life are critical for their future academic achievement. The goal of this research was to look into several aspects of parental involvement in early childhood education. The importance of parental involvement was a major subject that came up repeatedly during data collection. Five out of five (5 out of 5) teachers agreed that parental participation, or lack thereof, might have a substantial impact on young readers' attitudes about reading and literacy.

Teacher B agreed that lack of parental involvement was an issue:

> *Okay. Where, where I was, I think lack of resources, lack of parental involve involvement and the, the, the situation at home, So the learners are struggling. They find out that they're staying with, uh, grandmothers from the parents. They don't care about their education.*

According to Howie & University of Pretoria's (2008) data, learners have a much higher chance of being successful in learning how to read if their parents involve and engage themselves in literacy activities before the child enters formal school. This information also relates well to Logan et al. (2019)'s statistic previously mentioned in the literature review. It is stated that the parents who read picture books with their children at least once a day "provide their children with exposure to an estimated 78,000 words each a year" (Logan et al., 2019, p. 383). What these two sources do is show us the importance of parental involvement, especially in the earlier stages of the child's life. These articles prove that children are able to learn and understand information at a very young age, as opposed to what used to be believed. The lack of parental/adult involvement can be negative towards a child's learning as they do not have the support they require to improve and succeed. This is an issue with parents/adults not caring or having interest in their/the child's education and learning.

In addition, Teacher C stated:

> *You have parents who are academically brilliant, brilliant, and the child is not the child is for that the apple has fallen far away from the tree. And that child's not reading and not up to scratch like when they were five years old. They were reading to the class and then the pressure that's put on the child who's struggling, and how detrimental that can be as well. And academic excellence is a standard.*

Teacher C is highlighting the significant impact parents make on their children. When a parent has been very successful, they will expect that same excellence from their children. This type of behaviour creates pressure on these young children.

> *If I speak to educational psychologists, they, they don't say by name, but they often say I want to work at School A, School B all of that. The children are coming to them with anxiety performance at school, even little ones. Sure. And how they worry about and they need to keep on checking with the teacher. And it's a floating anxiety for perfection.*

Here Teacher C further explains that learners are aware of the pressures being placed on them by their parents or caregivers in order to be successful as they once were. Young children are

striving to be perfect, which is what is expected from their parents. From this, we can see that too much parental involvement or pressure can also be harmful towards young children.

Teacher D agrees and explains:

> *Definitely a collaboration. And that's why I'm always trying to instil that in my meetings with the parents – is that at the end of the day, we ultimately we meeting together as a team to help your child, in the benefit of the child.*

What Teacher D is highlighting is the importance of having a good connection between the parents and teachers in order to do what is best for the child's learning and understanding. By collaborating, clear communication can be achieved.

Teacher E adds in:

> *It's important to just to make sure that there's a written evidence that we are aware of the issue and working on it.*

Teacher E is focusing on the important step of writing down and keeping track of learners' strengths and weaknesses, in order to have clear communication with the parents of the child. This step is for the parents to see from the teacher's perspective what is wrong and how it can be improved. In conclusion, all the teachers interviewed believed that a parent's involvement can significantly impact a young learner's learning experience. Many believed that too little involvement can be harmful as learners fall behind and do not have the support necessary to catch up. In addition, another teacher believed that too much parental involvement can also be harmful as it can add unnecessary pressure on young learners achieve perfect results every time.

5.4. Resources

The use of resources has been widely accepted as being a large motivational factor for learners and teachers alike. With the addition of resources being used in the classroom, learners can feel more comfortable and excited to learn rather challenging topics. A goal for this research project was to investigate into what is happening within the literacy classrooms, to see the types of practices and techniques being implemented by foundation phase teachers. Four out of five (4 out of 5) teachers interviewed agreed that there is importance in using different resources within classrooms when teaching literacy to foundation phase

students. The resources mentioned varied but the main concept of using resources in lessons was consistent.

Teacher A agreed that various resources should be used within classrooms:

> *We've actually created our own English book, so within that English book review, we've incorporated a lot of different activities. So specifically like if we had to take a listening and speaking activity, each week is different.*
>
> *Another one is we would use YouTube clips and they have to watch the YouTube clip and then answer questions based on the YouTube clip. Another thing that we've been doing is -I'll read to the kids. I'll try and read to them twice a week or three times a week so that they can hear me reading and they can get how to pronounce words. And then again, comprehension getting them to try and read on their own and see what they can read.*

This response from Teacher A shows us that it is important to have a variety of resources used for learners within your class as it helps accommodate for all types of learners.

> *What is it that we can bring and then, so that those learners can be able to, to, to do better. Mm. So we, we, we wanna support the, the, the learners with, um, I mean, the educators with, uh, big books, the reading materials, the tablets, the lesson plans.*

This response from Teacher B shows that she believes resources are important within the foundation phase classroom. It is important to note here that Teacher B comes from a school with no technology at all. Looking at her response after knowing this, we can see that the school has adapted to try give the teachers and learners different resources. Teacher C is currently working in a well-resourced school but has previously experienced teaching with minimal resources. This is her opinion after experiencing both sides of the spectrum:

> *I think the more resources available, the better. The, no, let me say it like this, the better the resources that are available, the more it'll help the kids. Most definitely.*

This response proves Teacher C's understanding that fewer higher-quality resources are more important than many lesser-quality resources for young learners. This is a crucial understanding teachers need to have to ensure that they are using appropriate and good quality resources with their learners.

In addition, Teacher C explained that:

> *Technology has been very useful. And to not empower those teachers with skills of how to use technology is also a crime. Because you have these brilliant teachers with years of knowledge, years of experience, and they can't impart it, because they don't know the new medium.*

This comment is crucial as it highlights the importance of teachers being familiar with the tools and resources that they use to ensure that proper teaching is done. There are many older, more experienced teachers who are not able to access the resources and therefore, their learners.

Teacher D used a slightly different approach to the other teachers:

> *You know, I use technology. I do something quite interesting. I'll say my teaching that I've incorporated over the years, you know, I don't know if you know, I'm actually nursery school trained as well. And because of my new school background, I like to I like music and singing. So if I'm teaching a concept set, for instance, proper nouns, I'll go and find a video because I really believe that a lot of the kids are visual learners, but some are auditory as well.*

Teacher D's experience with nursery school teaching has given her a great advantage in her foundation phase teaching. The use of songs and videos relates directly to the young learners of today, who are surrounded by technology wherever they go. These learners who are used to seeing screens around them are more likely more comfortable to want to learn from screens. Teacher D is taking advantage of the resources and technology she has to try encourage her learners to participate in the lesson.

In addition, Teacher D states:

> *It's so important to to make it relevant to them because otherwise they're gonna get bored. Yeah, and they actually, I'm not one for lots of works, you know, they do a lot of worksheets and written stuff and things based in class.*

From this, it can be seen that Teacher D is aware of the type of learners she's teaching, in order to create the most effective and appropriate lesson for them. She is aware that her learners will learn best from the use of technology, rather than worksheets.

In conclusion, four out of five (4 out of 5) teachers interviewed stated the importance of resources being used within the literacy classrooms. Many of the teachers agreed that technology was a very useful tool in the learning environment.

5.5. Learners' Emotions

The learners' feelings and emotions while in the classroom is also recognised as a crucial part of the learning process. The learners need to feel confident and comfortable in their learning environment in order to learn most effectively. A goal of this research was to investigate into how the learners were feeling within their literacy classrooms. Four out of five (4 out of 5) teachers agreed that there is significant importance in ensuring that learners are comfortable and happy in their learning environments.

Teacher B stated that:

> *Okay. Um, from, from my experience, most of the learners are struggling to read only few, uh, hundred percent. I can say 20% can read and 80% cannot read and those who can read, they can read, but they cannot read for a meaning. They cannot understand what they're reading.*

Teacher B is highlighting that in her school, majority of learners are struggling to read for meaning. These young learners who are unable to read at this stage of their education must feel incredibly frustrated and unhappy, especially if they see some classmates reading successfully. This concept is backed up by the work by le Roux et al. (2014). It is explained that children who experience learning and reading difficulties have severe negative affect on their short and long-term "emotional development and learning experiences" (le Roux et al., 2014, p, 656). What this shows us that if young learners struggle and experience difficulty in their learning environment, they will experience emotional difficulty. This type of feeling and emotion will only make it more challenging for the learner to want to learn in class.

Teacher C adds to this idea:

> *Yeah, and sometimes also children get quite embarrassed, reading out aloud. And they know they find it hard. So those children make a plan not to ever embarrass them because already they finding reading difficult. So when you have to listen to them read make sure that it's one-on-one. No one's in the classroom there so that child doesn't get embarrassed. Yeah, yeah. shaming them. Yeah, no shaming.*

What Teacher C is focusing on is the importance of making sure your learners feel comfortable learning in your classroom. She is aware that there are some learners who find reading challenging and therefore, she never makes them read in front of the class. By allowing her battling students to read to her privately, Teacher C is allowing the learners to still learn and

improve but in a situation they find comfortable. Teacher C is not disadvantaging the student by forcing them to read in front of the class as that would only make the learner's anxiety worse and negatively impact their overall learning.

In addition to that, Teacher C also stated that:

> *There are a few things, the one was trying to get them reading material that they were naturally inclined to be interested in. Maybe if a child loved cricket, then I'll try to go on the weekends and maybe look for cricket books. Or even we often said magazines, even if it's a magazine, we will get one off the shelf, if it was going to interest that child.*

Here we can see that Teacher C not only is aware and respectful of the learner's anxieties and abilities within the classroom, she also tries to promote reading using each learner's own personal interests. By getting books or magazines that focus on what the learner finds interesting, Teacher C is able to get her learners excited and interested in reading more.

This concept is proven by Leland et al. (2018) in the literature review above. There is significant importance in having educational content be enjoyable for the learners. For a certain learner, a specific type of story or book can trigger them to want to read more. This emotional connection is linked with motivation. It is important that motivation is considered when teaching as it can impact the way the learners interact with the content or skill being taught (Leland et al., 2018). It is important that a teacher is aware of their students' current interests, similarly to Teacher C's approach, in order to ensure that they always have interesting resources that can inspire and motivate learners to try read more. In addition, it is explained that not only resources play a role in the teaching of literacy but the learners' own motivational levels are incredibly important to acknowledge (Howie & University of Pretoria, 2008).

Teacher D explains that:

> *Believe it or not, from a very young age, they're very aware, they're aware that they have a difficulty in a sense, not that you making it obvious, obviously, as they get older, it's probably more noticeable for themselves.*
>
> *And for me, that's a huge part of my teaching is always just trying to boost the child's confidence, encourage them to try their best, and even if they make mistakes, I think for me, that's, you know, quite important.*

Teacher D highlights here the importance of a learner's confidence in their own abilities. She tries to ensure that all her students feel confident as that is what allows them to try and learn in the process. By not making learners feel bad for making a mistake, Teacher D is creating a safe space for these learners to thrive. The extra pressures of achieving are dissolved and the focus is entirely on trying and learning from that. This is a much healthier way to teach young learners as it sets them up to want to attempt the work. In conclusion, four out of five (4 out of 5) of the teachers interviewed highlighted the importance of learners feeling comfortable and confident within their learning environments. It was mentioned that learners feel the pressure placed on them by the school and/or parents and teachers need to be aware of this in their lessons.

5.6. Professional Help

There is significant importance in using professionals (e.g. speech therapists) to assist foundation phase learners battling with literacy. When a child is battling and the teacher is unable to assist, it is time for them to see a more qualified person to assist in finding the cause of these difficulties. A goal of this research was to investigate into how foundation phase teachers deal with learners truly battling with literacy. Four out of five (4 out of 5) teachers interviewed mentioned that their school had professionals available for learners to see for more intense and in depth help.

> *And we would often have meetings with parents to say, the reading and the comprehension skills are below par, we need to intervene. And that was as far as we could go. We would always recommend a therapist, a remedial therapist or some kind of intervention, but we couldn't ever force them.*
>
> *I wanted to add in is that there's the yes centre where there are therapists available. So if a child is really below the average, we will make a time slot for the child to leave the class and go have that therapy or reading practice.*

Teacher C's explanation proves to us the importance of leaning on professionals for assistance whenever it is necessary. Usually it is needed when a teacher's attempts to help the learner have failed. Teacher C is lucky enough to work at a school where these professionals are easily accessible for both the teachers and children.

In addition, Teacher D states:

> *Yeah, and then, of course, if the if cases are very severe, then in speech therapy is recommended for kids.*

Teacher D explains here that when the teacher is unable to help the learner, they rely on the speech therapist to assist in getting the learner back on track. It is important to note here that the teachers at this school recommend the professional to the parents. If the parents are not interested in taking their child to the speech therapist, the teachers cannot force them.

In addition, Teacher E states:

> *And also, there's the speech therapist here the school, which we're very lucky to have her she has this program called Rave-O.*

The Rave-O program is one which works on improving literacy in learners. This is a course that teachers can study at Bellavista school. This is a very helpful course, as it was mentioned by numerous teachers during the interviews.

5.7. Knowledge of teachers about ITS

The need for intelligent technological systems within classrooms has become more and more necessary within modern life. These types of technologies can be significantly advantageous towards teachers and students alike. The goal of this research project was to investigate into if these types of technologies and tools are known within foundation phase literacy classrooms in Johannesburg. This research project also focused on whether these tools and technologies are accepted and wanted in these foundation phase literacy classrooms. Zero out of five (0 out of 5) teachers had heard of this ITS tool at some point in their teaching career. However, five out of five (5 out of 5) teachers interviewed agreed that this type of technology, and technology in general, can be very successful and useful within the foundation phase literacy classroom.

Teacher C states:

> *Technology has been very useful. It's been a game changer.*

Here, Teacher C is commenting on the technological tool they have started using in their classrooms. This tool helps promote the young learners to want to practice reading. This tool allows the learner to pick the book they want to read and it allows them to select the option

they want. This program can read the story to the learner, while they follow or allow the learner to read it themselves while recording themselves. This recording feature allows the learner to send their teacher their recording of them reading aloud. This use of technology is very different to the traditional method of teaching reading to learners, which is likely the reason why these learners are enjoying using it.

In contrast, Teacher A stated:

> *There's too much technology and focus on technology, and I think that's also what is delaying a lot of making a lot of problems in literacy. The fact that they spent too much time on screens.*

What Teacher A is focusing on here is the fact that technology can, and is often times, a huge distraction for such young learners. Teacher A believes here that young children are being exposed to far too much technology, especially as these technologies are disruptive and unhelpful towards literacy improvement and growth.

5.8. Discussion

This chapter has attempted to respond to the main and sub-questions posed in the beginning of this research project.

Main Research Question:

How can an ITS assist foundation phase English teachers to improve their learners' reading abilities?

Sub-Questions of the Research Project*:*

a. What is the current practice of teaching literacy in foundation phase in public schools?
b. What type of resources are used when teaching literacy in foundation phase in public schools?
c. What can ITS offer to benefit learners to read at their expected grade standard?

Thematic analysis is one of the most extensively utilized qualitative methodologies in psychological research. The aim of this study is to place thematic analysis in the context of the inference diversity that distinguishes qualitative research approaches. The goal of uncovering themes is at the heart of qualitative data analysis. Themes are abstract, often ambiguous entities that researchers identify prior to, during, and after data collection. What are the origins of these themes? Themes are derived from all the participants that were interviewed and their response were compared to one another. A theme is a recurrent term for an integrating, related idea derived from facts (Bazeley, 2009). It is most commonly used to describe items extracted from text, and it is usually this approach that's intended when people talk about detecting themes in data as a way of analysis. The themes discussed includes parental involvement, digital resources and limited knowledge in using ITS.

Theme 1: Parental Involvement

The first sub-question of this research project focuses on the current practices of teaching literacy within public schools. During the numerous interviews, this was found to be significantly affected by the involvement of, or lack thereof, the learner's parents in their child's education. Five out of five (5 out of 5) teachers agreed that parental participation, or lack thereof, might have a substantial impact on young readers' attitudes and abilities in reading and literacy. What this shows us is that there is a strong believe in foundation phase teachers that their learners require support from their parents in order to be as successful as possible. Within each of these five foundation phase teachers' classrooms, the teaching of literacy and reading is taken very seriously. These teachers each showed and explained their own ways of dealing with readings difficulties learners may have as well as their own personal techniques for teaching this subject. It was often mentioned the importance of brining in topics that the learners find interesting, as this promotes them to want to read more.

This concept is further proven to us by Leland et al. (2018) in this research project's literature review. Having enjoyable educational content for the learners has significant importance to their overall abilities and attitudes towards the skill. By teaching learners using topics they find interesting, a learner can be triggered to want to read and learn more. This type of motivation is an emotional one, which can help create a positive attitude towards reading within the learner. It is incredibly important to consider motivation when teaching young

learners as it can impact they manner in which they interact with the skill or topic being taught (Leland et al., 2018). Howie & University of Pretoria (2008) also agree with this statement as they explain that a learner's own motivational levels are crucial for teachers to acknowledge when teaching. It is crucial for teachers to be aware of their students' current interests, in order to ensure that they always have interesting resources that can inspire and motivate learners to try read more. "Extensive international research" has continuously been in favour that parental support and involvement can potentially improve the learner's achievements, both academically as well as socially (Hornby, 2011, p. 1). There are two types of involvements parents can partake in; at home or at school. The at home involvement includes the parent reading and listening to their child read aloud as well as observe them doing homework and help where necessary. The school involvement parents can be included in are things such as parent workshops or important meetings held at the school. With the increase of the parent's involvement and interest in their child's education, so too should their grades increase.

Another benefit of having parental involvement in foundation phase classrooms is that it can help motivative and improve their children's "attitudes, behavior, and attendance at school, as well as in their mental health" (Hornby, 2011, p. 2). What this shows us is that parents have a significant impact on their children's achievements as well as overall mental and behavioural state. What this means is that if a parent is disinterested in learning and education as a whole, their child will pick up on this behaviourism and mentality. This concept directly links to Bandura's (1965) theory of vicarious learning. Vicarious learning involves subjects developing emotional reactions and responses "through [only the] observation of the pain and fear reactions exhibited by other persons" (Bandura, 1965, p. 34). A good example given by Bandura (1965) is that often times people do not actually have direct, negative experiences with reptiles, for example, yet they still have a strong fear of them. This fear of the reptiles can often come from seeing how others react and respond to being around reptiles which develops the individual's own so-called fears. In the perspective of the parental theme, we can understand that a parent's negative experience whilst at their own school could be just enough for their child to develop that same hatred or fear. By a parent simply showing how they feel about the school and learning environment, their child can easily pick up these emotions and opinions on their own. This issue can be both an advantage or disadvantage. It could be a disadvantage if the parents or caregivers are against or disagree with the school's

policies and practices. Although the learner has not had a poor experience of learning and education themselves, they still hold this negative opinion and view of the schooling system. However, this can be advantageous for the school if the opposite is true. According to Bandura's (1965) theory, if the parents of the learner are positive about learning and education, then their child is likely to also be motivated and interested in learning. If a school has positive and motivated parents who are also involved in their child's learning, then it can be incredibly advantageous for that school.

Theme 2: Lack of Resources

The second sub-question is one which focuses on the various types of resources being used within foundation phase literacy classes in public schools. Many times during the teacher interviews, the topic of lack of resources was brought up and discussed. Four out of five (4 out of 5) of the teachers interviewed agreed that using different resources in the literacy classroom was important, however not all these teachers had access to these resources. The resources mentioned varied from teacher to teacher but the main concept of using resources in lessons was consistent. According to Brown (2016), with the increased usage of technology and multimodal devices, the explanation of what a "text" is needs to be re-evaluated and widened. Texts are no longer simply "written words and symbols", they are much more complex nowadays. This extension of what texts are defined and understood as brings us "more opportunities for meaning making" to be made within classrooms and learning environments (p. 43). Literacy is closely connected to meaning making processes as without them, one cannot understand what they have read or interacted with. It is explained that electronic readers or books can possibly be more helpful for learners who battle with physical copies of books as it allows them to use the technological features such as note-taking (Brown, 2016).

Hernandez (2011) explains that there are three important environments which impact, either positively or negatively, a learner's success whilst in school. These three environments are schools, families and "federal, state, and local policy" (p. 10). The school is included as it has direct responsibility for teaching young learners how to read. The family is on this list as they play a large role in the learner's exposure and experience with literacy and reading. As previously mentioned, parents' perspectives and views on learning and schooling can have a

direct impact on the way in which the learner perceives learning and school. This is related to Bandura's theory of vicarious learning (Bandura, 1965). Another reason that the family is also on this list of crucial environments is because the family's financial status can severely impact whether a learner gets access to resources to learn from. It is explained by Hernandez (2011) that if a family is poor, they are very unlikely to be able to afford to purchase resources for their children to learn from. Having resources in the home environment is known to drastically assist learners with growing their skills and knowledge as they have more exposure to the resources and therefore, more time and chances to learn and grow their skills.

It is highly disadvantageous for a school to not have access to resources to assist their learners in their educational journey. Kaufhold et al. (2006) explain that the lack of resources in the classrooms is incredibly frustrating for the teachers involved. This is because without some basic resources in the classroom, the teachers are severely limited with what they can and cannot do. These teachers depend on the resources in order to successfully teach young learners and without the resources to assist, there will be learners who struggle to grasp the concepts and topics taught. In the opposite situation, it can be understood that for a teacher to have sufficient, if not extra, resources to use, then their teaching would be more successful and enjoyable for them.

Theme 3: Teachers' Limited Knowledge in ITS

The third sub-question of this research project was one which focused on both the knowledge foundation phase literacy teachers had about Intelligent Tutoring Systems as well as how this program could possibly assist teachers and students in improving the reading ability levels. Zero out of five (0 out of 5) teachers interviewed had actually heard of or interacted with this Intelligent Tutoring Systems (ITS) tool at some point in their teaching career. In addition to this, five out of five (5 out of 5) teachers, after hearing what this tool is capable of, agreed that this type of technology, and technology in general, can be very successful and useful within the foundation phase literacy classroom for both teachers as well as learners. According to Listiani et al. (2021), the platform of YouTube has great potential to teach learners a range of subjects while using "fun learning styles" rather than the traditional method of teaching and learning (p. 157). The application of YouTube has lots of potential with teaching and learning as it is an easily accessible program which has a large range of

videos in various languages. This is because in order to post a video, one needs to have a YouTube account. This simple requirement means that this program is widely accessible and allows for a range of different kinds of people to upload their videos (Listiani et al., 2021).

EdTechXGlobal (2017) explains that the intelligent tutoring system is a completely automatic process, which does not require any human input to run successfully. This tutoring system allows for learners to receive immediate and personalised assistance, in order for improvement to be possible. If foundation phase literacy teachers were able to have access to this kind of tool, they would find some significant improvements and benefits. If a teacher uses this automatic tool to assist them in giving their learners feedback whilst doing their reading and literacy classes, a teacher could find that they have significantly more time to focus on other teaching aspects (EdTechXGlobal, 2017).

Screenshot below shows the Reading/Literature Difficulty Analyser. This basic tool was created to showcase the intentions of the ITS tool. This analyser was made just as a sample, not to be used fully. The tool has a box which allows the user to insert the text needing to be analysed. Once the text has been added, the user clicks “submit” and the tool calculates the difficulty level of the writing. This is made up of how many words there are and how long these words are. The higher the score, the more challenging the text is as a whole. Below we can see the Dr Seuss poem has been inserted here. It has received a relatively low score, showing that it is appropriate for beginner readers to attempt.

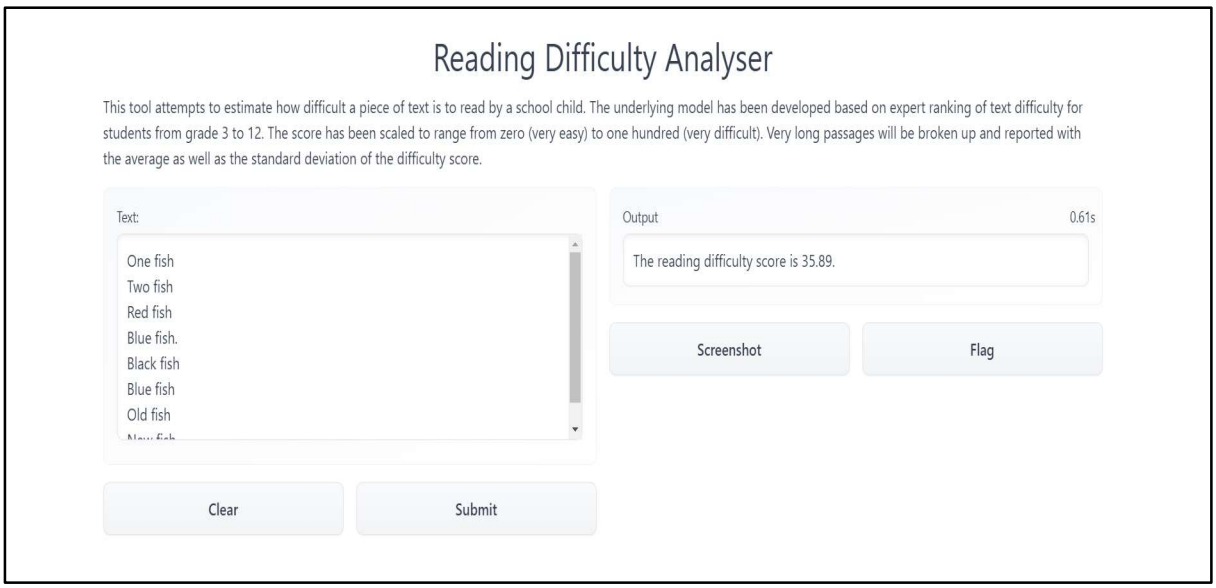


Figure 2: Reading Difficulty Analyser Website

As previously said, each learner in a typical classroom requires personalized attention; but, most of the time, teachers have little time to attend to individual requirements. ITS offers a tailored learning path and effective instruction. Teachers might use it as an intervention tool because they don't have enough time to conduct individualized tutoring. The ITS functions as a tutor. By offering basic phrases to read and positive feedback comments, the method assists and encourages learners. Where the learner never makes a mistake, it tries to figure out what caused the mistake and redirects the student to the mistake. It also facilitates instructional interaction with learners and determines which pedagogic actions are required. In addition, it includes ideas for overcoming performance stumbling blocks, assistance, support, explanations, various practice assignments, and assessments with the goal of assisting the learner.

5.9. Findings and Research Questions:

Sub-Questions of the Research Project*:*

a. *What is the current practice of teaching literacy in foundation phase in public schools?*

There seems to be a mixture of the different practices within the foundation phase literacy classes in public schools. There is no singular teaching practice which is best for foundation phase teachers to use in their literacy classes. Each of the various teachers interviewed had their own personal practices they currently use in their classrooms. These included the main headings of parents, professionals, content and technique. Each of these sections will be discussed below. Parents are a significant aspect of the learning process. Foundation phase literacy teachers tend to lean on their learners' parents for additional help and support in learning to read. This includes asking the parents to read or listen to their child read to them after school, so the learner gets in additional practice with a variation of adults. A common practice of foundation phase teachers is to constantly update and inform the parents of the learner's progress, which includes both their strengths and weaknesses, in order to ensure that they get the help needed.

Bringing in the assistance of professionals, such as speech therapists, is a common practice within foundation phase literacy classrooms. Often times the professional is on the school grounds, so they are easily accessible for the young learners. These professionals are brought

into literacy lessons when the foundation phase teacher believes that the learner has a deeper, more troubling issue present. These professionals are able to focus on less learners in much more detail to understand exactly what is causing their confusion and misunderstandings. The current practice within foundation phase classrooms relating to content is to give these young learners as much extra practice as possible. As mentioned before, this extra practice can be done with parents after school or can simply be more books for the learner to try read. A very common practice is for the teachers to simplify the content being taught if the learner is having difficulties understanding it. By taking a step backwards and making the work a bit simpler, the foundation phase teachers are able to diagnose exactly where the learner is battling and misunderstanding.

The technique that many of the foundation phase literacy teachers used was to focus on the content being taught, rather than exactly how it was being taught or assessed. What this meant is that if a particular learner was incredibly shy when reading aloud in front of the class, the teacher would let them read on their own in order to avoid all forms of embarrassment. If the teacher were to be stubborn and force the learner to read aloud in front of their class, they could feel too uncomfortable and therefore not want to try read ever again. This technique of being patient is a common one amongst the foundation phase teachers. The teachers unanimously agreed that it is crucial to take a learner's personal anxieties and pressures into account when choosing how to interact with them in class.

b. *What type of resources are used when teaching literacy in foundation phase in public schools?*

Resources are a privilege in public schools as often times the school is not given or cannot afford resources for their learners. The topic of the lack of resources was prominent as most teachers have experienced less resources than they required. Online resources is also one which has come into play more recently, due to the pandemic. These resources are incredibly helpful and very accessible for most foundation phase teachers. In opposition, the traditional forms of resources are also useful, if in stock at the school. Technology is another resources that foundation phase teachers use in order to teach literacy to their young learners.

Very often, public schools have minimal support or funds to be able to purchase resources for learners. This puts immense strain on the teachers and educational system, which also

negatively impacts the learners being taught. There are many learners who need resources in order to understand the concepts and topics they are learning about. These types of learners may have learning difficulties. Without sufficient, good-quality resources to use, teachers find themselves unable to successfully teach their learners. Since the beginning of the pandemic, there has been a sharp increase in the usage of online resources in the foundation phase classrooms. This is because if a learner has access to internet, they will be able to have the resources to assist with their learning. These online resources are often used as they offer teachers a new, fresh approach to the subject matter. This different approach allows for some learners who struggle without resources to be included in the classroom and hopefully, learn. Using these online resources are also great extra practice for the learners involved. These resources allow for the learner to practice their skills or learn more at home, which takes the pressure slightly off of the foundation phase teachers.

Traditional forms of resources are also often used in classrooms as they teach foundation phase learners the necessary skills when using a book. For example, it assists with their fine motor skills, when turning the pages, and teaches them how to care for a book properly. This exposure to traditional resources, such as readers and big books, is crucial for the learners in foundation phase classrooms. Technology is another newer resource that is making its way into the educational system. The usage of videos, songs and games has increased. By using videos in lessons, the learners who battle to learn in a more traditional manner are catered for as there is a new way that they can learn and grow. Technological resources are one which are much more relevant to the learners of today, as they have been born into a world with technology and electronics. By using this resource more in the foundation phase literacy class, teachers will be able to get their learners much more interested and motivated in the work being done, as it is a fun experience for them to partake in.

c. What can ITS offer to benefit learners to read at their expected grade standard?

The use of ITS can benefit foundation phase learners as it creates a more efficient work space which is more relevant to the types of learners that are found in schools today. There were a few teachers who believed that the introduction of technology, specifically ITS, can significantly improve learners' reading abilities.

The use of ITS in foundation phase literacy classes can assist teachers in keeping track of the learner's progress as well as potentially estimate how the learner will improve with time. By allowing the ITS to be used, it allows the classroom to run more efficiently overall. This can not only benefit the learner but the teacher as well. In addition to it being efficient, the use of an ITS can be incredibly relevant for the young learners of today. This tool can be relevant for young learners as they have all grown up with technology around them. By using this tool in foundation phase classrooms, learners who are struggling are able to potentially be helped. A young learner might find a tool less intimidating than an adult teacher when asking for help with work. This is because the learners are so used to technology around them.

Main Question of the Research Project*:*

d. How can an Intelligent Tutoring Systems (ITS) assist foundation phase English teachers to improve their learners' reading abilities?

Within the foundation phase literacy classrooms, there are various methods and practices being used in order to assist these young learners with reading. These methods and practices involves the help and assistance of parents and professionals. ITS can help bridge the gap between these important individuals, creating a link between the teachers, parents and professionals who work at the schools. The Intelligent Tutoring System would be able to keep track of the learner's progress whilst learning how to read and share that information with the teacher. By having this information readily available, the learner's teacher will be able to see exactly where the learner needs more help. In addition, this information can be shared between the teacher and parent, in order for the parent to see for themselves where their child is battling. If that learner usually uses a professional to assist them, this information can be shared with them too. By having this easily accessible information, the teachers will be able to clearly communicate with the parents and professionals in order to ensure that the learner gets the help that they require.

Public schools often struggle to afford resources, which results in learners not having anything to learn from. This puts strain on not only the teachers, but the learners too. ITS can assist this issue by recommending learners specific resources rather than use the general ones expected at school. By using ITS for this, the learners' reading abilities will improve as they are getting appropriate and personalised resources. ITS can also assist learners and teachers

in finding the exact type of resource needed for the learner, which makes that process much simpler. Another reason why ITS can assist learners in improving their reading abilities is that this system is likely to be much more relatable to these types of learners as they have been born in a world where technology constantly surrounds them. A learner like this might find it fear-inducing to ask an adult teacher for assistance and would rather opt to getting a tool to assist them. This tool can help those learners who battle asking for help as it far less overwhelming and intimidating.

Chapter Six: Research Project Summary, Conclusions and Recommendation

6.1. Chapter Overview

This research project's focus was on foundation phase reading abilities in public schools, looking specifically at how using ITS can assist and help learners improve their reading abilities whilst in foundation phase. It looked into the different aspects which teachers find prohibit these young learners from improving their reading level and ability. These aspects involved included the resources and parental involvement, to name a few. This chapter will provide an overview of the research project. This chapter will look back at what the focuses of this research project were as well as summarise the findings. This chapter will also discuss the limitations this research project had, as well as any recommendations for future research to be made.

6.2. Reflection on the Research Project

This research project investigated into how ITS can assist foundation phase learners with improving their reading abilities. In order to reach this, there were some sub-questions that needed to be focused on. These questions looked at how literacy was being taught in the foundation phase classrooms, as well as the types of resources (or lack thereof) was being used in these lessons. This research project was qualitative in nature, using the interpretive paradigm to investigate the answers given by the interview participants. This research paradigm paid close attention to meaning making of participants. The interview participants were told to give their own opinions and thoughts on the matter at hand. Thematic analysis was used in order to pick up patterns and repetitions that came from those interviews.

6.3. Limitations of the Research Project

This research project was limited to using only online resources rather than physical sources, due to it occurring during the COVID pandemic. Empirical investigations could not be conducted, which limited this project to only previously completed studies and resources. The research project's sample size was small, which did limit the overall research. Another large limitation was that this research project was done in only one province of South Africa.

6.4. Recommendations

This topic has a sound theoretical and empirical foundation for this study endeavor, but it needs be researched in greater depth both theoretically and empirically. This study project has the potential to grow into a far more impact piece of work, especially if more recent studies and research are included. Lack of certain basic skills, like reading comprehension, can significantly hinder the academic progress of the learners in future. Unlike the classroom teachers who face challenges to cater individual attention of each learner, the ITS that interpret complex human responses and learn as they operate, adjusting their feedback style and content focus to align with students' learning needs. As technology is advancing in each day, there is a need to train the educators on how to use the ITS to raise the literacy skills for learners. The schools and the Department of Basic education should strive that schools should have an ITS for teaching reading comprehension skills with customizable content. Bearing in mind that the ITS is tutoring software that can tailor instruction to an individual student's requirements, and can provide intelligent instructional support similar to human instructors.

6.5. Concluding Remarks

To conclude, this research project has highlighted that there is potential in using ITS within foundation phase classrooms today. This research has shown that this tool can be advantageous for both teachers and learners alike. ITS has potential in improving the relationship between teachers and parents as well as giving learners immediate feedback.

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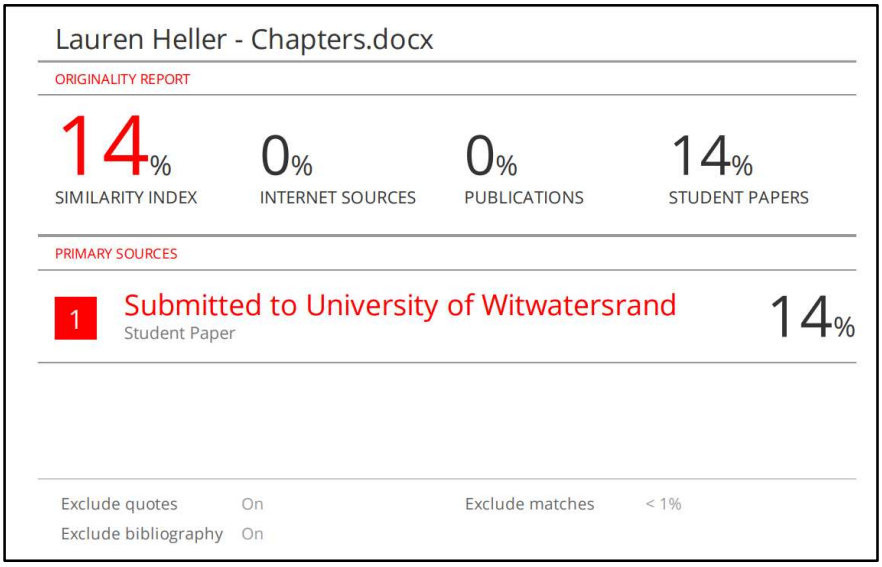
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Appendix I: Interview Schedule for Foundation Phase Literacy Teachers

Interviews to be between 30-45 minutes long

1. There are so many learners that complete their foundation phase with reading difficulties. Do you face a similar situation within your class? If so, please explain the problems your learners are facing.
2. What do you do to help support learners like this?
3. Do you find that these support systems actually help the learners with their reading abilities?
4. What are the current practices for teaching literacy in your school?
5. What types of resources do you use in order to teach literacy? Does it help you?
6. Do you use technologies of some kind to assist you? Does it help you?
7. Have you ever heard of ITS? If so, have you ever used it within your classroom?

Appendix II: Turnitin Report



Lauren Heller - Chapters.docx

ORIGINALITY REPORT

14%	0%	0%	14%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to University of Witwatersrand Student Paper	14%

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