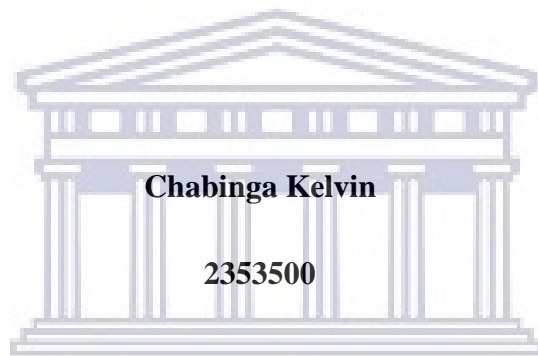**UNIVERSITY of the WESTERN CAPE**

Emerging Technologies for Teaching and Learning: An Investigation into the Use and Role of iPads in Grade Six English Second Language in Three Primary Schools in Northern Zambia

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A thesis submitted in fulfilment of the requirements for the degree of Philosophiae Doctor in the Department of Language and Literacy Studies, University of the Western Cape

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Key Words

- Emerging Technologies
- Literacy
- ZEduPad
- English
- Second Language
- Grade Six
- Zambia

ABSTRACT

The current study framed as, 'Emerging Technologies for Teaching and Learning: An Investigation into the Role and Use Of iPads In English Second Language in Three Primary Schools in Northern Zambia,' is situated in Northern Zambia in the Mungwi District. The study set out to investigate the role and use of emerging technology/-ies that is iPads, for literacy development in Grade six English Second Language schools. The purpose was to gain insight into the role emerging technologies play in fostering English Second Language (ESL) and literacy development in the era of new multimodal texts. This entailed acquiring an understanding of how highly ZeduPad tablets might facilitate meaning-making in the process of developing literacy skills.

In order to achieve this objective, the study employed the Input Hypothesis and Affordance theories as lenses through which to view language and literacy teaching and learning. In particular, the study employed a pragmatic paradigm intertwined with a mixed method, thereby combining the prototypes of quantitative and qualitative research. A pragmatic paradigm affords the researcher a degree of objectivity. The focus was to investigate both learners' and teachers' perspectives on how they used ZEduPads to facilitate teaching and learning. Thus, as a non-participant observer, I keenly observed how learners were engaged in multimodal texts and how meaning-making was accomplished through the use of ZEduPad tablets.

Data was thus collected through the questionnaires, focus groups, individual interviews and classroom observations. The overlapping information gleaned through these instruments allowed me to step inside the natural set-up of the ESL and literacy learning practices as a non-participant observer to gain feedback first-hand while striving to maintain the relatively objective stance required for unbiased interpretation. Non-participant observation allowed me to view participants' perspectives on new literacy practices, while numerical data enabled me to complement the thematic data quantitatively and eventually to interpret the numbers. A total of 225 learners across three primary schools, seven teachers and one district official were involved in the sample. The schools were selected because they had already been using the ZEduPads for teaching and learning in Northern Zambia.

As a robust methodological and theoretical approach, the Input Hypothesis and the Affordance theories afforded a thorough interpretation of the data.

Consistent with Goodwin's research, the results of this study thus indicate that ZEduPads play a significant role in the development of primary school learners' language and literacy (Goodwin, 2011). The findings indicate that the ZEduPad promoted collaboration and learner-centred teaching and learning. Thus, the digitized content facilitated self-directed learning; a mode favoured by both teachers and learners.

Teachers revealed that ZEduPads were useful in the teaching of literacy but that the average time invested in preparing a ZEduPad integrated lesson was dependent on whether the teacher had had a formal orientation in how to use the device. Moreover, the findings indicate that the ZEduPad technology plays a major role in sustaining learners' interest in engaged learning. Notably, engaged learning is associated with the acceleration of literacy uptake. Finally, the teachers observed enhanced performance and motivation in learners who used the ZeduPads. They expressed confidence in the impact the ZeduPad made on the enhancement of learners' literacy development.

The study concludes that technology(ies) in the form of ZEduPads are potential instructional and mediation tools for English Second Language learners' literacy development.

DECLARATION

I declare that 'Emerging Technologies for Teaching and Learning: An Investigation into the Role and Use of iPads in English Second Language in three Primary Schools in Northern Zambia' is my own work and that it has not been submitted for any degree or examination at another university. All the sources I have used or quoted have been duly acknowledged and indicated in a system of complete referencing.

Full name: Kelvin Chabinga (2353500)

Signed:_____

Date: November, 2021
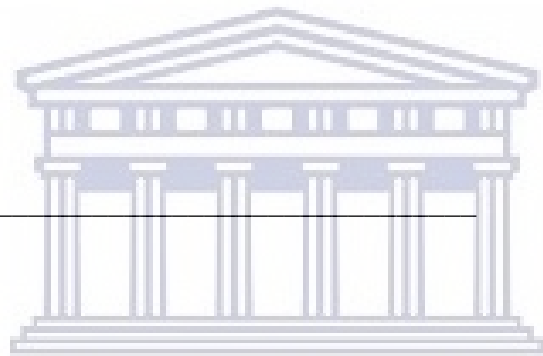
DEDICATION

I dedicate this work to Roydah, my wife, to my children, Chatowa, Tikolane and Duncan Chabinga, to my late mother, Christine Musukwa Chabinga and to my father Elias Chabinga.

ACKNOWLEDGEMENTS

It is a singular honour to thank and acknowledge all who have contributed to this achievement. I am particularly indebted to my supervisor, Professor Vuyokazi Nomlomo for her unflinching and undivided responsiveness and support during my studies. She not only provided academic supervision at all the stages of my study, but also financial support through a personal contribution that enabled me to attend an international conference at UWC. The experience and insight derived from this conference threw light on my own work. Thus, I owe my intellectual progress to Professor Nomlomo because "I have seen further by standing on your giant shoulders" (Isaac Newton, 1675). I am deeply appreciative to her for having been my anchor.

The Department of Language Education provided an enabling environment critical to my work. The former Departmental Head, Professor Sivakumar Subramaniam, the Departmental Coordinator for Language Education, Dr. Peter Plüddemann and the entire academic and support staff eased my progress both academically and socially. I further acknowledge my B.Ed (Honours) lecturer, Nonhanhla Shandu who first inspired me to take on this research, and my fellow PhD candidates both in the Faculty and across campus for the academic stimulation.

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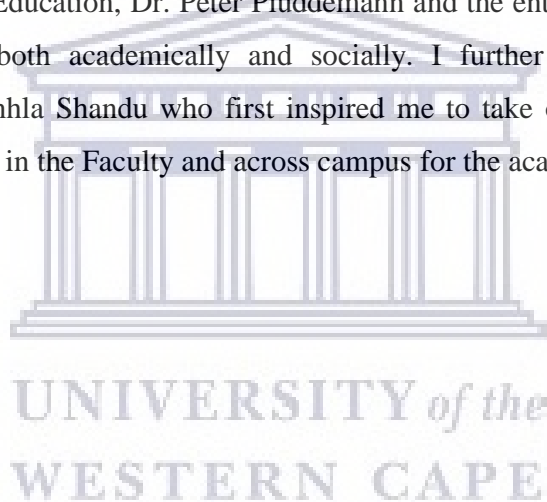
LIST OF ACRONYMS

AT	Affordance Theory
CIH	Comprehensive Input Hypothesis
CoP	Community of Practice
CoT	Cultural organisation Technologies
Covid 19	Corona Virus Disease 2019
CS	Community Schools
DBE	Department of Basic Education
EFA	Education for All
EFL	English as a Foreign Language
EGL	English as Global Language
ESL	English as a Second Language
ET	Emerging Technologies
FRM	Four Resource Model
HL	Home Language
ICT/s	Information and Communication Technology/-ies
LoI	Language of Instruction
LSP	Literacy as a Social Practice
MLP	Minimum Level of Proficiency
MMA	Mixed Method Approach
MoGE	Ministry of General Education
NAS	National Assessment Survey
NET	New Emerging Technologies
NLG	New London Group
NLS	New Literacy Studies
NPA	New Pedagogical Approaches
NRP	National Reading Program
PRP	Primary Reading Program
RTL	Read to Learn
SCT	Social Cultural Theory
SPAA	Social Practice as Activity
UNESCO	United Nations Educational Scientific and Cultural Organization
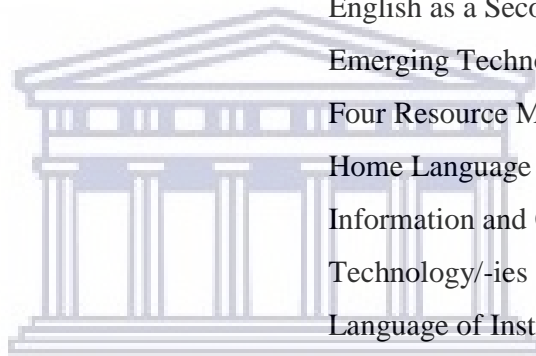
USD	United States Dollar
ZICTA	Zambia Information and Communications Technology Authority
ZNBC	Zambia National Broadcasting Cooperation
ZNCF	Zambia National Curriculum Framework

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EPISODE 1: SURVEYING THE FIELD

1.1   Introduction

As a farmer maximises the yield by employing the latest agricultural technology so I have been interested in ameliorating low literacy levels in the classroom by identifying new educational technologies. To ascertain what interventions might be employed within linguistic education, this study set out to investigate contemporary emerging technologies for literacy development. Contemporary and emerging studies concerned with mobile learning, point to the potential of technology to foster new learning styles, exploratory opportunities (Clarke and Abbott, 2016) and literacy development (Lin, 2012).

Undoubtedly, New (Emerging) Technologies (NETs or ETs) form a large part of the educational landscape in the 21st century. As Newton and Dell (2011) note, iPads are increasingly perceived as forms of assistive technologies. iPads are further recognised as instrumental instructional kits to stimulate learners' interest in active exploration. Recently, Emergent Technologies (ETs) have flooded the classrooms exponentially. When this research was being conducted the tablet was the most recent technological device to be adopted in classroom instruction in Zambian primary schools. It is acknowledged globally that technology has transformed many aspects of life including that of doing business (Girod & Cavanaugh, 2001). With technology, doing business has become easier and more cost effective, and social life is said to have improved.

It is further acknowledged that education is an agent of social change (Dewey, 1937; Stephens, Hernandez, Román, Graham, and Scholz, 2008), and technology such as an iPad acts as a catalyst to enhance the rate of this change (Girod and Cavanaugh, 2001). In this regard, many schools and teachers around the world have realised that technology plays a vital role in enhancing the delivery of teaching and learning in various ways. This realisation is based on the assumption that the use of Information and Communication Technologies (ICTs) is transforming the ways in which teachers teach and students learn. New technologies have the potential to transform pedagogical practices, and they are thus acknowledged for their educational value in schools (Hawkridge, 1990). Moreover, technology's potential to transform the economy and social status of citizens of any country is yet another reason for using ICTs in schools.

In Zambia, Mark Bennett, the Managing Director of iSchool Africa and a Zambian entrepreneur, created a multi-media interactive localised e-Learning programme for the Zambian primary school curriculum. It was installed on an iPad. This e-Learning device is known as the Zambian Education iPad (ZEduPad). ZEduPad is an acronym derived from the shortened name of Zambia as it is called "Z" by the locals, the short form for education (Edu) and the short form for iPad (Pad). The realisation that Africa's multiple challenges can be solved largely through radical reforms in education was what inspired the creation of ZEduPad.

The ZeduPad is a special 7-inch iPad technological device that is preloaded with the Zambian primary curriculum content. The touch screen sensitive tablet has a 32 GB memory and a long-lasting solar-charged battery that makes it particularly suitable for rural and disadvantaged schools. Zambia took advantage of the new powerful digital technology and created the iSchool (literally, 'technology-infused schools'). The iPad obviates the need for infrastructure such as fixed computer laboratory (Al-Bataineh and Brooks, 2003; Bjerede, Atkins and Dede, 2010).

The ZEduPad set is for teachers, learners and parents – for home use. It contains the curriculum on a (pre-loaded) interactive iPad that gives learners access to the curriculum content after classes. The multi-touch screen tablet has eight (8) contextualised and interactive audio-visual materials for teaching and learning. This medium and its content enhance the prospect of cultivating critical literacy, and the initiative is therefore approved by the Ministry of Education. It is renowned for its semiotic and multi-semiotic texts that facilitate the learning of language and meaning making in an authentic manner (Leppänen, Kytölä, Jousmäki, Peuronen, and Westinen, 2014).

Multisemioticity is an integral feature of language acquisition in modern technological devices such as the ZEduPads. Multisemioticity describes an effect on meaning. It arises when there is an interdependent interaction involving multimodal semiotic codes. Multisemioticity occurs in language learning across modes (O'Halloran, 1999). However, because research has been limited, not enough is known about either teachers' use of ZEduPad technology or its impact on literacy development since its introduction into primary schools in 2013.

Moreover, while the ZEduPad technology costs are relatively low ($200 each), certain schools and disadvantaged families are unable to afford access to this resource. Yet this technology presents a way of saving the ailing Zambian education system. The educational tablet known as the ZEduPad has thus been approved by the Zambian Ministry of General Education. It enables learners to create a personal profile on its seven-inch screen to keep track of their progress, to have access to e-mail and Wikipedia.

This study sets out to investigate how teachers use the ZEduPad technology for literacy development. Attention will be paid to what methods and strategies teachers use for literacy development in three Grade six English Second Language (ESL) classrooms in Northern Zambia.

In the next section I present the background to my current study.

1.2   Background and Context

Globally, literacy is viewed as having a key positive social impact on individuals. Its significance and role on social life in general is well documented too. To be literate is not only important for an individual because they can read and write, but it is essential for life's opportunities in respect of the current workplace demands (Collier, 2007). It is against this backdrop that literacy is a widely promoted commodity and regarded as a form of currency for progressive social change. Literacy is the foundation for any kind of learning involving reading and writing – including digital literacy – as it affords access to fundamental opportunities in the 21st century.

The fight against illiteracy is thus a global initiative directed at harnessing the potential of individuals for self-sustainability and the eradication of social problems associated with illiteracy, such as poverty. Globally, there are an estimated 250 million children who cannot read, write or even do basic arithmetic despite the fact that half this number have attended school for up to four years (UNESCO, 2014b, 2017).

The low literacy levels not only threaten social economic development (Bash, 2004; Reddy, 2004) but also place a strain on individual potential to participate fully in social life. Broadly, literacy goes beyond mastering a set of technical skills involving reading and writing (Bash, 2004) to a more ubiquitous notion encompassing diverse literacies and the skill of sourcing, discriminating and managing information.

Many organisations, such as the United Nations, Educational, Scientific and Cultural Organisation (UNESCO) have been taking a lead in this fight against illiteracy. From the inception of UNESCO in 1946, raising literacy levels around the world has been its core policy especially for developing countries such as those on the African continent. Literacy training has been and still is part of UNESCO's efforts to foster basic education. According to UNESCO, literacy is closely tied to the social and economic development required for increased productivity and sustainability (UNESCO, 2006). From this point of view, UNESCO has assisted developing countries, especially in Africa, with policy making intended to eradicate illiteracy.

However, most African countries continue to have a huge literacy deficit because of economic constraints. Thus, many African governments have 'scaled up', to meet the global policy standards concerning literacy. One such example is UNESCO's Literacy Decade 2003-2013, Education for All (EFA) and more recently, a post-2015 literacy agenda encouraging efforts to formulate and implement policies for raising literacy levels in various countries. These global policies for youths and adults aim at achieving equal access to quality and equitable education at all levels (UNESCO, 2014a).

In South Africa the Department of Basic Education (DBE) has recently launched several literacy intervention programs such as National Reading Programs (NRP). Amongst these were programs promoting the use of Information and Communication Technologies (ICTs) to enhance teaching and learning experiences (Department of Education, Government Gazette, 2004). Intervention programs such as Read to Learn (RTL) (Lucas, McEwan, Ngware & Oketch, 2014) have also been run in Kenya and Uganda respectively to improve literacy levels in primary schools. This initiative advises that the mere delivery of textbooks to schools does not yield progress unless it is coupled with deliberate teacher interventions. All these efforts are based on the assumption that when we 'know,' we realise our 'being' and we make efforts to 'act' (Reddy, 2004). Zambia has not lagged behind in these efforts to improve literacy in schools.

Primary education in Zambia lasts seven (7) years and is divided into two phases: Grades 1 to 4 and Grades 5 to 7, and it covers the lower and upper primary levels. With an estimated population of 14.45 million people (Central Statistical Office, 2013) and still growing rapidly, the government struggles with the expansion of school infrastructure and human

resources. The total number of schools is estimated at 8500 of which 3500 are community owned. The majority of these schools are disadvantaged and are located in the rural areas.

The Community Schools (CS) are responsible for at least 40% of learners with 85% of its teachers being unqualified volunteers.

Generally, all schools are characterised by large classes and it is assumed that overcrowded classrooms contribute to low literacy levels. A high rate of absenteeism by teachers and learners is reported and this appears to contribute to low literacy levels among learners. Because of a lack of learning materials, the learner textbook ratio still stands at 1:3 in many schools (National Assessment Survey, 2012). Consequently, teacher attrition is becoming increasingly high, especially in rural schools. The reality is such that more than 80% of Zambia's children are functionally illiterate when they leave school. In the main, teaching and learning practices entail teacher dispensation (the transmission approach) and a rote teaching approach, especially in English Second Language (ESL).

Since the colonial era English has been the Language of instruction (LoI) in Zambian schools; also, at tertiary level. Until recently, this practice was reversed on the understanding that learners' acquisition of a second language depends on their level of proficiency in their familiar first language or Home Language (HL) (Benson, 2005; Cummins, 2000). The Government of the Republic of Zambia through the Ministry of Education (MoE) as it was called then conceded that:

> …there is strong evidence that children learn literacy skills more easily and successfully through their mother-tongue, and subsequently they are able to transfer these skills quickly and with ease to English or another language. Successful first language learning is, in fact, believed to be essential for successful literacy in a second language and for learning content-subjects through the second language. (Ministry of Education, 1996, p.39 pdf Doc)

To this effect, the Government of the Republic of Zambia (GRZ) embarked on revising the education curriculum. The current revised education curriculum of 2013 indicates that Grades 1- 4 would be taught in their familiar Home Language (HL) before the learners are introduced to ESL in Grades 5-7 upwards (Ministry of Education Science Vocational Training and Early, 2013). English as a subject is only introduced in Grade 2. In other words, Grade 4 serves as a transitional phase in which learners are ushered into another phase, namely Grades 5-7 onwards where the LoI is ESL. However, it is debateable whether English

remains a second language in many communities, since it is preferred over the mother tongue, even by parents, because it is seen as a 'global language' (EGL) (Crystal, 1998).

According to David Crystal, English is a global language because everyone owns and shares it (Crystal, 1998). This view raises many questions about the teaching and learning of ESL in multilingual settings and the place of other languages in the market place.

Language and literacy are rarely discussed without their being linked to the socioeconomic wellbeing of individuals, along with status, power, identity and politics. Zambia is no exception. In spite of efforts to foster the use of Home Language instruction such as Bemba in primary schools, the literacy skills are below Minimum Levels of Performance (MLP) of the acceptable standard of 50% (Brombacher, Bulat, King, Kochetkova, & Nordstrum, 2015; NAS, 2012).

Intervention programmes such as the Primary Reading Program (PRP) were introduced by the GRZ as a response to the low MLP. Its aim was to enhance literacy skills among the learners. Despite this additional intervention, research on the PRP indicates that MLP in literacy is still low. The effects of low MLP were clearly visible in the recent 2015 Grades 7 and 9 composite examinations announced in January 2016. Nevertheless, it appears that the GRZ's recourse to ICTs recently is an opportunity to raise the current ailing literacy levels among learners in the country.

The iSchool of Zambia developed the e-Learning initiative which was approved by the Ministry of General Education (MoGE). This is the Zambian Education Primary Curriculum digitized on an iPad called ZEduPad. It sells at a reduced price of USD 100 in Zambia. Although a clear e-Learning policy to this effect is lacking, there have been positive reports on its use in many pilot schools and in schools that managed to purchase the ZEduPad technology for teaching and learning purposes. The reason why this research investigated the use of the iPad technology was to probe in particular, the low levels of learners' literacy development, a current concern both in the country and all over the world.

1.3   Rationale

Learners' low literacy performance levels are reported in National Assessment Surveys in Zambia. These reports show that Grades one, two and five learners perform below minimum standards. This implies that government, teachers and other stakeholders have much to do if

they are to improve literacy levels in the country (Brombacher, Bulat, King, Kochetkova, and Nordstrum, 2015; Sichalwe and Kanyika, 2012).

The impact of learners' low literacy abilities in the early grades has been felt in the Grades 10 to 12 classes that I teach. Therefore, I have been motivated to enlist with other stakeholders who are searching for sustained literacy intervention strategies. One of the interventions is the willingness the Zambian government has demonstrated through the Ministry of General Education (MoGE) by approving the Zambia's iSchool digitized primary school curriculum on ZEduPad iPad developed by Mark Bernnett.

However, while there is convincing evidence regarding the ever-growing popularity of emerging technologies such as the iPads in the classroom, little is known and understood regarding the role and use of these devices in teaching and learning. Thus, understanding the role and use of the ETs from the teachers' and learners' perspective is necessary as this can shed more light on the future development and implementation of tablet technologies in the classroom. However, for this to succeed it is necessary to conduct research that will provide insight into both the preparedness of teachers to use technology across subjects and language instruction across grades. Thus, a model for integration is necessary.

As stated earlier, ZEduPad is an iPad tablet that is pre-loaded with the Zambian Primary School Curriculum from Grades one to seven, in English and eight Zambian Languages (ZLs). In his first address to parliament in 2016 the President of the Republic of Zambia confirmed the government's commitment to endorsing the use of budding technologies for learning, required by all Zambian learners (Lopes, 2015).

By recognising the significance of an educated community to the social and economic wellbeing of any country, government is turning to the use of ICTs in various sectors such as agriculture and education. ZEduPad technology has been made available to a number of pilot primary schools in Zambia with some schools purchasing the iPad technology on their own. What is not clear, however, is whether the teachers take full advantage of ZEduPad educational tablets for language and literacy development in primary schools effectively, especially for ESL. Thus, investigating the use and role of the ZEduPad technology in ESL in this study was a very necessary contribution to knowledge about the role of technology in enhancing learner performance in literacy in the country.

1.4   Statement of the Problem

While commentators and literature on the use of Emerging Technologies (ETs) exists (Phiri, and Silumbe, 2016; Phiri, 2016; UNESCO, 2013), there is none on the dynamics and interactive value these may provide to enhance or inhibit teaching and learning of literacy practices in second language or foreign language acquisition in Zambia. Studies conducted in this regard, for example, were mainly concerned with social studies as a subject (Mtanga et al., 2012) and mathematics (Phiri, and Silumbe, 2016; Phiri, 2016). Hence, theoretically as well as methodologically this 'disjuncture' presents an investigation gap thus necessitating this current study. Furthermore, a question emerges on the literacy practices in the process of language acquisition enabled by the multimodal and semiotic ET's resources.

Moreover, there is a considerable amount of literature that has been reported in educational studies regarding the ease with which children gain knowledge about how to use new technologies such as the iPad (Ghavifekr and Rosdy, 2015; Ghavifekr, Kunjappan, Ramasamy, and Anthony, 2016). Furthermore, analysts have in many cases observed numerous ways in which existing and emerging technologies might become viable tools in the enhancement and support of teaching and learning. Various scholars note the benefits of ETs for pupil collaboration, motivation and engagement. For example, it has been argued that ETs can make possible the accessibility of the curriculum by attuning it to a diversity of pupil learning capabilities. Simultaneously, pupils might be inspired by making connections between their educational aims and real-world platforms (Price-Dennis et al. (2015). In fact, for some teachers, digital technology has the potential to facilitate differentiated learning and to enhance grades, content retention, focussed attention, and the building of self-esteem (Williams, 2018).

While this is the case, it is still not very clear how ETs enhance or inhibit literacy acquisition. This leaves a gap between the technological device and the specific literacy practices that might enhance language learning. Put differently, following the introduction of these ETs known as ZEduPad, nothing is known about their efficacy in enhancing literacy skills among language learners learning English as second language or indeed English as a Foreign Language. Further, there is no certainty about whether these ETs will be sustained, reproduced and contested as viable tools for literacy skills development. In this regard, the problems researched directly relate to the role and use of ETs as fluid semiotic and multimodal constructs and resources.

While Emerging Technologies such as tablets are viewed as multimodal and semiotic resources for literacy teaching and learning, there are concerns that these tools are also distractors in the process of teaching and learning. For example, a recent study found that technology which is especially used for non-educational purposes can be distracting to students in class (Flamigan and Babchuk, 2020). The phenomological study that involved 11 instructors on their perceptions of technology in classroom revealed that technology also has an influence on their (instructors) pedagogical decision making. These concerns are not peculiar to Zambian schools where any form of technology is not allowed for the same reason. In fact, schools have policies that prevent learners from coming with technological gadgets to classes. However, as indicated in the findings section of this studt, these policies appeared to be less of a problem for the teachers and learners under study.

However, as will be discussed in Episode 2 (Historical Appraisal of ETs), related studies tend to rely solely on the quantitative approach, thereby reducing the results to mere enumerative and taxonomic information. Such work has rendered the research enterprise in this area numerical and somewhat simplistic. From this perspective, the current study stretches beyond the mere quantitative narratives and representation of literacy development to also focus on a detailed descriptive interpretation of the semiotic and multimodal resources within these (Villarreal, 2013; Weber, and Horner, 2012; Weber, 2009). This enquiry hones in on the effectiveness of ETs within the socio-materiality of literacy acquisition.

iPad use to support emergent literacy development in the Zambian educational context is still in its infancy. Zambia has only started to embrace the use of hand-held smart technologies for teaching a range of subjects across the curriculum. However, these technologies are a relatively new (emerging) addition to classroom instruction worldwide and in particular, in Zambia. Therefore, there is little knowledge or published research to inform classroom practice for language teaching and literacy development as it pertains to new devices such as the iPad (see Episode 2). This study, therefore, aimed to fill this gap by investigating how iPads were being used and could be used for literacy teaching in Zambian primary schools.

As alluded to earlier, illiteracy worldwide is a concern not to be ignored because of its adverse social and economic implications (UNESCO, 2017). It is a life-threatening matter. The World Literacy Foundation (WLF) describes illiteracy as a 'global tragedy' that costs the world more than a trillion per annum because one in five people in the world is functionally illiterate (Cree, Kay, and Steward, 2015). This translates into an appalling 76 million illiterate

people world over, with 67 million children without access to primary education, and an additional 72 million learners who cannot attend secondary school (Cree, Kay, and Steward, 2015). These findings are similar to those of developing countries such as Zambia.

Functional literacy in Zambia, whose population stands at 15.47 million people (Central Statistical Office, 2014, p. 3), is staggeringly low with 10% to 20 % of the population unable to read nor write. The recent results of Grade Seven and Grade Nine Composite Examinations are disappointing. According to the statement released by the Minister of General Education (MoGE), candidates did not perform well in literacy and numeracy (Brombacher, Bulat, King, Kochetkova and Nordstrum, 2015b). The low performance defies the government's highly ambitious efforts to resuscitate the ailing education system standards through policy reforms. For example, in an effort to increase access to universal primary education, the government declared free primary education (FPE) for Grades 1 to 7 in 2002 and abolished examination fees for Grades 7 and 9 National Examinations (National Assessment Survey, 2013).

Furthermore, gender specific policy referred to as "re-entry policy" was introduced to allow girls who become pregnant to return to school after having given birth (National Assessment Survey, 2013, p. 5). Despite these efforts, NAS reports indicate that the literacy and numeracy levels are below the acceptable minimum level of performance (MLP) and the desirable level of performance of 40% and 50% respectively (Sichalwe and Kanyika, 2012, p.25). Factors attributed to this low literacy performance are teacher/learner absenteeism, minimal contact time, the socio-economic status of learners, access to Information and Communication Technologies (ICTs) and quality instructional practices (Ministry of General Education, 2015; National Assessment Survey, 2013, p.1).

While the Zambia National Curriculum Framework – ZNCF (2013) – prescribes that ICTs in the primary school curriculum, specifically computers, are an examinable subject (Ministry of Education Science Vocational Training and Early, 2013), the policy on e-education in Zambia is unclear. It does not provide guidelines for teachers on the use of ICTs for pedagogical practices (National Information and Communication Technology Policy of 2006, 2006).

Policies on ICTs restrict practices to science and technology subjects only. In fact, ICT is taught as a separate subject called technology studies (Ministry of Education Science

Vocational Training and Early, 2013, p. 30). One of the competencies learners must demonstrate at the end of their primary education is Information and Communication Technology skills. The aim is to "modernise the educational delivery system so as to improve the quality of education and training at all levels" and to "promote and facilitate the integration of computer skills into the teaching and learning process at basic (primary), high school and tertiary levels" (MCT, 2006, pp. 27-28).

Moreover, the tablet Personal Computer (PC) user ratio has been greater in the past few years, with an increase in the momentum of sales (Statista, 2013). The use of tablet PC in the education sector has become prevalent globally and the hope is that the device has the potential to alter the educational process. For example, the unique features of ZEduPad offer educational benefits for both the teachers and the learners (Dündar and Akçayır, 2012). As a result, several researchers have recommended the use of ETs as a supportive tool in the classrooms.

However, there has been limited research on the role and use of ETs for literacy development (Dündar and Akçayır, 2012; Galligan et al., 2010; Loch and Donovan, 2006). In addition, global economic competitiveness has increased rapidly and thus the major concern for many countries around the world is educational development. Of serious concern are developing countries which grapple with improving not only the quality of education but also the standards considered difficult and perplexing because of inadequate national resources and limited time for learning on a personal level (Bahamondez, Winkler and Schmidt, 2011). But in most cases, children learn in the absence of clear e-policy guidelines. Therefore, it is worth investigating how teachers use the ZEduPad technology to enhance literacy development in Zambian primary schools. Such an investigation will be vital for policy makers, teachers, school managers and related stakeholders because Zambian schools like schools in many other countries, were shut down due to Covid 19. Hence, this investigation provides insight into the role and use of emerging technologies to transform the way teaching and learning might continue in the face of events such as pandemics.

Thus, in the absence of such studies the current study is ground-breaking, as it is the first to deal with the subject of the literacy and language learning landscape in Zambia. It also differs from other studies by paying attention to how ZEduPads enhance literacy development through the interaction of language learning and the socio-materiality of the multimodal ZEduPads.

In the section following, I therefore highlight the aim, objectives and research questions of the current study.

1.5   Purpose of the study

With illiteracy as a global threat to the socioeconomic well-being of people, especially that of young girls and boys, the study set out to investigate the use and the role of the ZeduPad educational tablet in ESL in three Grade six primary schools in Northern Zambia. It aims to investigate whether these iPads have a role in enhancing reading and writing, especially in the face of the current Covid 19 pandemic that has sent schools across the globe in search for new ways to view learning.

Owing to this, I ask what semiotic resources are available on the tablets that aid the linguistic competence of language learners. How is meaning-making made possible and arguably, easy with the multi-semiotic texts embedded in the digitized content. In other words, do iPad technologies enhance literacy skills among learners?

In search of answers to these questions, the study investigates the methods and strategies teachers use to teach literacy through ZEduPad technology. In this respect, the study is ultimately concerned with the lived classroom experiences of both teachers and learners about the use of technology in English. The aim is to gain an in-depth understanding of the meaning and nature of what teachers and learners do and experience as they engage with literacy acquisition mediated by ZEduPad tablets. In other words, the study is concerned with investigating practice in the use of ZEduPads as Zambian primary schools transition from rote and traditional teaching practices to new modes of teaching and learning. Through this investigation, the study identified particular constraints associated with the use of ZEduPad in the English (L2) classrooms.

1.6   Aim, Objectives and Research Questions

In this section I focus on the primary aim and objectives of this study. I also present research questions that guided my research journey.

1.6.1 Aim

The general aim of the current study was to investigate the role and use of the multimodal emerging technologies, specifically the ZEPad for teaching and learning in three Grade Six English Second language classes in Northern Zambia.

1.6.2 Specific Objectives:

1. to obseve how teachers made use of ZEduPad technology in English Second Language (ESL) in three primary schools in Northern Zambia

2. to assess the type of support needed by teachers for the effective use of ZEduPad technology in the classrooms

3. to identify and understand the factors that facilitate or constrain the use of emerging mobile technologies in teaching ESL literacy; and

4. to investigate the teachers' and learners' experiences with regard to the use of ZEduPad tablets in English (L2) literacy lessons.

1.7 Research Questions

To realise the objectives of the study, this key question was posed:

How can the ZEduPad tablet be used as a viable tool to enhance the teaching and learning of English Second Language (ESL) and literacy in Zambian primary schools?

The list that follows presents the sub-questions that have been considered to disaggregate the main research question.

1) How do teachers use ZeduPad technology to facilitate the learning of ESL and literacy in selected Zambian primary schools?

2) What methods and strategies do teachers employ in ESL literacy using ZEduPad tablets?

3) What professional support do teachers receive to use the ZEduPad tablet as a mediation tool in the teaching and learning of English language and literacy?

4) What factors facilitate or constrain the integration of ZEduPad tablet in ESL?

5) What are the teachers' and learners' perceptions and experiences on the use of the ZEduPad tablet for English (L2) literacy development?

1.8 Scope of Study

This research study covers the use and role of ZEduPad technology as a multimodal semiotic tool for English literacy development in Grade six. The sixth-Grade learners were chosen because they are a group at a critical stage of developing their reading and writing for learning across the curriculum, and they are able to evaluate and process information in concrete ways. In the Zambian curriculum Framework of 2014, learners at this level have been using English as the language of instruction for one year. In other words, they are not so grounded and drilled in English to use it fluently. Thus, to upset their confidence at this stage would be to lose them. It is the time when most of them are entering adolescence, a time characterised by wanting to find self-identity.

It is highly pertinent therefore, to conduct research that examines and explicates the experiences of both teachers and learners. The ultimate importance of this research would be to bring to light aspects of how each group constructs and develops self-identity through reading and writing, by interacting with the ZEduPad technology.

The study was conducted in three of Zambia's Northern Province primary schools. As a matter of convenience, the three primary schools were chosen because they are among the few which have been supplied with the ZEduPad technology. This initiative was sponsored by iSchool Zambia with the help of USAID, thus making the study viable.

The targeted population of the study included three teachers of English as a Second Language (ESL), three Head Teachers, and three focus groups of six learners each. In order to obtain rich in-depth data, I decided to use this relatively small group of participants as recommended in a phenomenological study tradition (Groenewald, 2004, p. 11). This consideration gave me sufficient reason to opt for not more than ten participants, excluding the focus groups of 18 learners – six from each school (Vasileiou, Barnett, Thorpe, and Young, 2018).

In the next paragraph, I provide an outline of this study and explain the use of episodes.

In order to present my research study narrative in manageable sections, as a stylistic element I opted for the word 'episode' instead of 'chapter. Episodes are 'concerned with the moment-

by-moment unfolding of the text' as one might presume the reader to experience it when they engage with the various aspects of the study (Bodie, Powers, and Fitch-Hauser, 2006). In addition, my episodes follow a farming metaphor which depicts the process a farmer takes to earn the final product. I view my study as a "farming" journey that started off by planting a small seed in the form of ZeduPad tablets that were used to enhance teaching and learning in Zambian primary schools. I regard the findings of this study as the final product of my farming exercise.

What follows is an outline of the episodes.

1.9   Episode Outline

This study has eight (8) episodes as described in the section that follows.

Episode 1: Surveying the Field

The introductory episode comprises the introduction, the background to the proposed research study, its rationale, a statement of the problem, and an outline of purpose of the study, with aims and objectives and the research questions. Included in this episode is the scope of the study and the episode outline. In short, the episode sets the scene for the current study.

Episode 2: Clearing the Ground – A Historical Appraisal of Technology and Learning Theories

In this episode, literature that informs the study aims is reviewed. The topics for the research are defined, showing overall trends and gaps, including particular emerging themes. Thus, the discussion entails a brief history of technology in education, the social function of technology, and the effects of globalisation with its implications for teachers. A description of emerging technologies is also provided.

Following this is an appraisal of an interdisciplinary approach to learning theories and technology in relation to literacy acquisition in the 21st century. This has been done to acknowledge that any attempt to venture into the field of literacy requires informed vision via the lenses of prior theories or some prior knowledge about how the acquisition of language takes place. I argue that this sheds more light on the role and use of emerging technologies in enhancing literacy acquisition. This also briefly feeds into the role of language policies as a prerequisite for the successful integration of technology and language learning.

Episode 3: Clearing the Field Further: From Literacy to Multi and Trans-Literacies

This episode discusses in detail concepts and terms associated with literacy. It focuses on how the term literacy has come to evolve over time due to the information age, and how practices of language teaching and learning have been affected in modern times.

Episode 4: Tillage Implements: The Theoretical Framework

The theories against which practices of good literacy teaching and learning are evaluated, are discussed in this episode. The episode is informed and underpinned by two major concepts, that is, the Input Hypothesis and the affordance theories. Further concepts such as socio-materiality and actor-network theories are also discussed to affirm and support the need for adequate input as a pre-requisite for input to be understood.

Episode 5: Data Harvesting: Harvest Instrumentation (Implements)

This episode highlights the research design, population sample, research instruments, and issues of validity and reliability including the limitations of data collection. Hopefully it shows I have taken seriously the warning that poor methods of data collection result in poor data collection. Hence, the methods of data collection, the techniques and the ethical considerations are discussed in this episode.

Episode 6: Post-Harvest Work and Implements: Collage of Lived Experiences (vamakhalilo) Qualitative-Quantitative Data

In this episode, the focus is on mixed method approach to research. The episode therefore has highlighted why the approach was used in this research and the different that involve mixed methods. Particularly, the episode has underscored that mixed methods research is a method used to collect, analyse and mix both quantitative and qualitative data in a single study to have an indepth understanding of a research problem

Episode 7: Harvest Winnowing: Data Analysis

This episode focusses on the process of interpreting and validating the data. It engages with what other researchers have done and considers what is workable in the light of the data gathered for this investigation. In other words, the episode involves a discussion about the data so as to shed more light on key questions of the current study. Thus concepts highlighted in this episode include but are not limited to the use of emerging technologies, theorizing collaboration practice, describing and theorizing informal learning amongst other subtopics.

Episode 8: Harvest Consumption: Summary of findings, conclusions and recommendations

In this episode, the literacy researcher takes into account the data that has been accumulated and analysed. The episode provides a summary of the study results or findings and advocates ways in which elements of this study might suggest ideas for further research. With this overview the reader is reminded of the aim of the study; its goals are restated, highlighted and aligned with the findings. Conclusions are drawn and recommendations suggested.

1.10 Episode Summary

This episode concerns setting the scene for the current study framed as 'Emerging Technologies for teaching and learning: An investigation into the role and use of iPads in Grade Six English Second Language in Three Primary schools in Northern Zambia'.

The study was introduced in this episode as having been conceptualized to address low literacy levels among primary schools in Zambia. This episode therefore explores how multimodal and semiotic resources embedded in the emerging technologies could represent an intervention to enhance the literacy levels of these learners.

In the process of this investigation, the following components of the study were addressed: the background to the study, the rationale, a statement outlining the problem, the purpose of the study as well as the aims, objectives and the research questions guiding the investigation. In addition, the hypothesis was stated and the scope delineated. An explanation of how the current study is structured is presented in the episode summary to the study.

The foregoing episode problematized the need for policy change to allow for clear eLearning guidelines directed towards pedagogical transformation for both teachers and learners in an information age particularly affected by the current Covid 19 pandemic. Zambia like other countries was faced with the challenges of keeping up with education in the absence of policies that advocate for eLearning, in the midst of severe social strictures necessitated by the prevalence of Covid 19. The experience of education at this time was and continues to be an eye-opener for all those in the education sector; it calls for new ways of teaching and learning.

The episode that follows discusses the historical appraisal for technology and learning theories.

EPISODE 2: CLEARING THE GROUND – A HISTORICAL APPRAISAL OF TECHNOLOGY AND LEARNING THEORIES

2.1 Introduction

In Episode one (1), my focus was on surveying the linguistic field in education to explore low literacy capacity in rural schools.

In this episode I consult existing research practices in order to gain an overview of investigations akin to mine. An historical trajectory of the research enables me to validate and conform to related approaches in the linguistic literacy field of school case studies. In other words, my primary focus in reviewing literature in the field was to find the best practices in relation to the results they produced. This would better equip me to evaluate the approach I elected for my own investigation.

Thus, the initial mission was to contextualise the investigation. This involved examining the role and use of emerging technologies (ETs) in education as represented in the current literature. Within this context, Episode 2 discusses how this research shall proceed. This process can be described as tangential because, as indicated earlier, in Zambia limited studies exist on the use of iPad technology for literacy teaching practices in English Second Language classes.

My reference to theories of learning is specifically aimed at elaborating on the trajectory of technology: how technology has been implicated in the discussions and debates about learning theories and how these should be grounded within contextualised notions of authentic, meaningful experiences. Thus, 'theories of learning' does not capture the conceptual framework of this episode. The literature review for this investigation is split into two episodes, namely Episode 2 and Episode 3 respectively. The basis for splitting up the conceptual composition into two episodes eradicates or reduces ambiguities.

The research discussed in this episode foregrounds an historical appraisal of technology in the teaching and learning landscapes. An intricately intertwining appraisal of technology and its implications in the conceptualization of interdisciplinary approaches to learning is discussed. Additionally, the episode explores the social impact of technology as well as trends in globalisation and its implications for teachers. Premised on the latter, it then explores issues of global discourse and local (Zambian) policy regarding Information and

Communication Technologies (ICTs) for education. It proceeds by evaluating the concept of emerging technologies (iPads) and its implications for the Zambian primary school context. The perspective taken could lead towards predicting the type of literacy development practices that might emerge from the use of iPads for ESL. The discussion therefore encompasses issues concerning perceptions of the use of technology in Zambian schools, which in some instances has been seen as a problem.

Episode 3 discusses notions of literacy and its current conceptualization of literacies, trans-literacies, digital literacies and literacy as a multimodal practice. This episode will thus highlight how the notions of literacy, technology and theories of learning that foster well-rounded critical abilities for learners are by their nature interdisciplinary. Within the framework of language teaching and technology, the episodes draw on research studies that consider emerging technologies as cultural artefacts, and literacy as a social practice.

This episode concludes with brief reference to predominantly rote and traditional teaching methods in Zambian schools. By reviewing the literature about the technology used in Zambian schools and globally, in this episode I show that no tangential studies in Zambia have investigated the utilisation and role of iPads for literacy development in ESL, which partially justified the undertaking.

2.2   Clearing the Ground: A Brief History of Technology in Education

> The radio will supplant the teacher. Already, one can learn a language by means of Victrola[1] recording. The moving pictures will visualise what the radio fails to get across. Teachers will be relegated to the backwoods, with fire-horses, and long-haired women or, perhaps shown in museums. Education will be a matter of pressing the button. Perhaps I can get a position at the switchboard.
> (Thomas Edison, 1922)

Looking far back into the past helps us to understand and interpret revolution and to implement its effects in current situations, in this case, instructional practices in the classrooms. Edison's comment gives us an insight into when and how educators or teachers were eager to use technology for transformative pedagogical efficacy. I argue that to ignore the use of any form of technology, moreso the latest forms in the classroom is to be intentionally oblivious to the fact that times have changed, and therefore classrooms and pedagogy have evolved.

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[1] [1] Victrola: is an old term used to refer to a record player (Cuban, 1986)

Thomas Edison (1922) believed that audio-visual motion pictures, the invented technology of the day, would revolutionise classroom instruction not only in the United States of America but around the globe. His belief led him to predict how textbooks would no longer be useful or have a place in instructional circles. According to Edison, gains from textbooks are microscopic: "about two per cent efficiency out of the textbooks" (Cuban, 1986). He predicted that the future of education would be administered through motion pictures which would make it possible to get almost a hundred per cent efficiency. Since Thomas Edison proclaimed the future of technology in education, technology has evolved a great deal.

Traditionally, teaching was characterised by prescriptive, rote and transmission methods in which learners were passive participants while the teacher who 'owned knowledge' told them what to do. Oppenheimer (2007) claims that this kind of knowledge transmission was the force that propelled the turbines of instruction. Consequently, teachers sought ways of teaching that could be conducted efficiently away from chalkboards. In fact, since the 19th century, the classroom has been home to a succession of technologies varying between the chalkboard, film, radio, and television including overhead projectors (Cuban, 1986).

Chalkboards, radio, television and later overhead projectors were used as tools to enhance instruction in the classroom. For example, radio and film were seen as teaching aids. Darrow (1932) in his book entitled Radio: The Assistant Teacher, asserted that the radio as an educational tool brought the whole world into the teaching space (Cuban, 1986). Ideally, the aim was to afford learners worldwide to learn to access universal knowledge from the finest teachers (p. 19). Darrow's successor, William Levenson (1945) further proclaimed that "(t)he time might come when a transportable radio device will be as widespread in the classroom as the blackboard."

Four decades later B.F Skinner, an educational psychologist, in making reference to his first days of "teaching machines" in the late 1950s and the beginning of 1960s, wrote,

> I was quickly indicating that, with the support of teaching machines and programmed teaching, learners could learn twofold as much at the same time and with the similar energy as in a conventional classroom. (Oppenheimer, 1997, p.45)

Like modern technology, radios and other related devices used as instructional equipment were not free of challenges. Challenges ranged from maintenance issues, battery charging problems and purchasing expenses.

Television was another instructional tool used in classrooms in the United States after radio and film. Because of its purported potential for classroom instruction, articles and magazines promulgated its use and benefits advocating that television had more benefits than shortfalls (Cuban, 1986). World War II and its military expansion and industrial research saw the rise of audio-visual technology and the use of technology for instruction in the United States.

The use of the media in teaching was referred to as visual instruction (Reiser and Ely, 1997). Television as a manifestation of this visual tool changed the role of the teacher into that of a coach. Teachers followed televised procedures to conduct their own in-class discussions and for assignments. However, teachers still had control over subject content and its transmission, thus, they determined when the television would be introduced in the lesson (Cuban, 1986; Oppenheimer, 2007). Because of these developments, there was a need to conduct studies that focused on identifying principles that could be used to design audio-visual instructional materials (Finn, 1972).

In general, since the 20th century with its developments in new communication technologies, literature on education and even the popular press envisioned schools inundated with technology that would enhance teaching and learning in the education system. Some education historians such as Cuban Larry (1986) noted that the advent of new technologies also spurred an interest in the teachers, administrators and advocates of technology. Those using Victrola, radios, film[2], projectors, television, cassette recorders, and later videos undoubtedly presumed these to be propellers of educational rejuvenation and reform (Cuban, 1986). As some scholars noted, new technologies would increase instruction efficiency, resolve teacher shortages and supplant substandard teaching practices (Levenson & Stashef, 1952). The very use of media was referred to as visual instruction (Reiser and Ely, 1997; Reiser, 2001).

However, after the fading out of television as the visual instruction tool, Personal Computers (PC) became the new form of technological boom potential for instructional purposes in the 1970s. While computers were used for educational purposes much earlier than the 1970s, the early 21st century introduced something unique about the use of computers in education. Unlike television and mainframe computers that lacked the concept of interactionism, (Reiser and Ely, 1997; Reiser, 2001), scholars have observed that later computers had the potential to

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[2] Film: a thin and bendable strip made mainly of plastic material coated with light-sensitive emulsion for exposure in a camera, and used to produce photographs or motion pictures.

foster learner collaboration and interaction. Collaboration and interaction have proved to be useful strategies in teaching and learning as they enhance linguistic metacognition among the interlocutors.

Computers caught the interest of educators after the interest in television as an instructional tool faded. Microcomputers were also introduced and used for instructional purposes in the United States. Microcomputers as scaled down from mainframe computers, are third generation (3G) and fourth generation (4G) computers such as laptops, which came to be preferred for their small size, the speed with which they processed information as well as for their capacity to perform the same functions as the desktop computers preceding them. Between 2000 and 2016, the likes of the Universal Serial Bus (USB), iPods, iPads and wearable technologies have caught the attention of the business world as well as educators.

These instructional technologies tap into the behavioural sciences that have researched how technology could improve human performance (Saettler, 1968). Earlier technologies did not yield much more transformation in education (Reiser, 2001). Despite recent developments in new technology, transformation in education is still staggeringly slow. However, it is worth predicting that a decade from now, these new technologies will transform instructional practices more than ever, especially in developing countries. This is because a great breakthrough has been made in behavioural, cognitivist methods of instruction: approaches such as the sociocultural and the constructivist have become more flexible. The associated changes will be addressed in more detail later, but it is essential to keep in mind this shift.

Currently a plethora of new technologies such as the iPad, is transforming instructional practice. It is a trend that demands attention if we are to prepare the young net-generation to function fully in the 21st century. The question arises as to why we should concern ourselves with 21st-century demands on the social and economic well-being our citizens.

In the next section, I focus on the societal function of emerging technologies in the 21st century.

2.3   Societal Function of Technology: A Sociological View

From a sociological perspective, it is urgently necessary to examine what the social patterns of society would look like in the wake of the technological explosion in the next few decades. In the 1990s people experienced a surge in Personal Computer (PC) technology not only in

the United States of America but around the world. Consequently, the boom in PCs resulted in a modification of where and how people work today, without necessarily having to be in the office. They get connected to their places of work through electronic digital social networking: mobile phone i.e. face time, personal computer, e-mail, Facebook, Skype, Chat viber, Chat rooms, discussion forums, We Chat, WhatsApp, and sometimes still use the almost obsolete technology, the facsimile.

Telecommuting, as it is called, enables workers to operate under administrators in another country or state. This type of employment particularly assists handicapped people who are not able to leave the house or go to a workplace, as well as the working parents of small children. Telecommuting is powered by another form of technology, the Internet, the planet's biggest computer network that has totally changed the way people communicate and live their lives.

Apart from work and work-related trading, the plethora of emerging technologies (ET) has enabled people to maximise their full potential at various levels of their social life. The number of individuals using the web is increasing each year, with a minimum of 90.7 % of the world population "online" in March 2017, leaving Africa at 9.3%. Zambia's estimated population stood at 17,237,931 inhabitants in March 2017 with a state Area of 752,614 square kilometres. By June 2016, statistics indicate that only 3,167,934 were online surfers, translating into 18.4% of people according to Internet World Stats, 2017. Thus, even though educational systems function nationwide, the difficulties play themselves out on an international scale (Altbach and Davis, 1999).

Schools have significantly transformed during the past two full decades, and people working in the educational enterprise have yet to cope with the ramifications of such modifications. The fact that educational institutions and systems have experienced the demands of escalating numbers of learners and demographic modifications calls for answerability, a reconsideration of the societal and economic purpose of primary education, an upswing of current market forces and the influence of recent technological innovation, amongst others (Light and Cox, 2001). However, education, even creatively conceived, cannot remedy each of the challenges of contemporary society. Yet without it the downside of societal organization cannot be resolved. It is deemed an indispensable, yet not adequate, condition for optimistic transformation. But I see it as the power-plant for the continuing development of knowledge.

Educational establishments are affected by the social activities consistently transpiring all around them (Hargreaves, 1995). The expansion of knowledge in any field is swiftly outstripping any individual's capacity to continue being up-to-date. Learning how to obtain information, in lieu of memorization, is fundamental to dealing with this swift transformation. Essentially, internet access and mobile technologies permit learners to acquire lessons just about anywhere on the earth. The geographical position is no longer significant; individuals are in worldwide competition with all other educational providers on the internet. Educational establishments that overlook predicting and planning for the long term, risk becoming obsolete and are not able to prepare learners for life-long skills (Young, 2004).

The necessity for the net-generation to have the 21st-century skills need not be overemphasised. In past decades, knowing how to read and write is all that it took to be prepared to function fully in society. This at least was the claim (Barbara, 2009); one had to be able to read and write. Reading and writing was based on print alone (Sang, 2017). Other modes, which might aid reading and writing were not so carefully conceived.

However, given the turn of events, a remove away from the Industrial age, the net generation adds another dimension to the way we have viewed literacy to date – knowing how to read and write. To double the point, today to be literate means more than reading and writing. It implies being in possession of technology-related skills and using these for problem-solving and innovation. The acquisition of reading and writing (literacy) is now conceived of as a complex socially-mediated process with new cultural and symbolic artefacts.

As a cultural artefact, technology has taken a position among the tools that are widely recognised for economic and development advancement. Technology continues to play a significant role not only in advancing and improving the living standards of society, but also in enabling social actors to improve their confidence and to challenge social inequalities. In the recent past, some technologies have permiated entered the market to reshape social life immensely as an effect of globalisation. This turn of events which is an expression of globalisation, has perpetually prompted teachers and researchers to rethink curriculum design as well as instructional strategies for teaching and learning in relation to knowledge construction.

In the next section, I therefore focus on globalisation and the challenges it poses for teachers.

2.4   Globalisation and Technology

While the term globalisation is elusive to define, its effects on almost all aspects of social life are worth traversing to engage with its benefits and consequences. 'Globalisation' is often used as an expression that explains the procedure for integrating communities by eliminating legal, governmental, and geographic restrictions (Trowler, 1998). Vulliamy, (2004) explains it as a procedure that is speedily integrating the globe into a single economical space through a progressively networked worldwide telecommunication system. An investigation by Tikly, Lowe, Crossley, Dachi, Garrett, and Mukabaranga, (2003), describes globalisation as an inescapable and mainly irresistible trend which contains possibilities and threats for a country's development.

Thus, the general view of globalisation remains that it is primarily concerned with incorporation into worldwide and localised market segments underpinned by technological innovation. In relation to education, globalisation has direct implications that can either enhance or hinder learning outcomes. Its effects challenge teachers to fine-tune their pedagogical practices to keep up with current trends in the world and therefore in education more broadly. Though internationalisation is no novice to education policies, the factors and tensions beneath the umbrella of globalisation amount to substantially diverse surroundings through which education establishments and policy designers function (Marginson, 1999).

The unprecedented surge within emerging technologies, new and old, as argued in this study, the previously strange or unexplored world, continents isolated from one another, and the various nations have recently become one close global village. It is no longer difficult to discover what is happening 'next door', even to the extent of tapping into state classified information. It is an era in which the world is termed 'the global village'. Consequently, information and communication technologies (ICTs), our means of communication, have been significantly enhanced. Language and its nature have been changed in this revolutionary environment in the recent past. For example, it is hardly ever adequate to function in one language only. However, whether or not the technologies lead to changes in language structure, style and use is not the primary focus of this study; what is of interest is whether this entails any response from teachers, curriculum designers and policy makers in education. From this perspective, questions arise, such as: 'What is the implication of globalisation on the pedagogical practices of teachers as far as technology is concerned?'; 'What are the implications of globalisation for curriculum designers in the face of the information age?';

and 'What are the implications of globalisation on all policy makers at state and educational levels?'

As a researcher, I clearly see that these emerging technologies have not only created an environment of multiple languages, but also the way we perceive literacy and information processing. As will be discussed in Episode 4, literacy is no longer a mono-modal, but a multi-modal practice invoking diverse literacies which (are to) function equally and fully in the information age. And the ecology of language and literacy (van Lier, 2004) technology with its ever-changing dynamics demands that teachers update and upgrade their pedagogical skills constantly.

2.5   Emerging Technologies: What Are They?

Emerging Technologies (ETs) have recently been a matter for debate by both policymakers and researchers in the 'academisphere'. These debates partly concern the emergence and novelty of ETs, as an increasing number of publications on ET illustrate by the attention they are receiving. I argue that ETs are highly elusive devices to define. However, any definition must not be disassociated from the context within which the ETs are used.

By contrast, with ET as a growing area of study, there appears to be a lack of consensus on what exactly defines and classifies technologies as *emergent*. Certain definitions, for instance, have come about in relation to the potential bearing ETs might have on society and on economic growth (Kvochko, 2013). Others are based on a description of the typical characteristics of ETs novel nature and growth (Small, Boyack and Klavans, 2014). These characteristics and claims Veletsianos (2016), are described in terms of four common aspects; 'not defined by newness', 'coming into being', 'not yetness', as well as 'unfulfilled yet potential'. Some characterise them in terms of their availability for many to use, or for the majority of people (Halawey, 2013).

Clearly, 'emerging technologies' is often a difficult concept to pinpoint. The term is used loosely. Those who have attempted to give a definition acknowledge the complexity of the term and so broadly define new technologies as those which are "currently developing or will be developed over the next five to ten years, and which will substantially alter the business and social environment" (Business Dictionary, 2016).

A project entitled 'Ethical Issues of Emerging ICT Applications,' financed by the European Commission, researched the ethical implications regarding emerging technologies Stahl (2013). In his report of ET, Stahl reviews technological innovations like those that have the potential to acquire social relevance over the next ten to fifteen years. Additionally, he suggests that ETs are at present not only seen within the initial phase of their development, but also as being past the purely conceptual phase. Yet this is simply another misconception about technology – the idea that it has a phased lifespan which can indicate whether or not it is emerging.

The term 'emerging' appears to be used synonymously with the words 'new' and 'universal', yet it cannot be applied to either, least of all to technology. It is my view that the term emerging is relative and tied to specific contexts, disciplines and use. Thus, in the case of my study, iPad-technology is emerging or new in the context of the Zambian education system, specifically. While it is commercially available in the general business sector in a limited capacity (recently, only in Barclays Bank), it is not yet commercially available in the education sector for transformative pedagogy and practice. Its unavailability is firmly tied to both misconceptions about the use of technology in the classroom and to economic implications.

Questions such as, 'Why should ET always be new or emerging?' have been hard to comprehend. I question why an iPad-technology need be seen as obsolete, emerging, new, no longer holding and so forth, in countries such as Zambia where it has hardly been used, especially in a classroom context. Is what is new, emerging, or is what is always emerging, new? When does what is new or emerging become neither new nor emerging? What qualifiers may determine whether an item or object is new or emerging?

These questions indicate that the terms – emerging or new – are both polarised and embroiled in scientific ambiguity. Mindful of the fact that it may be genuine that what is termed 'emerging technologies' is usually the most recent, yet simply because they are new, may not essentially classify them as 'emerging'. The concept of "emerging" technologies therefore, does not always mean that all such innovations are new or revolutionary in themselves. Some have been in use for decades or, in a variety of forms, for years. For instance, the global positioning system (GPS) (NASA, 2014; Yunck, Chao-Han & Ware, 2000), the feature known as virtual reality (VR) (University of Illinois, 2009; Virtual Reality Guide, 2013), and the Motion Picture Experts Group Layer-3 known as MP3 (Bellis, 2010), have existed for

some time, yet are still regarded as new or emerging. Technological innovations of the past are still infused into everyday lifestyles almost everywhere. From this perspective, technology may be seen as 'emerging' if it is not yet available for use in the hands of many (Millea, Green and Putland, 2005).

Rather than focusing on a development in which 'newer' clever technologies supplant the incumbent, I contend that instead the focus should be on that which is emerging/new or old or both. This implies technologies which might offer the consumers such as the education sector alternatives novel to them. In the case of teaching and learning, the use of these technologies may be tested for their value in the hands of the teacher and the learner. In other words, a question crucial to this study involves what opportunities this technology might afford in attempts to make learning more accessible and authentic.

Casting a closer eye on the evolution of technology, one might notice that in certain spheres some innovative, clever technologies emerge, swiftly supplanting existing ones, yet in other spheres these may take long to take off. One such sphere is the education sector. As noted earlier, my view on the emerging technologies is that their usefulness is relative to need, though there may be some overlap. An instance of overlap, diversity and dissimilarity between technological requirements may be cited in the differences between agrarian emerging technologies and nursing emerging technologies (Huston, 2013).

From the foregoing perspective, the question as to whether or not iPad-technology is still emerging, lingers; in other words, there is still speculation about whether or not iPad-technology constitutes an emerging device. Should this be considered the case, it can be validated further by the S-Shaped curve (see Figure 1). Michael and Martin (1994) posit that technologies have a lifecycle trajectory subdivided into four phases namely, embryonic, growth, mature and ageing respectively.

In the embryonic phase, the knowledge of technologies and its potential market applications is limited and therefore faces uncertainty or a murky future. In other words, the S-Shaped curve describes how the innovation of technologies from their slow early beginnings or early processes is developed through to an acceleration phase also known as a steeper line, as it matures. The final stage is the stabilisation process over time, also known as the flattening curve, with corresponding increases in the performance of the item.

One critical question is whether iPad-technology is still in its infancy with regard to its knowledge and potential market application, especially in education. As stated previously, though iPad-technology has continued to exist beyond 2010, it is still being debated whether this technology is emerging or embryonic in its market application.

The second phase is the growth phase, which is based on the success of research and development (R & D) in the first phase. If knowledge about technology accumulates because of investment in R & D, the growth rate reduces, and the technology enters the stage of maturity. Limited studies have been conducted on the use of iPad technology for literacy development to warrant the devices entering in the stage of their maturity, and thereby rendering them absolete for teaching and learning.

In fact, new interdisciplinary theories or approaches are emerging for the integration of ICTs in teaching and learning. This is an additional reason for why I devote the next section on interdisciplinary approaches to technology integration.
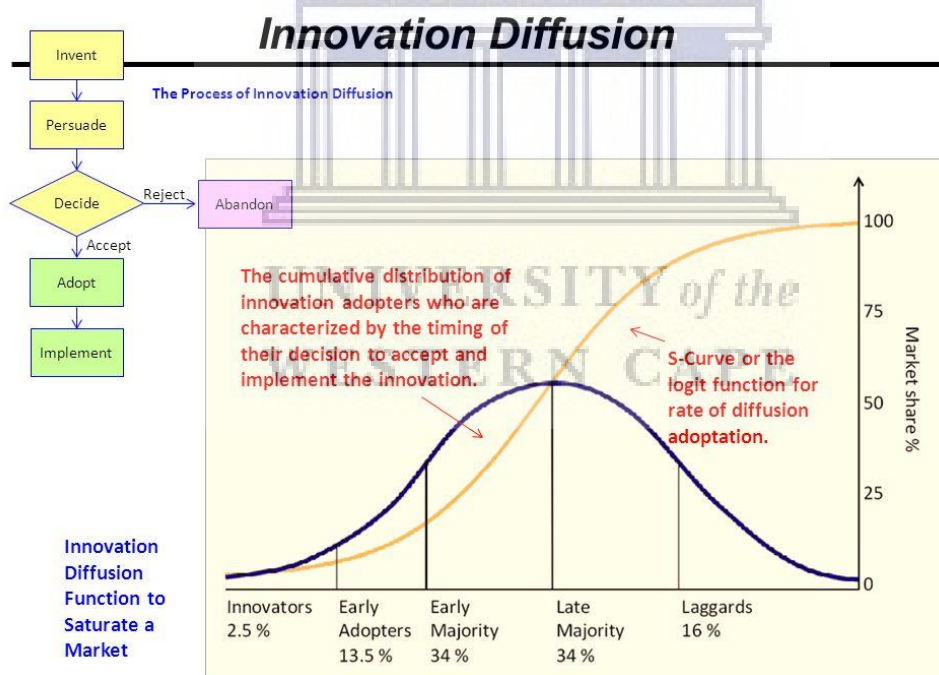
Figure 1-The S-Curve

From the depiction in Figure 1, we can see that some are early adopters of the multimodal and semiotic technological artefacts which form part of the socio-materiality of the social

practices in society and education. Thus, the concepts of new or emergent I argue, relate to the point at which technology is adopted to the point of saturation or maturity.

In the next section, I discuss the wave of emerging technologies, with a focus on iPads in schools.

2.6   Emerging Technologies: The Wave of iPad

From the time Apple introduced the iPad onto the market in 2010 as an emerging[3] technology, the iPad and similar technologies have been appraised as potential tools that might not only enhance but also transform teaching and learning in education. This transformation was not thought of as being restricted to adult education, but inclusive of young learners too.

Like its technological antecedents such as the Interactive Whiteboard (IWB), iPads are by their nature multimodal tools. Basically, iPads have the capacity to present texts in plural formats such as pictures and sounds. They are different from other multimodal tools because they have been designed with special and specific novel features that have the potential to transform teaching and learning in the future of education. These features include their light weight and portability, no need for separate input peripheral devices which require some level of dexterity to operate, and they (iPads) are designed to accommodate user-friendly, intuitive applications (apps) for learners. The iPad technology thus provides learners with unprecedented opportunities to experiment with the creation of content, and so to foster their learning in novel and dynamic ways.

Some research has been done to justify the potential of iPad for instructional practices (Blackwell, 2013; Lys, 2013; Pellerin, 2014; Wang, Teng and Chen, 2015). Other researchers have observed that iPad technology enhances collaboration, engagement, and differentiated learning, and it has the potential to open a plethora of opportunities for authentic and meaningful learning (Anderson, Schwager and Kerns, 2007; Chabinga, 2015). In one research study on the use of iPads in teaching and learning in Australia, Faulkner and Striepe, (2012) investigated primary school learner activities in literacy practices. The results indicate that learners were more engaged with an iPad than without the iPad tablet. The study shows

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[3] Emerging technology: The word emerging in relation to iPad technology appears to be relative. In other nations iPad technology may not be emerging. In this study, I use 'emerging' in the context of certain developing countries such as Zambia where an iPad is not fully exploited in teaching and learning.

that learners interacted more when they used the tool. These results imply that iPad technology enlivens learning spaces for dialogic experiences which have the potential to sharpen literacy skills among the learners.

In a study done by Masataka (2014), shes/he compared the impact of extensive direct exposure to iPads to a published photo-book with regard to the reading capability of 4-year-old Japanese boys. The writer observed an improvement following the children's experience of the iPad e-book, which was not the case with the printed book. However the significance of these results is problematic since the research failed to separate the effects of procedures from the outcomes of various forms of media (Sung and Mayer, 2013).

With a similar interest in the subject, Dundar and Akcayir (2012) compared children's reading pace and understanding when reading through a printed textbook versus an iPad tablet e-book. The investigation found no substantial variation in the capacity of children when reading texts on tablets and when reading print in hard-copy. In their comparative study, Chiong, Ree, Takeuchi and Erickson (2012) report on thirty-two parents, as well as their 3-6-year-old children, who were observed as they read through textbooks in three modes: printed textbooks, basic and improved e-books on the iPad. Their discoveries established that iPad-tablet ebooks motivated a lot more non-content associated interaction in both children and parents.

Diverse outcomes have been obtained in the research with 20 primary school learners aged 11-12. Correspondingly the research indicates that young children use diverse technologies for a number of reasons, such as to record their voices, to word-process and to take pictures for stories (Chabinga, 2015). Research demonstrates that it is the *utilisation* of iPads as opposed to *the device per se* that is important and creates a difference in young children's learning (Flewitt, Messer and Kucirkova, 2014; Hutchison, Beschorner, and Schmidt-Crawford, 2012).

From these studies, it is evident that there is a link between emerging technologies and literacy skills development. This connection concerning pedagogy, or an ethos of instruction, and the use of iPads' in the classroom continues to be reported on in several early observational research studies. For example, Hutchison, Beschorner and Schmidt-Crawford, (2012) discovered that the educational prospects of iPads are proportional to the teachers'

capability to successfully leverage iPads' [4]affordances, and to artfully link these to the curriculum. In a similar vein, Chabinga (2015) in a study conducted in one affluent primary school in the Western Cape, South Africa, demonstrated that there is a direct link between the teacher's digital fluency and their pedagogical disposition to using technology. This revelation implies that regardless of whether teachers have prior knowledge and the use of iPads in everyday life, emerging technologies are essentially new in the classroom application.

While research reveals substantial variation in the strategies in which iPads are utilised, nonetheless well-planned, iPad-based reading and writing activities have clearly been seen to trigger numerous constructive perceptions and behaviours in young children in most contexts. However, the question is: 'How would such information (results) change if iPads were substituted with, for instance, mobile notebooks or digital cameras?' Teachers' and young children's individual proficiency in using the devices, along with other variables within the educational framework have to be considered when deciphering or interpreting the consequences of iPad use as recorded in observational research. Also, societal, political, religious and cultural effects on education have to be taken into account. Thus, it is this wider framework of classroom dialogue (Crook, 1991,p. 81) that is intimately connected to the ways in which iPads aid learning.

Critics from the perspective of technological determinism[5] argue that research findings may be criticised for their top-down approach because more often than not, such interventions to teaching with technology have been implemented before formally evaluating these tools. This is because the reductionist and simplistic concept of technology, for many, is the idea that iPad tablets are a quick remedy to long-standing educational ills.

Such conceptions are blind to the issues or idiosyncrasies of individual educational settings. Moreover, a common critique from those who have received technology for teaching is how

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[4] Affordances: According Norman (1988) affordances are "properties of objects which show users the actions they can take. Users should be able to perceive affordances without having to consider how to use the items. For instance, a button can be designed to look as if it needs to be turned or pushed". In other words, affordances are any features of any object that presents or offers prompts on what can be done with this the said object.

[5](Technological determinism is) "the belief in technology as a key governing force in society" (Smith & Max, 1994). Rigid adherents to technological determinism do not believe the impact of technologies varies in relation to how a device is being or can be utilized. Rather than contemplating technologies as an element of a bigger spectrum of individual activity, technological determinism perceives technologies as grounds for all individual activity. It assumes therefore that people are powerless and at the mercy of technology. As technologies are stabilized, their design and style tend to shape users' behaviours, subsequently decreasing individual agency. This position disregards the societal and cultural conditions in which the technologies originated.

they are presented with hardware devoid of a software program that would aid curriculum content. They complain that skills advancement is marginal or non-existent for teachers. This modus operandi is not likely to generate instructional innovation or improvement in practice. Instead, the chances are it will replicate predominant forms of instruction such as rote teaching. Unsurprisingly, and as already stated, preliminary research demonstrates that it is the utilisation of iPads as opposed to the device per se that is important to children's learning (Cox, Webb, Abbott, Blakely, Beauchamp and Rhodes, 2003).

This leads me to the next section in which I discuss the role of iPad technology for classrooms.

2.6.1 Role of Technology in Teaching and Learning

In the past half-decade, the introduction of a new Apple iPad loaded with sensitive features has sharply drawn worldwide attention of educators as well as researchers to its purported potential for teaching and learning (Meurant, 2010). Thus far, research that has been done on the use of technology, chiefly emergent technology such as iPads, affirms its potential to enhance teaching and learning. For example, a study conducted with pre-school teachers in New Zealand, Hunter and Daly (2013) investigated the use of iPad applications (apps) in the teaching of language.

In the investigation, four-iPad language apps were identified which pre-school teachers then used to teach language. The findings indicate that the use of iPad, and carefully chosen language apps for language learning, were useful in providing authentic learning. The apps also aided learners' pronunciation skills. Another study conducted by Gaided (2013) in Canada indicates that iPad and iPod technology has the potential to assist learners struggling with second language acquisition. Gaided (2013) investigated the use and impact of iPad and iPod technology in second language learning and the findings showed the value of these technological devices in this domain.

Similarly, Lys (2013) reports that iPad technology has a positive impact on second language learning. The aim of Lys' (2013) research was to understand how learners progressed with iPads in German primary schools. Lys (2013) stresses that the success of iPad technology is dependent on the opportunities within the interactional conversations learners are given during learning. This finding concurs with that of Jepson (2005) who states that social interaction or interactional conversation plays a major role in language learning, and

acquisition. Lys (2013) concludes that iPad technology is a suitable tool for literacy development with regard to listening and speaking proficiency. In other words, interactional conversation aided by technology is invaluably beneficial in teaching and learning a target language.

Accordingly, an action research study conducted in South China by Chen (2013) on Mobile Assisted Language Learning (MALL) reports that iPad technology is suitable for fostering language acquisition through collaboration and interaction as long as learners are enabled by iPad's affordances. In Taiwan, research carried out on University students shows that the iPad technology does not only enhance learner/student outcomes but also increases learner/student motivation (Wang, Teng and Chen, 2015).

In Africa, Chabinga et al. record similar findings in research they conducted which shows that iPad technology is a potential tool for teaching and learning (Chabinga, 2015; Haßler, Major and Hennessy, 2015; Hennessy, Haßler and Hofmann, 2015; Maher, 2013). Different researchers continue to have varying interests in ICT in education. For example, Gachago, Bozalek, and Ng'ambi, (2013); Ng'ambi, (2013) have advocated the use of emerging technologies in higher education for what they see as its transformative effect on teaching and learning. Their research signals the necessity for access to technology for a transformed society in the 21st century.

Further elaboration on access is discussed in Section 2.74. For example, Gudmundsdottir's (2011) research explores issues relating to "the digital divide" in a multilingual South African context. The digital divide refers to the gulf between the economic "haves" and "have-nots" in accessing technology within the schooling system. Many developing countries face challenges relating to the digital divide. Other commentators for example, Chigona and Chigona (2010) acknowledge the potential of information and communication technologies (ICTs) to facilitate teaching and learning.

However, they bemoan the lack of supportive training and teachers' lack of freedom to access the computer laboratories, as in the case of the Khanya Project in Western Cape schools. Computers were distributed to schools around Cape Town but not all hard access to the computers even within the schools. This all too common instance illustrates an effect of "the digital divide" where schools have the need to safeguard their (scarce) resources to the extent that classes not directly involved in IT are excluded from the 'computer room' in the school.

Gudmundsdottir notes that to disadvantaged schools, greater access to technology might mean greater opportunities, but may also lead to the widening of prevailing social gulfs. Chabinga (2015), by contrast, focused on the use and integration of iPad technology in Grade six English Home Language in the Western Cape, South Africa. His results show that iPad technology has the potential to enhance literacy development and engage learners in learning. Technology, in this case, is a mediation tool in language learning (p.130).

Similar research conducted in Ghana and Mali concerning the use of ICT in education, shows positive results in life skills befitting the 21st-century workforce (Acquah, 2012). Acquah (2012) produced these findings from theirresearch conducted in primary and upper basic schools. The purpose was to investigate how ICTs could transform curriculum delivery. Other research, conducted in sub-Saharan Africa on the professional development (PD) of teachers reports that the teacher's perception of technology plays a key role in enhancing learning and outcomes (Hennessy, Haßler & Hofmann, 2015).

By contrast, Zambia appears to have little research to show for exploration into how technology enhances teaching and learning. As noted in Episode 1, this study is thus an attempt to break new ground because there has been no research conducted to explore how the recently launched ZEduPad technology is transforming teaching and learning in relation to the low literacy levels. Investigating whether ZEDuPad constitutes a transformative pedagogical tool in literacy development is thus imperative. I contend, however, that the successful use of ZEdPad depends on the teacher's understanding of literacy in the light of new literacy orders in the digital age.

The integration of digital literacy and multimodality as approaches to teaching and learning are now part of the bigger picture of how literacy development can be fostered in a world increasingly reliant on technology. Kress (2007, p.15) reminds us that today's children live in the digital world. This reality has resulted in the emergence of learning environments very different from those of the past. The significance for students is that teachers are constantly challenged to keep them appropriately engaged in the classroom (Prensky, 2010b).

Therefore, it is increasingly important that in a quest to improve low literacy levels, teachers embrace, understand and use digital literacy and multimodality in developing learners' language literacy skills. A touch-screen such as the ZEduPad offers this opportunity to teachers in Zambian primary schools. However, it is necessary to confront the question as to

what extent this offer is accessible and equitable. In the process of exploring it further, the concepts of digital literacy and multimodality are discussed in the literature review in Episode 3.

In the section that follows, I address access and equity in education where first steps have to be taken towards a stable economy.

2.6.2 Innovative Instruction: Disrupting the Banking Models

The Banking System Approach (BSA) to teaching is only indirectly associated with Paulo Freire, a Brazilian educator and philosopher whose very different approach presented a fundamental critique of it. The banking approach to education is a notion that depicts the transmission mode of instruction. It uses the metaphor of learners as containers into which teachers must deposit knowledge (Freire, 1970, 1974).

In the way many other schools around the globe still experience or practice teaching and learning, Zambia's education system is largely characterised by traditional rote modes of teaching (Linehan, 2005) such as the BSA. A close investigation of the teacher-learner connection at any learning stage today whether within Zambia's formal education system or on its periphery, discloses its essential character of rote-teaching. This version consists of a 'narrating subject' (teacher) and patient, listening 'objects' (the learners).

Irrespective of whether beliefs or scientific proportions of reality are being narrated, the content of teaching, and the teaching process as a whole, turns into inactive and petrified practice. Generally, instruction or teaching still suffers from the narration- or teacher-to-learner illness. This means the teacher discusses reality (through lessons) as though it were still, fixed, compartmentalised, and foreseeable. Alternatively, the teacher expounds on topics unfamiliar to add to the existing knowledge of the learners. In this paradigm, the teacher's job is to "load" the learners with the content of their narration, content that may be removed from truth, turned off from the totality that engendered them and that might provide them with relevance.

This practice is known as narration (with the teacher as narrator). It compels the learners to memorise the content or material robotically. Worse still, as Freire points out, it transforms learners into "storage containers," or "receptacles" to be "filled up" by the teacher (Freire, 1970). The more completely s/he thinks they are filling the containers, the greater the teacher

considers themselves to be. The more meekly the receptacles make it possible for themselves to be filled, the better they think they are as learners. Consequently, in this case instruction becomes the action of depositing, where the learner is classified as a depository, while the teacher is regarded as the depositor. Rather than conversing, the teacher dishes out information and makes deposits which the learners with patience obtain, commit to memory, and replicate. This is the "banking" notion of instruction, where the range of activity given to the learners reaches only as far as receiving, filing, and stocking the deposits.

However, based on some of the interdisciplinary perceptions of education described earlier, in general, instruction should not fall short of mutual understanding. This assumes an understanding that learners are not 'tabula rasas'[6] or 'empty slates' upon which information is inscribed. In the banking notion of education, knowledge is seen as a gift from individuals who consider themselves educated, to individuals (learners) whom they view as having no knowledge.

Projecting a complete lack of knowledge onto other people is a manifestation of the philosophy of oppression and negates instruction and knowledge as functions of inquiry (Freire, 1970). Thus, in the 21st century, any education and learning which 'domesticates' instruction and turns a blind eye to the influence of technology is designed to deny people the legal right to 'name their world'. This is what Freire describes as the 'banking understanding of education'.

Even though the National Curriculum Framework is primarily prescriptive, at school level teachers are certainly not precluded from implementing a 'problem-posing' technique within their instruction. Arguably, by employing a problem-posing technique in educational institutions, we could shift to a scenario in which education is not merely determined by what teachers assume learners should learn, need or understand. Teachers may instead offer possibilities for learner negotiation or involvement within the curriculum while valuing and integrating their backgrounds and identities into the curriculum. As a cultural artefact, technology offers these seamless opportunities in a manner different from before. However, invariably teachers do not acknowledge the pliability they may have in delivering the curriculum (Maylor et al., 2013). This could be attributed to the teachers' attitudes towards technology integration.

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[6] "the mind in its hypothetical primary blank or empty state before receiving outside impressions" (Merriam-Webster Dictionary-Online). It is from the Latin 'tabula rasa' literally, "erased tablet," on which writing has been deleted, and therefore it has been prepared to be written on once again.

2.6.3 Attitudes Towards the use of technology in Zambia

Attitudes and beliefs can either enhance or constrain teachers' use of ETs for instruction. Across the globe, they have been linked to the concerns surrounding the slow uptake of technology in education as compared to the corporate world. Research repeatedly shows that when a teacher believes that any challenges inherent in a technological device are greater than they think its performance or its usage is worth, that teacher will not be likely to utilise the technological device (Ang'ondi, 2013; Lufungulo, 2015; Oldfield, 2010). In other words, research reveals that when the perceived usefulness does not match the perceived usability, teachers tend not to try to change their thinking and teaching practices. However, devoid of the specified training that enables teachers to comprehend technologies competently, technologies will almost certainly be funnelled or used inappropriately via the traditional pedagogy.

A relatively significant amount of research about teacher attitudes has been documented. For example, a mixed method study was conducted to investigate a reliability and validity factor of the teacher's attitudes on the use of ICTs in universities (Ramos et al., 2014). The study reveals that teacher attitude plays an exceedingly important role in the successful integration of ICT in teaching and learning (Hernández-Ramos et al., 2013). The results provide insights into the correlation between teacher attitudes towards technology integration and teacher competence. Similarly, this correlation is reported by Chabinga (2015) in a qualitative study of the integration of ICTs in one affluent primary school in Western Cape. Chabinga, however, was mindful of the limitations of the study regarding generalisation, as the study was a single qualitative research study.

In Tanzania, a mixed study conducted in secondary schools by Placidius Ndibalema reinforces the foregoing findings and the correlation. Ndibalema (2014) reports that teachers exhibited positive attitudes towards ICT integration. However, teachers were not particularly knowledgeable about the use of technology for teaching and learning. In other words, the interplay between technological competence, beliefs and attitudes suggests that positive attitudes alone towards technology in teaching do not necessarily entail competence in this potentially transformative technological instructional application.

Teachers' perceptions about educational technological innovations vary considerably, with technophiles and technophobes present in equal numbers at most educational institutions.

Comprehending and accounting for diverse perceptions towards technologies is necessary for any school seeking to benefit from the adoption of contemporary educational technologies. This is because irrespective of how complex these technologies turn out to be, the students' achievement continuously depends on teachers developing an optimistic attitude towards them (Huang and Liaw, 2005).

Until recently, the adoption of mobile devices in Zambian schools was still fragile and volatile. Misconceptions abound, and the resistance by parents, teachers and other stakeholders to the integration of technology in teaching and learning is widespread. On the one hand, these attitudes, beliefs and perceptions are economic in origin. On the other hand, there are personal barriers that border on the belief that technology distracts and disrupts the learning process. This has contributed to the slow integration of technology for teaching and learning in most Zambian schools.

Beliefs behind economic considerations reveal that Zambia is not fully developed and therefore schools which already operate with inadequate teaching resources cannot afford to purchase technological devices. This also points to insufficient funding and the failure to recognize education as the primary economic driver for development – in any country (Brown and Lauder, 1996). More pertinently, these beliefs betray a lack of ICT policy awareness on the part of teachers. Generally, there is limited sensitization to many issues. This is particularly attributable to a lack of information in the public domain in such matters as educational ICT policy and its curricula guidelines, and on how technologies can be used. It is also due to a lack of speedy connectivity, electricity and hardware. At the personal level, the beliefs reveal that the teachers lack the skills to use technology for teaching and learning. They also indicate that some teachers cannot afford to buy technological devices such as the iPad technology.

In addition to these beliefs and perceptions, school managers enforce school policies that prohibit learners from bringing any mobile devices onto the school premises. Such rules attract stiff consequences if a learner is found with mobile devices. Evidence of such practices is documented in Episode 5 of this study.

In general these perceptions and beliefs bring to light issues relating to access, equity and equality. Matters concerning the latter are explored in Section 2.7.4.

2.6.4 Inequity and limited access: Imperils to Quality Education

Access, equity and quality are perceived as key indicators of progress towards improving literacy levels among primary school learners. Hence, issues to do with inequality and limited access to resources hamper the development of quality education. In education, inequality refers to the unequal distribution of learning and teaching resources – usually to rural disadvantaged schools – which include but are not limited to: qualified and experienced teachers, school funding, books and technologies (Richards, 2008).

To discuss issues relating to equity, access to education and arguably, a means of breaking the vicious poverty cycles in most developing countries around the globe including Zambia, I begin with a quote from the UNICEF (2016) world report which justifies the need for quality access to education:

> Quality education has the power to end intergenerational cycles of inequity, improving the lives of children and the societies in which they live. Education can provide children with the knowledge and skills they need to succeed in life. It is associated with increased incomes, reduced poverty and improved health. But for education to play this role, it must begin with early childhood development and continue with quality learning opportunities that provide all children, especially the most disadvantaged, with a fair chance to thrive. (UNICEF, 2016)

This quotation is consistent with my study in its expression of the necessity to investigate the role of emerging technologies which are inevitable tools in the 21st century, the Information Age. UNICEF's statement reaffirms the commitment to children that they have a right to quality education.

This reaffirmation is also realised through the recently commissioned Sustainable Development Goals (SDGs) which encourage governments to see to it that boys and girls have access to quality and equitable education (United Nations Development Programme, 2015). Access, therefore, must commence early in the lives of children. UNICEF (2016, p.42) reports that "38% of children leave primary school without learning how to read, write and do simple arithmetic". This is appallingly alarming. The compelling simple yet significant questions in relation to emerging technologies and education are, 'What is access and equity? When is education said to be equitable as well as accessible? How are equity and access measured?'

Access signifies the kinds of applications, devices, resources, and settings that assist and give access to linguistic epistemological content material and instructional activities for every learner. According to Motala, Morrow and Sayed, (2015) access, though a complex concept, signifies meaningful admittance and systematic learning which must go beyond physical access to material culture such as the iPad or emerging technologies, but with ways that ensure quality teaching and learning. In this case, quality teaching and learning could be meaningful, in my view, if the teachers are adquately prepared digitally. As Pendlebury, (2009, p. 24-25) puts it:

> Access is meaningful only when schools ensure epistemological access, and support children's systematic learning of basic skills, knowledge, values and practices, and do so in a manner that respects children's dignity and background. Pendlebury, (2009)

This assertion shows that teaching and learning, or education in general should be inclusive. Thus, besides empowering learners with disabilities to work with content material and engage in activities, the ideas also apply to accommodating the unique learning demands of learners like those of English Second Language Learners (ESLLs), learners in non-urban communities, or learners from economically deprived households.

ET supports ease of access via embedded assistance. For instance, text-to-speech, sound and electronic digital textual content models of instructional resources, programs that distinguish instructions, flexible assessment, built-in applications, along with other assistive technologies (Chabinga, 2015; Schwartzbeck, and Wolf, 2012). From this one can deduce that excellent learning experiences are not accidental but have arisen as a consequence of numerous factors which range from the nature of the resources to the calibre of the pedagogy, and include the individuality of the teacher. The ideal predictor of accessible and equitable learning is often an experienced teacher along with high-quality resources offering the techniques that enthuse learners and adjust to their demands.

Learning tools like ETs, provide numerous supplementary benefits (Halawey, 2013). It is easy to have on-demand access to an array of classified resources that fit fairly diverse learning styles and access needs. But the absence of ET as part of a learning system will eventually generate a barrier to academic progress. By contrast, learning platforms with ease of access have a greater possibility of rendering effective benefits with the advantage of smart technologies.

Portable learning applications and devices, and tablet technologies are increasingly trialled at schools across the globe, thereby permitting learners to gain access to essential learning resources such as e-textbooks and knowledge at any time, in any place. (Gachago, Bozalek, and Ng'ambi, 2013). This phenomenon includes Zambia. The current upswing of edtech signals that learners will no longer carry weighty textbooks to classes, but are now able to make notes, highlight and annotate essential elements of textual content on their tablets.

Equity in education and learning implies improving all students' access to instructional possibilities, with a focus on eradicating interruptions in this process. It includes eliminating imposed limitations based upon learners' 'ethnic background', 'race', national origins, gender, dis-/ability, English language competencies, religious faith, socio-economic status (SES) or physical location.

When thoroughly fashioned and considerately employed, technologies can speed up, enhance, and extend the influence of efficient teaching techniques (Blackwell, 2014; Clarke and Svanaes, 2014; Long, Liang and Yu, 2013). However, for ETS to be transformative, teachers require the skills and knowledge to maximize on the technology-rich learning settings. For appropriate systemic adjustments to learning and teaching to be put in place, training frontrunners (teachers and school leaders) are required to develop a wide-angled vision for the way technologies can best meet the requirements of pupils, in addition to creating a strategy by which to implement that vision.

Technology-enabled evaluations assist learning and teaching by conferring proof of learning success and offering experience to teachers, managers, young families, and most significantly, to the learners themselves (Clarke and Abbott, 2016; Flewitt, Kucirkova, and Messer, 2014). These evaluations could be embedded within electronic learning activities to lessen disruptions to learning time. Learning, instructing and evaluating empowered by technologies, require effective facilities or infrastructure. Key components of this infrastructure include high-speed online connectivity and devices widely available to students and teachers whenever they require them (Pelgrum, 2001). Amongst other resources, an all-inclusive learning infrastructure consists of digital learning material, cable connections and devices, and skill-advancement for teachers and education frontrunners.

Thus, making quality and equitable access to education a reality in the 21st-century calls for strong and effective policies that not only support learning on paper, but are implemented in action.

The next section traces the trajectory of the education policy and alludes to current attempts at transforming education into an eLearning hub in Zambia. Designed for individuals and communities which are culturally, economically and politically deprived, the use of ETs has paradoxically the potential to narrow the digital divide (Gudmundsdottir, 2011). This is because devices like personal computers, mobile phones, PDAs and media players could be costly to acquire and expensive to operate, sustain or maintain. Education and training systems play a significant role in facilitating the accessibility of these devices to learners, through training and teaching. Government plays a leading role in its policies to create quality and equitable education through sound policy implementation.

2.7   Border-Crossing: Globalised Education Policy

To appreciate the relevance of education policy in particular, I argue that policies play a pivotal role in guiding organisations, states and related bodies in carrying out certain crucial plans for social and economic outcomes (Howlett, Ramesh and Perl, 1995; World Bank, 1988). Importantly, these plans conform to general patterns and commonalities across localities. This is why a lack of policy or even improperly framed policies, in my view, can imperil social and economic success. With the advent of new technologies, policies that foster the integration of new technologies for teaching and learning must be developed. It is my belief that such policies can contribute significantly in the development or advancement of learners' literacies.

Relative to globalisation, the role of policy for 'a global village' becomes apparent. The effects of globalisation increasingly force organisations and states to think of and champion standardisation of education (Cree, Kay and Steward, 2015). At the heart of any development, social or economic, education is believed to be the conduit of development. It is viewed as a process of global and economic integration as well as internationalisation (Brown, and Lauder, 1996). However, until the formation of United Nations Educational, Scientific and Cultural Organisation (UNESCO) more than five decades ago, and the declaration of human rights, what happened to people in other parts of the world was difficult

to conceive of. Education and learning were at the mercy of colonialists who imposed their standards.

Most of what was adopted by schools and communities was what two scholars on colonial education, Kelly, and Altbach, (1984) have since referred to as an attempt "to assist in the consolidation of foreign rule". This form of colonisation was not physical but mental control through a central intellectual location; the school system which Louis Althusser describes as the 'ideological state apparatus.' In their argument, Kelly and Altbach posit that colonizers 'sought to extend foreign domination and economic exploitation of the colony'. In this process colonial education puts pressure on indigenuos learning structures by drawing them towards the colonizers. The effects of this type of education entailed teaching learners to be docile, thereby preparing them to accept lifelong exploitation.

From the foregoing perspective, in the human rights declaration by the United Nations General Assembly in Paris on 10 December 1948, the General Assembly Resolution 217 marked a shift towards global policy-making in education. This paved the way for increased bilateral, multilateral as well as non-governmental organisations' (NGOs') influence on the transformation of the educational system, in the process providing the assurance that it would meet global educational standards.

This was ostensibly intended to halt the violation of people's freedoms. As member states, governments – developing and developed – have been engaged in the global educational interface with policy-making. Bodies such as Group 8, aka the G8 – now replaced by G20 – consists of several member countries of the United Nations. The efforts to standardise education policy at a global level was, and is still necessitated by globalisation that continues injecting a the sense of a potential new lifestyle, and skills.

I describe Education Policy (EP) in this study as the modern state's apparatus and putative domain to spur social and economic development. Borrowed from Louis Althusser in his writings about "Ideology and Ideological State Apparatuses", the term is originally used to describe the control of the repressive state system which encompasses the army, police, judiciary amongst other national operations (Wolff, 2005). Inside the state apparatus, education policy is therefore a basic set of principles which guide the state and lower bodies on a course of action to achieve the equitable accessible provision of quality education for all, especially for children. Thus, access to quality and equitable education in a bid to globalise

standards leads to the inception of many other organisations. For instance, the Program for International Student Assessment (PISA) was formed after 2000 surveys had been conducted to compare education quality across countries (Hanushek and Woessmann, 2010), including the Southern and Eastern African Consortium for Monitoring Educational Quality (SACMEQ).

Because globalised education policy is an increasingly complicated pluri-lateral product of globalisation, its efforts raise questions, for instance, 'Why, how and to what extent have national governments been induced to allow globalised policy to find its place in what is regarded as the national preserves-policy. The levels of policy diffusion and penetration are diverse. However, states across the world, including Zambia, adhere to these policy regulations in their efforts to offer quality education, thereby hoping to raise the living standards of people.

2.7.1 ICTs and Global Education Policies

In most regions of the world, the distribution of Information and Communication Technologies (ICTs) in education or schools has led to a huge revolution in the educational landscape. Although there is no consensus about the actual benefits of these technologies in guaranteeing the quality of learning, increasingly ICT has been seen as a fundamental aspect of modern education systems. Thus, policy-makers have been keen to ensure that there is alignment between the growth of ICTs in the world, their dissemination and their eventual use in all pedagogical spaces (Teaching and learning).

While it is generally understood that ICTs have the potential to transform the education system, several countries around the world face significant challenges in activating technology to this end (Kozma, 2010; UNESCO, 2014b). Challenges include the infrastructure, access to network connectivity, electricity, cost, technical issues and many more (Chabinga, 2015; Ghavifekr, Kunjappan, Ramasamy, and Anthony, 2016; Salehi, and Salehi, 2012). While these issues exist, several countries have responded by developing ICT policies to guide the process of their integration in schools for pedagogical purposes.

In the case of the United States of America (USA), there are various widespread policies designed to encourage the integration of ICT in schools (Anderson, and Dexter, 2005). In efforts to streamline their curricula and assessments with policy directives, the USA has generally followed the National Educational Technology Standards established by the

International Society for Technology in Education (2007). In its National Education Technology Plan, the USA implicitly and explicitly exhorts those involved in education to develop skills that enable participation in the digital age.

Other locations with educational ICT policies include a number of countries in Latin America which have increased their focus on the use and integration of ICTs in education by introducing one computer for every school student (commonly referred to as one-to-one resourcing). These countries include Brazil, Argentina, Peru, Chile, and Uruguay (Ministry of Education of the City of Buenos Aires, 2013; Ministry of Education of Uruguay, 2013; Severin and Capota, 2011; Severin, Santiago, Ibarrarán, Thompson, and Cueto, 2011).

Thailand also has evidence of one-to-one resourcing. In line with its one-tablet-per-learner program in 2012, its government distributed over 800,000 tablets to Grade 1 learners. All the tablets were preloaded with educational content from Science, Mathematics, Social Studies, English and Thai (UNESCO, 2013).

African countries have not been left out in such initiatives, as will be shown in the next section.

2.7.2 ICT and Education Policy in Africa

African countries have not lagged behind in incorporating ICT policies in education. The attempt by African countries to integrate ICT in education and other sectors, is in the hope that technology will solve some its challenges regarding operations.

South Africa is amongst the countries on the African continent that have formulated and integrated ICT policies. For example, the South African e-Education policy document sets out the structure for government and the private sector to collaborate in the provision of ICTs in schools. The greater objective is to develop quality learning and teaching in the 21st century (Gachago, Bozalek, and Ng'ambi, 2013; Vandeyar, 2013).

E-policy in South African education was introduced to transform the education system. It is used in the Khanya and Gauteng online projects (Department of Education, 2007; Motala, Morrow, and Sayed, 2015b). Similarly, in Namibia e-policy clearly states that the Namibian government will encourage the use of ICT in schools. Namibia adopted the National ICT policy for Education in 2005 and the National ICT Policy Implementation Plan in 2006

(Osakwe, Dlodlo, and Jere, 2017). Apart from these countries, Zambia has also been contemplating developing an e-policty.

2.7.3 Education Policy in Zambia: The Trajectory

Education Policies capture and set the vision for strategies in educational development.

Zambia has adopted several education policies which include the 'Education Reforms: 1997', 'Focus on Learning: 1992' and 'Educating Our Future: 1996'. These policies build on one another to improve and increase access to education (Kelly, 1991). Yet despite efforts by the government through the Ministry of Education (MoE), the adoption of several policies suggests there is a need to review the current education policy of 1996. This insight can be attributed to a number of factors that inhibit access to education. In other words, the current education policy contains several disparities that border on inadequacy in terms of gender and availability of the relevant educational resources.

The Education Reforms of 1977 aimed at using education as an instrument for both personal as well as national development. This policy can also be called 'Education for Development'. The Focus on Learning of 1992 emphasised the need to mobilise resources to develop schools, while the Educating Our Future Policy of 1996 stressed the importance of education for all children at all levels of education. The significance of these policies for my research is that they show the trajectory of aspirations ingovernment regimes, and indicate what each had wanted to establish and/or procure in the process of governing the country. Tracing these policies therefore helps one appreciate the efforts, as it contributes to informed decisions on important current educational changes and how they may best be effected.

The section following is dedicated to issues of the language policy trajectory.

2.7.4 Language Policy in Zambian Education

Before Zambia's independence in 1964, in the colonial and federal periods, the language policy issue in education was relatively straightforward. Local languages were used for instruction.

The policy on the language of instruction (LoI) was consistent before 1923 when Zambia was still the Federation of Northern Rhodesia, which consisted of Nyasaland, now Malawi (Linehan, 2004). This meant that prior to 1923 the language policy for missionary education

(Carmody, 2004) promoted the use of indigenous languages. As a powerful linguistic tool, the policy to use local languages helped the missionaries to achieve evangelization.

However, between 1924 and 1958 the language policy was revised when Northern Rhodesia came under Britain as a colony in April 1924. The Phelps-Stokes Commission which was tasked to investigate the needs of the local people in terms of education, recommended the use of English as an official language. English then became the LOL from Grade 1 to higher education. Thus, English was formally adopted as the LoI and enshrined in the 1976 Education Act by J.M Mwanakatwe, the then Minister of Education (Kelly, 1991; Linehan, 2004).

Thirty years later, there was a move to revert to the use of vernacular languages as LoI through the 'Educating Our Future' education policy (Ministry of Education, 1996). The move to revert to vernacular languages was based on the premise initially recognised that learners learn best when a familiar language is used for general instruction (Linehan, 2004). In 1977 those who opposed the introduction of English as LoI argued that a second language was detrimental to the learner's achievement. The argument was cognisant of the fact that Zambia then, as now, is a complex multilingual society with approximately 72 ethnic groups. However, even after making the move to revert to the use of the vernacular languages, and by introducing English only much later, Zambia still staggers to raise the low literacy levels in both Icibemba and English. (Brombacher et al., 2015; Sichalwe and Kanyika, 2012).

Responding to the World Conference on Education For All (EFA), Zambia's second Educational Policy, 'Focus on Learning 1992' was meant to replace the 1977 Education Reform policy and instal the vernacular languages as the LoI from Grades 1 to 4. While this policy change was approved by Cabinet, it failed to be implemented. Reading and Writing (Literacy) levels were very low as indicated by one of the major studies carried out by Britain's Overseas Development Administration (ODA) (Linehan, 2004). The study indicated that learners in Grades 3, 4 and 6 could not read in Zambian Languages. In addition, they could not read English texts two years below their grade level. In this study, my focus is not to promote one language over the other but to promote innovative approaches and resources that could enhance the acquisition of language and literacy in this 3information age, especially active as it is through the English language. While Zambia is now promoting the maintenance of local languages and elevating them to a status equal to that occupied by English, English, to a large extent remains the official language for most labour market jobs.

This is a move away from fixed notions that literacy involves only print media, to the multimodal presentation of texts for social practices. I tap into the latter stance based on the objectives of the 2013 National Reading Committee (NRC). The NRC was tasked specifically to find solutions to problems surrounding the LoI and low literacy levels (Linehan, 2004). One suggestion made by the NRC was that regardless of the LoI, certain goals had to be achieved, such as the acquisition of basic literacy in the vernacular language by the end of the first year; and English by the end of the second year of primary education (p.4).

These two objectives would be achieved through improving the teaching and learning of reading and writing, using appropriate training and materials. However, all three Education policies – especially the latest – refers to ICTs or technology in passing. For example, the current education policy: Educating our Future, advocates offering ICTs as a subject but does not provide a clear policy on how ICTs will be rolled out in schools. This has been left in the hands of well-wishers such as the Zambia Information and Communications Technology Authority (ZICTA) who are expected to donate computers to schools with the relevant authorization. However, this initiative has come to a stop.

What can be deduced from this turn of events is that not only do the policies fail to present clear guidance on the use of Information and Communication Technologies (ICTs), but they are also lacking in strategy and a framework for implementation. The latter objective is a matter of particular concern as regards teaching and learning in an information age where, especially in Africa, ICTs in education are on a continuous rise in dynamic ways. Policies are thus important in that they provide the much needed guidance which might inculcate accountability, consistency, clarity and efficiency on how ICTs should operate in schools (Kozma, 2010). In other words, policies offer guidelines and reinforce principles.

In the following section, I focus more intensively on Zambia's need to have an ICT policy for education.

2.7.5 Zambia's Education and ICT Policy

All over the world there is evidence of attemtps to transform schools. The quest here is to find out how to educate our young ones to take their place in the 21st century. How can this be done when no one can anticipate what the future will look like 10 to 20 years from now? Zambia's adoption of ICTs in schools remains visibly low and slow. The perceptible

incremental uptake of technology is tardy despite high levels of motivation. As stated earlier, in schools this might be attributable to factors such as a lack of infrastructure, equipment and skilled teachers, among others (Salehi and Salehi, 2012; Tondeur, van Keer, van Braak and Valcke, 2008), including the absence of a comprehensive ICT Education Policy.

The lack of clear ICT policy and guidelines across subjects and disciplines in Zambia is depicted in the slow ICT uptake by the Zambian Education System, particularly in language teaching.

Camara Education (2014), an organisation that supports the use of technology in schools for education notes that policy documents in Zambia acknowledge the need for ICT use in education. This organization predicts that the use of technology improves the livelihood-related skills of people. In fact, technology grants access to a substantive body of knowledge shaped by numerous skilled scholars and educators around the world. By contrast,, few schools have the technology and skilled personpower to teach in an equitable capacity.

Computers lie idle in certain schools which had been received as donations from the Zambia Information and Communications Technology Authority (ZICTA), a body mandated to oversee and regulate ICTs in Zambia. Rural schools are the most disadvantaged in terms of access to computers in Zambia. Zambia drafted an ICT Education Policy in 2007, but it appears it has not been released in the public domain. However, the National Information and Communication Technology Policy of 2006 notes the introduction of a computer-based examinable subject (National Information and Communication Technology Policy of 2006, 2006).

The idea of technology as a subject was adopted in the revised Zambia National Curriculum Framework – ZNCF (Ministry of Education Science Vocational Training and Early Childhood, 2013), which implemented teaching computer literacy in primary school (Ministry of Education Science Vocational Training and Early Childhood, 2013). Thus, ICTs is taught as a separate subject called Technology Studies.

Based on my experience as a teacher, usually it is the teachers of science and technology who get to use the school computers most often. Teachers of science use computers to allow learners to search for notes on their science projects only, but this depends on whether they are connected to the internet, which is often erratic.

One of the competency sets learners must demonstrate at the end of their primary education is Information and Communication Technology skills. While it is offered as a single subject (Technology), the aim is to 'modernise the educational dispensation system with the goal of improving the quality of education and training at all levels' (MCT, 2006). In the long-term, the idea is to 'promote and facilitate the integration of computer skills in the teaching and learning practices at primary, high school and tertiary levels (pp. 27-28).' However, inadequate funding and incomplete ICT Education Policies appear to impinge on this ambitious move.

Indeed, incomprehensible education of ICT policy or eLearning policy hampers implementation of ICTs in education, and this in turn affects instruction. ICT in education policy and strategies depends on policymakers who are usually in strategic positions to effect an educational shift so that it compares equitably with others across the globe.

The idea of teaching computers merely as a subject alienates learners who might not be taking computers as a subject. This scenario has the makings of a warning that a lack of direct outcomes associated with the use of technology can significantly inhibit access, and thence learners' achievement at all educational levels. But the fact that the Zambian primary curriculum has been pre-loaded on the iPad called ZEduPad is a good initiative towards quality education. However, the lack of funding and the fact that the iPads are not the government's initiative to supplement teaching materials in schools makes it inaccessible to most primary schools.

Initially, the iPad was sold at $100 but was later priced at $215. This in itself not only made the ZEduPad expensive for disadvantaged schools, but also inaccessible to many homes. The cost of the iPad in other words, undermines the intention to enhance teaching and learning as it can be purchased neither by the majority of schools nor by most Zambian households. As alluded to in the foregoing section, if the Government of the Republic of Zambia (GRZ) had put in place a policy framework, this could have facilitated the systematic provision of iPads. It could have made them easily accessible by the state's action of disseminating them in the schools, even if this had to be carried out in phases.

This would have meant that since 2014 when iPads made their debut in the market, most schools would have been using the iPads for educational purposes. But as things stand, there

is no hope that the majority of schools will acquire iPads, especially rural and disadvantaged schools whose struggle for access to quality education is more dire, as stated earlier.

In the section following, I summarise the content of this episode.

2.8 Episode Summary

This episode has appraised the trajectory of technology as an aid to teaching and learning in relation to situations in which its adoption has not been fully exploited. In this endeavour a socio-historical perspective of technology in education was discussed to project its potential. The context of globalisation was addressed in an attempt to validate the need for learners and teachers to use technology for teaching and learning.

Indeed the evolution of globalisation is arguably evidenced in the emerging technologies which characterise it. Questions on the nature of emerging technologies such as iPads as multimodal resources formed a substantial part of the discussion about what happens in many classrooms across the globe. In addition, the issues connecting ICT, and the education policies governing it were discussed in relation to language and literacy.

Multidisciplinary theories that support the use of ETs for teaching and learning were also discussed and appraised. Furthermore, ETs were defined for their implications in teaching and learning, with an emphasis on language learning and literacy development. This was done while acknowledging that ETs mean various things and are context bound. However, the successful implementation of ETs in education is dependent on the effectiveness of the policy on e-Education.

The study reasons that ICT education policies are the means to an enhanced and transformative pedagogy which could spur social and economic development in globally competitive ways. As education is the agent of change, the move to use e-Education in schools could improve the rate at which of literacy skills are acquired, especially in disadvantaged schools, which is the focus of my study. Moreover, technology opens windows onto a broader view of literacy, herein referred to as multi- and trans-literacies.

In the episode that follows, I explore the concepts of literacies, multiliteracies and transliteracies, to find out how these interfaces with emerging technologies within the

learning spaces enterprise. I will focus particularly on matters of literacy and concepts extending from it such as literacies and multi-literacies.

EPISODE 3: CLEARING THE FIELD FURTHER: FROM LITERACY TO MULTI- AND TRANS-LITERACIES

3.1   Introduction

Leaving progress to chance might result in damage. It is thus necessary to be vigilant to potential threats by taking precautions. These may be specific despite or because of their reliance on general information, trends or practices elsewhere. They may involve processing traditional knowledge through practice informed by modern information systems. Such consciousness may facilitate coping strategies for the transition from small-scale supply to addressing the needs of a much greater, perhaps widespread population.

In Episode 2, I argued for the need to regard the history of the linguistic field as a way to inform the present, and to interpret the role and use of emerging technologies in language education. In this endeavour I commented on how the societal functions of technology were influenced by globalisation and its effects on teachers. Thus, the use of emerging technologies for classroom practices, teacher attitudes, accessibility, and global and local discourse on education policies formed part of the exploration in Episode 2.

Episode 3 provides a map of the conceptual framework of this study. I argue that this framework explains in graphic and narrative form the key constructs of literacy/-ies and the interrelationship presumed to exist between them (Miles, Huberman, and Saldana, 2014). In my discussion about key constructs of literacy and its associated concepts, I extrapolate on the content that forms the structure on which this study is built.

The conceptual framework enables me to be selective about the constructs I include or exclude, and determines how they interlink in a meaningful manner. Furthermore, the constructs guide the data collection and analysis. Thus, in this episode I focus on appraising literacy, literacies, multi-literacies and trans-literacies to see how these constructs have evolved – partly due to globalisation – into a multiplicity of interpretations. The discussion hones in on definitions of literacy as 'mono literacy' then shifts to current debates about multiple literacies and explores how technology is implicated in the current notions of literacy/-ies as socially contested concept.

I hereby seek to justify the need for emerging technologies as potential tool dispensers of Comprehensive Input (CI) for literacy skills development implicated in socially contested contexts if deployed in meaningful ways.

3.2   Literacy: A Socially Contested Term

Literacy, uncomplicated and implicit as it may seem, opens up a whole world of complexities. Scribner (1984) comments on this when he points to the fact that although literacy is every nation's principal concern, there are no set boundaries as to what it means (Scribner, 1984). Researchers have devoted their time to untangle the vagueness of the definition of literacy as a way of measuring the notion (Bash, 2004; Ellis, 1994; Long, 1982). Dominant reactions to the perceived vagueness of literacy have caused researchers to engage in a much more rigorous search for a definition and way of measuring the notion. Several methods have been used to this effect. The most notable is the 'Adult Performance Level Project 1975' (APLP) (Griffith, and Cervero, 1977).

APLP is one of the projects that has attempted to arrive at a meaningful concept of 'adult performance levels', and to devise tools by which to measure performance at such levels. The project seeks to identify instruments that might assist them to evaluate the functional competences of a representative sample of the population.

An effort was also   made by Hunter and Harman (1979) to create an all-encompassing definition of literacy. According Hunter and Harma (1979) literacy is the ability to read and write but also being able to decode and incode texts in more than one mode. According to Radwin (1978), such attempts have acknowledged significant boundaries of literacy, but not a single one of them has earned consensual agreement for having laid out an innovative historic and conceptual evaluation of the changing literacy definitions. Explanations or definitions of literacy (reading and writing) as well as what it implies to become literate, are therefore still diverse, conflicting and ambiguous, and range from ideas of 'literacy as functional' to 'literacy as cultural'.

Explicitly attempting to define literacy, and extending what it means to be literate in the information age – especially for the sake of teachers – justifies the need to engage and keep up with current notions of literacy. Premised on this, the argument in Episode 3 is that how literacy is defined has an effect on the way classroom teaching and learning is conducted.

How literacy is defined affects the opportunities learners are given for acquiring literacy. In short, an understanding of what may be meant by 'literacy' ultimately affects societal services.

Traditionally, literacy is defined as the capacity to read and write (De Valenzuela, 2006). However, this definition is somewhat narrow, elusive and simplistic. A critical analysis of what literacy is might not elicit a simplistic, reductionist reading-and-writing answer. Asking what literacy is might call forth more questions, and attempts to answer them might lead to an altered, perhaps less usable, analysis of the scope of the problem. However, as indicated, defining literacy shapes what we might perceive in individuals who may fall below literate or non-literate standards that would consequently affect the style and substance of their literacy instruction.

A chorus of clashing answers also creates problems for literacy planners and educators: as literacy continues to be described in several, occasionally contradictory ways. Some who create definitions pinpoint the abilities required by people for work, education, societal interaction and arbitration within a daily lifestyle (Prosper, 2012). Others employ a social focus, so their emphases range from literacies for particular contexts to ones that enable specific communities to challenge the established order (Bash, 2004; Reddy, 2004).

Hence, I argue that how literacy is described patterns the types of policies formulated and the teaching and learning procedures which follow in its wake.

3.2.1 Historical Conceptualisation of Literacy: Literacy or Literacies

There appears to be some form of understanding that literacy is not merely a couple of fixed abilities, but ought to include literacy for and in action, critical literacy, literacy as a social process as well as multiple literacies (Burnett and Merchant, 2020). For instance, Street contemplates that reading and writing ought to have an increasingly 'social' emphasis, including the supposition that it adds to knowledge within socio-cultural contexts. He describes this concept of literacy as 'ideological literacy' which signifies the social conceptions and purposes of literacy.

This perspective persuades us that literacy is a gauge for interpreting our construction of society. Street (1997) extends this concept by contending that literacy not only varies according to the social context in which it is required along with social principles and

discourses, but that its functions and connotations are embedded in relations of status. This implies that literacy is defined by culture, and in this way it contributes to the society whose culture has defined it.

By contrast, Olson's (1977, 1986) explanation concentrates on literacy as a 'cognitive' product, which can be essential for function, training and social conversation. This dominant perspective describes literacy simply as a straightforward, acquired intellectual ability; that a person learns to write and read just as a person learns to punch a tennis ball, drive a motorbike or make a dessert. It can obviously be understood as soon as the ability has been acquired. This conceptualization of literacy is what Brian Street (1985) critically classifies as an ideologically autonomous model.

3.2.1.1 Autonomous Model

'Autonomous literacy', according to Street (1985, 2003) involves a process whereby individuals who learn this ability do so for the advantage of influence and reputation. The autonomous model of literacy assumes that literacy has effects on cognitive and other social practices. In general, the autonomous approach to literacy correlates with ideas concerning the general progress of civilization and similar concepts.

The approach presents literacy as an independent "autonomous" skill that flows along a predictable evolutionary stream. In other words, literacy according to the autonomous model, is concerned with the expression of an individual's capabilities which it declares are determined by psychological tests that assess an individual's literacy level. The autonomous model might be viewed as a 'narrow conception with an assumption that literacy itself will have effects on social and cognitive practices, while the ideological model refers to literacy as a social practice' (Street, 2006).

This distinction will be discussed in detail under 3.4 of this Episode. The autonomous model as already noted, 'construes reading and writing as existing separately of particular contexts of sociable practice' and 'as separate from and unbiased toward tendencies and challenges in day-to-day life' (Street, 2006).

Simply stated by Street, the autonomous model of literacy:

takes on a one-way direction through which literacy development can be tracked, and is associated with 'progress', 'civilization', individual literacy as well as social mobility. The approach isolates literacy as an independent variable and then claims to be able to study its consequences. These consequences are classically represented in terms of economic 'take off' or in terms of cognitive skills. Street (2006)

In other words, the autonomous model perceives reading and writing (literacy) as the route to upward social mobility and critical thinking skills development. It seems to follow that the model emphasizes the notion or promotion of 'segregation' between those who are illiterate (who by this model cannot read and write) and the literate (who by this model can develop logical and abstract thinking skills). What the autonomous model implies is that literacy learning is politically neutral and that literacy is a technical skill devoid of social or political implications (Street, 2006).

Street (2006) concedes that the model emphasizes the inherent –if limited –value of literacy. Those who follow the autonomous model believe that "there are functions of language that are significantly affected by the mastery of a writing system, particularly logical functions. Written forms he argues, "enable the user to maintain social or interpersonal relations between people" (Street, 2006).

In my exploration of how emerging technologies might facilitate literacy acquisition, I sought to gain a better understanding of which model of literacy could work best within emerging technologies. This objective relates specifically to closing the literacy gaps which form part of the experience of rural and disadvantaged learners. While the autonomous model works towards enhancing high mastery of literacy skills for the economy, I realize that the social (ideological) dimension to this approach could be appropriate.

3.2.1.2 The Ideological Model

The ideological approach to literacy is a model that views literacy as a social practice. In this case, literacy is not simply a set of technical and neutral skills that must be learned, but concerns itself with the ways in which people perceive literacy (reading and writing). This understanding of literacy seeks to consider communities' deep-rooted notions of identity, of knowledge and of 'being' or existence and livelihood.

According to criticisms of this model, literacy is independent of the context and its purpose is to "imbue into individuals an acceptance of the dominant ideologies and its explicit purpose is to enhance the economic productivity of the nation" (Lonsdale and McCurry, 2004). In other words, the ideological approach to literacy conceives literacy as a critical exercise. This approach could be described as the social practice model which views literacy not simply as a technical and neutral set of skills, but rather ways in which individuals learn reading and writing from their prior knowledge or experiences which link with their identity.

The ideological model maintains that literacy is a social practice and therefore a social responsibility. In other words, learners could be engaged in several literacy activities that are learner-centred while involving technology as a mediating tool to acquire literacy skills. This type of approach to literacy places a huge responsibility on the social context where literacy practices happen. Rather than there being an essential view of literacy in which texts are delinked from real social practices, in this model, 'literacy' consists of varieties of textual encounters that take place within a specific human social practice. In other words, literacy turns into "an active relationship or a means of orienting towards the social and cultural world" (Lankshear, 1999). Extending the perception of literacy further some scholars, such as Kathleen Welch (1999), view it as connected directly to awareness. Welch states that:

> (literacy is) an action of the intellect, ... (an ability) to discern and engage purposeful issues combined with the ways in which thoughts, sensibilities, and emotional baggage are constructed by and along with communities whose participants communicate by means of particular technological innovation. Welch (1999, p.67)

Thus, the tension between the autonomous and the ideological occurs because of an essential dichotomy at the centre of perceptions of literacy, either as a "tamer at the disposal of rulers as well as the church" or, conversely, as "one of the cornerstones of human and social emancipation" (Rantala and Suoranta, 2008, p.95). Within the autonomous view, literacy can be used as part of an artillery of oppression, in conjunction with the establishment's preservation of hegemonic authority. The ideological perspective by contrast, states that literacies (in a dual sense) are socially negotiated and culturally embedded. They *emerge* as opposed to being *determined*.

Literacy is thus an expression of both what is in existence and what is still developing.

The new literacies from the World Wide Web (WWW) along with other Information and Communication Technologies (ICTs) range from the competencies, techniques and tendencies essential to effectively use and adjust to the fast-changing ICTs and contexts that are constantly being produced and the impact these have on other areas in our professional and personal lives. These new literacies permit us to search on the internet along with other ICTs to find input on significant questions, to find information, to significantly assess the effectiveness of the information, to synthesize data, to respond to questions and to convey 'the solutions' to other people.

David Evans (2014) explains how the work of the educator these days involves education that extends far beyond phrases and their meanings. He points out that the way in which information and facts are presented is fundamental to reading and writing. Reading and writing concern attaining knowledge, thus, it behoves us as educators to integrate new literacies into our teaching. New literacies encompass the notion of multimodality, a term describing an approach by which texts are presented in more than one mode. Hence, instead of a single unitary literacy, literacies in the plural seem more appropriate.

One would argue that the concept reflects the concept of human capital. This concept denotes that individuals invest in themselves through education or training to raise their future prospects and income. In this way, their intellectual skills form part of the market, and the backbone of the workforce, and their skills and knowledge become a commodity that could be exported to other nations. This way of viewing literacy forces teachers to practise drills in order to teach literacy. This is contrary to the concept that literacy should be a social practice or ideologically detectable (Street, 2006).

Following this, scholars dispute the perception of literacy as a social and cognitive tool in and of itself (Gee, 1996, 2010; Street, 2003). For example, what has been termed the "New Literacy Studies" (NLS) (Gee, 1991; Street, 1996) reflects the novel tradition that sees literacy not so much as the "technology of the mind" (Goody, 1968, 1977) or even as a set of skills, but rather as a social practice (Street, 1984). This means recognising literacy in terms of plural or multiple literacies, constantly changing in time and space.

This concept of literacy factors in the value that technology such as the ZeduPads presents, which is the focus of this study. For example, it is clear that technological media can "influence context and forms of express(ion) and communication" (Lonsdale and McCurry,

2004). Thus, the use of the ZEduPad might influence the manner both in which learners acquire literacy skills and in how they make use of the acquired skills in society.

The importance of looking at the history of the concept of literacy lies in the fact that it helps us appreciate new literacies, or transliteracies or even multiliteracies (Boche, 2014; Borsheim, Merritt, and Reed, 2008). For this reason, the next section is dedicated to surveying the scope of emerging technologies against the backdrop of a brief history of educational technology: its social function in the 21st century, its role and potential affordances, its benefits and challenges in specific primary schools, and the modes of its literacy delivery compared to traditional literacy delivery. Particular interdisciplinary theories of learning through and by technology will be highlighted to accentuate the need for technology as an ecological aspect of social and economic life.

This section provides the context for the study. A review of relevant literature in the field of language, literacy and technology is presented to advance the idea that technology is a factor in language and literacy skills development.

Thus, in this part of the thesis I conceptualise the use of technology in education, particularly in language teaching, and I provide a broad outline of research that has been undertaken in this domain. Further, I discuss the changing concepts of literacy in the light of new technologies that have become increasingly ubiquitous in the corporate world as well as in the education arena. Thus, concepts of multimodality, trans-literacies, literacy, language, technologies, iPad and digital literacy, pedagogical practices, critical literacies are among the concepts which are highlighted and discussed in this Episode. UNESCO offers a helpful starting point:

> Literacy is usually an attribute acquired by people in a variety of degrees
> from just over nothing to the indeterminate higher levels. Some individuals
> are essentially (more) literate than the others, but it is far from a possibility
> to talk about illiterate and literate individuals as two unique groups.
> (UNESCO, 1957 – in Holme, 2004:7)

The foregoing quotation suggests a notion of 'literacy' which is comparable to the Wittgensteinian dilemma encompassing the concept of a 'game': the crowd understands specifically what the utterer implies by the word, but pinning it down in a more formal way is significantly challenging (Hannon, 2000, p.36). In other words:

A Wittgensteinian approach to language, literacy and learning recognises that learning is impacted by the formative experience of one's engagement with the world and others, which combines both interpersonal and intrapersonal development. The language, literacy and learning practices that individuals (rely on to) interpret (things) and (to) engage ... are part of not only their language development, but also their social development. (Hannon, 2000).

Merely conceiving of literacy as 'the capacity to read and write' not only creates an incorrect dichotomy (involving those who 'can' and those that 'can't'), but also cannot make allowance for approaches to writing and reading in which a variety of resources are employed. According to this description, literacy can be regarded as a stairway which can be climbed by individuals (Hannon, 2006). The Oxford English Dictionary provides two meanings for the word 'literate': (i) 'a person who can read and write'; and (ii) 'a liberally knowledgeable or learned individual.'

Furthermore, it is important that the concept of literacy is well understood to inform future practice especially where technology is concerned because, despite the shifting nature of literacy in today's world education continues to be preset on traditional concepts of literacy. Thus, it is important in this current study, to discuss the variety of techniques teachers use to promote literacy in a classroom, using tasks and assignments that are connected to the growth and development of new literacies.

For example, the application of Tweets as a way of creating intergenerational literacy and chroma-key strategies to generate children's dreamed realms in virtual spaces enhances the process of literacy acquisition. As earlier referenced, extending from the New Literacy Studies (Street, 1997), the notion of new literacies shows how 'simulated literacy events' within a virtual space can go beyond the 'real' world to promote literacy learning by way of purposeful contexts. All this is possible through iPad technology – chosen as a focus of this study.

Literacy may be referred to as the ability to read for understanding, to write coherently and to think critically concerning the written word. Literacy may also incorporate the ability to comprehend all sorts of communication, whether in the form of body gestures, photos, video clips or audio communication (reading, speaking, listening and viewing). The incorporation of other modes of literacy such as videos and audios defy the traditional notion of literacy whose emphasis is singularly on print media.

Changing the meaning of literacy may include many of the symbolic representation systems appropriate to a specific local community. This concept of literacy challenges even the more 'liberal' definitions whose focus on reading basic textual content tends to generate a relatively simplistic statement about daily life (United Nations Educational Scientific and Cultural Organization, 2006).

It is actually with these abilities to write and read *in several forms or modes* [my italics] that those people who are literate in this way have the potential to engage more fully in society. As community members they may comprehend and apply an increased degree of control in everyday activities, both in the economy and socially. This capacity to be able to write and read and to carry out activities in day-to-day life is referred to as functional literacy.

3.3.1 Functional Literacy Approach

The functional approach to literacy views knowledge of reading and writing as the foundation that enables individuals to acquire basic cognitive skills to accomplish practical goals in culturally specific settings (Street, 1995, 2006). In other words, functional literacy targets the purposes reading and writing are to serve. Gurak (2001,p.13) explains that these are well-known definitions of literacy which are also referred to as 'performative.' That is, the capability to act or to do something is what matters.

Gunther Kress suggests that "literacy could be the expression to utilize as we make communications using letters as the way of documenting that message" (Kress, 2003, p.23). Literacy, according to Rodríguez Illera (2004) is viewed "as skills (rather than overall performance), that is, similar to a cognitive capability, competent at producing several particular forms" (pp.49-50). It is primarily the definition that "has typically dominated curriculum and pedagogy" (Dighe, 2005).

Similarly, UNESCO's running model of literacy describes it in terms of skills (reading, writing and oral), literacy as applied, practised and embedded, literacy as a learning process and literacy as a text (UNESCO, 2006). Recognizing three concepts within this outline of 'literacy' (Bélisle, 2006), Claire Belisle identifies functional, sociocultural and transformational approaches to the process of acquiring literacy.

Functional Literacy, according to Claire Belisle is based on the concept of literacy as a range of uncomplicated cognitive and practical competencies necessary for operating efficiently within the local community. UNESCO provides an additional description:

> An individual is functionally literate if they can participate in dozens of actions by which literacy is necessary for efficient operation of his group and local community and for empowering him to continue through reading, writing and calculations for their own and also the community's improvement. UNESCO, 2006, p.154

Abilities and practices pitched at the fundamental level of the framework sometimes appear to incorporate individual digital literacy skills which constitute the minimum requirement for staff. These competencies, for instance, the capability to generate authentic resources to aid learners, are seen not only as essential for staff to operate within modern day classrooms, but also for the continuing development of other people in the local community.

Furthermore, it can be argued that functional literacy is necessary because it is the basis of future lifeskills. These skills affect one's professional success including one's academic life. For example, in the absence of the fundamental capacity to comprehend basic reading materials, learners cannot absorb information from texts even if the input is adequate. This aspect will be discussed more fully in Episode 4.

An individual's work or employment outcome is seriously affected by the absence of a strong basic literacy skill set. In the case of learners, it means that their educational prospects will be weakened and they will be disadvantaged throughout life; also, in contexts of adult education. Learners who have a shaky literacy and numeracy capacity tend to drop out of school especially in rural and socially disadvantaged places. This in itself means that they cannot have any significant access to profitable knowledge-based jobs in society or to the labour market.

Thus, one strategy by which to promote early literacy skills is to encourage 'read-aloud drills' (Achugar, Schleppegrell and Oteíza, 2007). Learners can take turns at doing this, as they respond to questions about the stories under discussion. Turn-taking is one example of a democratic process in literacy learning in the classroom (Rose, 2005). What is important is to give learners a variety of opportunities to help them learn, based on what they can relate to from their own social settings. This leads to an exploration of another theoretical position on literacy acquisition, namely the socio-cultural approach.

3.3.2 Socio-cultural Literacy Approach

Apart from the reading and numeracy skills that enable an individual to participate at different levels of society functionally, including academic life, the social context in which they do so matters greatly. Hence, an important aspect of literacy teaching and learning is one which emphasizes "the interdependence of social and individual processes in the co-construction of knowledge," known as the socio-cultural literacy (SCL) approach (Gee, 1996; John-Steiner, and Mahn, 1996).

The socio-cultural approach to literacy can be described as relating to the social and cultural practices, thoughts, beliefs and traditions within a particular society (Gee, 1991). This SCL approach to educational work with language is used worldwide. However, within this frame, every individual learns their own particular language, and this occurs in a variety of ways. Everyone creates their own discourse. As teachers or those involved, we must learn these forms of expression, relate them to our own knowledge about learning language and then create a new unknown discourse of language for the students. The '4 Resources Model' (Freebody and Luke, 1990), a helpful reference here, emphasises language as a social cultural practice, the development of literacy and the use of a variety of text types.

In most rural schools the belief about the need for literacy ends at being able to read the Bible and to write for the purpose of church services. Literacy is not perceived as an economic skill and therefore most learners do not go very far in their education. However, technology and its multimodal and semiotic enabling facilities expand the view of literacy. In the words of James Gee (1991), "the traditional view of literacy as a private mental possession which can be quantified and measured in terms of discrete decontextualized skills is deeply inadequate".

Consequently, becoming competent involves knowing which practices and/or values are sufficient in a given circumstance. In the framework of teaching, what this implies is an understanding of those abilities and practices that will be most effective in a learning situation. It requires obtaining a variety of techniques one might possibly employ where necessary, and acquiring the capacity to think critically about the application of technologies for learning.

Educators designing, planning and setting standards in the framework for assessing literacy teaching and learning may have reason to become curious about how to enhance their digital

literacy. Their professional advancement could become more self-directed and they are likely to be capable of thinking critically concerning the technological innovation that they use and its particular suitability to their circumstances. As mentioned earlier, Bélisle (2006) notes, literacy may be viewed through the socio-cultural lens, as knowledge acquisition – the ability to carry on creating an individual's personal understanding.

The Four Resources Model (FRM) originally developed by Peter Freebody and Allan Luke in 1990, explains that effective reading taps into a repertoire of resources and practices. These enable the learners, as they interface with reading and writing activities to:

> 1) break the code of texts, 2) text decode [or] participate in the meanings of text, 3) [be a] text participant [who] uses texts functionally, 4) [be a] text user [who] critically analyses and transforms texts and [to be a] text analyst. (Freebody and Luke, 1990)

The ability to engage with texts in this manner is likely to show that if at this stage the learners are able to perform these skills, they have acquired the intellectual resources to decode and encode texts literally. This indicates that learners are at the level of transformational literacy capacity.

3.3.3 Transformational Literacy

One of the first things a researcher and/or a teacher in the literacy field might want to ask is 'What does it mean to have transformational literacy?' Briefly, I argue that transformational literacy is the ability to let go of our past habitual patterns to more fully become ourselves and to co-create the future we seek. Having this ability inspired me to engage in the literacy field and I was determined to actualize this practice by 'presencing'. I want to refer to this as the social field of 'presencing' because it makes our individual essence more present to the world and the world of literacy. This is so for the researcher, the teacher, and for all those engaged in the enterprise..

According to Scharmer (2009), "It's a generative social field that comes into being whenever groups move outside their habitual filter or bubble and engage in processes by opening the mind (curiosity), the heart (compassion), and the will (courage)." The result of this practice is a cycle of co-creative transformative action amongst the language learners. While much might be said about presencing, I have focussed on only three human virtues: curiosity, compassion and courage. These form the human instruments or tools – discussed in Episode

5 – which enabled me to harvest data on literacy and in so doing, contribute to the social field of which these virtues are characteristic.

3.3.3.1 Curiosity (Open-mindedness)

Albert Einstein said: "[I]am neither especially clever nor especially gifted. I am only very, very curious" Eistein (n.d). As the saying goes: the mind works like a parachute — it only functions when it is open (Deawr, n.d).

In the field of literacy and in teaching and learning, it is vital to appreciate that curiosity is a virtue which enables individuals to "see the world with fresh eyes", "suspend judgements and habits of thought" as well as to "listen to information that challenges what we already know". It is curiosity that drives our very desire to seek and learn new levels of understanding.

Accordingly, the emerging technologies such as the iPads in the context of this study, are arguably that one element of material culture and artifact that appears to spark interest among the learners, and that generates enthusiasim in them to learn new things. The technology assists learners by enabling them to see beyond the known, and to discover the unknown even with self-initiated talks. This is evident in the keenness they express to learn even beyond the allotted time

3.3.3.2 Compassion (Open Heart)

"Every new object, well contemplated, opens up a new organ of perception within us." (Goethe, n.d).

One would argue that compassion is our human capability to rechannel our cynicism through listening with our hearts wide open. This includes one's 'ability' to empathize', 'to see situations through the eyes of someone else' and 'sense other perspectives' from outside our current boundaries. Compassion gives birth to our ability to love each other, suffer for each other and strenghthen our relational bonds even when significant boundaries exist.

I argue that as teachers we should model compassion and acts of compassion on a daily basis, by complimenting the learners on their successes, inquiring about their literacy activities, and addressing all literacy deficiencies consistently. In this way, learners begin to develop the courage to attempt literacy skills even on their own. The following section highlights courage as means to foster literacy skills.

3.3.3.3 Courage (Open Will)

In discussing courage, Anais Nin (n.d) said, "Life shrinks or expands in proportion to one's courage." Courage is our capacity to approach the world, the self and the future. It entails 'letting go' of our constricting beliefs, attitudes and assumptions such as 'us versus them,' to invite a new sense of self and of what is possible. The right curiosity, compassion and courage can foster the learning of literacy skills.

Fostering such virtues in learners is one viable strategy by which to raise low literacy levels because they can face their fears by using information to co-collaboarate and co-create content together..

3.3.3.4 Co-creating our future

A learning opportunity is one which provides accessa deeper level of our humanity thus shaping ourselves and the future in a single act. Put simply, they are potent to virtues that inspire transformational questions. It enables us to fine-tune our strategies for co-creating and shaping the world we want to live in. Transformational Literacy, according to Belisle (2006) has to do with mental empowerment.

Mental empowerment takes place each time individuals furnish themselves with new intellectual resources. Claire Bélisle believes that electronic resources give us 'genuinely new raw resources to think with and also to generate knowledge' (2006, p.55). This approach to literacy ultimately makes it possible for a change in individual thinking capabilities – enabling us to determine and look at the world in a fresh way.

Some teachers have completely integrated technologies into their teaching practice, and are equipped to share their encounters with fellow workers, amongst others. They actively search for possibilities whereby to build their understanding and abilities. They employ their understanding to create advancement both within the classroom as well as for entire school community development.

3.4   Multiple Conceptions of Literacy: Unitary and Pluralist

The concept of 'literacies' provides a modern approach to teaching and learning literacy. It also contributes towards establishing and advancing the practice of 'multi-literacies'.

In his comment on 'unitary' and 'pluralist' perceptions of literacy, Hannon (2000) states that the unitary perspective is predicated on the notion that literacy can be a 'skill'. Implicit in this perspective is the consequent use of the pronoun 'it', which most scholars use, thereby conferring on the idea of 'literacy', the status of a single referent.

It is assumed that referring to literacy as 'it' tags it as a skill or competency, or the ability to use written language. Based on this perspective, the actual functions which certain writers attribute to 'competence' may actually, according to Hannon, be segregated from the competence itself (Hannon, 2000, p.31). How this competence is used largely depends on the complex social, economic and political factors influencing the user of the written language.

By contrast, the pluralist perspective holds that there are various literacies. Hannon quotes Lankshear and Knobel, (2011) and Lankshear, (1987, 1999) who link social literacy practices using a pluralist perspective of literacy. They argue that we ought to acknowledge that numerous unique literacies exist. Each of these, according to these scholars, is composed of a recognizable range of socially constructed practices based on print and organized around values determining how the abilities of writing and reading might or, potentially, ought to be employed.

Pluralists such as Hannon (2000) thus advocate that we ought to talk about 'literacies' instead of 'literacy'. Their view is that the practice of literacy is subject to the familiar social influences of power, social identity and political ideology. Thus, for them the concept of literacies constitutes more than the conventional or traditional perspective of literacy as the singular isolated ability to write and read without links to other human interaction. Through privileging specific literacy practices, purposefully or unexpectedly, hegemonic power is possibly elevated or diminished (Gee, 1996, p.46).

The pluralist perception of literacy is to some extent, like the postmodernist movement in the late 20th century. Postmodernists contend that modernism is elitist whereby power is in the hands of the few and it reinforces the dichotomy between the low and high cultures. In other words, postmodernism rejects universal truths. In the case of literacy, it argues that literacy is embedded in the diverse human experience and practices. Although enthusiasts do understand what they may be up against, in this instance a 'unitary' understanding of literacy, it is not generally apparent what they themselves represent. What constitutes 'a literacy'? Precisely what do 'literacies' share?

Hannon tries to provide some clarity by appealing to the concept of 'family resemblance,' which is almost as much as Wittgenstein did for the concept of 'game' (Hannon, 2000, p. 36). His point is the fact that even though we cannot define 'literacy' in a manner that would gratify every single critic, we can nonetheless know what it implies in practice.

Critics contend that if there are plural literacies, the question is which literacy should be considered for teaching, and why that particular literacy? With plural literacies, how do you justify an instance where one is valued more than another? What if the learner's school literacy appears to differ from their home literacy? These questions also extend to teachers whose initial training especially in early childhood education cultivated in them specific psychological models of development.

Hannon (2000) would not position himself as either a 'unitary' or a 'pluralist' thinker in relation to literacy despite theoretical debates about whether literacy was a skill (psychology) or a social practice (sociology). He queried why a choice has to made between these two concepts. According to Hannon "(a) complete perception of literacy in education, involves knowledge of both" (Hannon, 2000, p.38).

From this perspective, therefore, literacy may also incorporate the capability to comprehend all sorts of communication, whether in body gestures, photos, video clips or audio (reading, speaking, listening and viewing). The incorporation of other modes of literacy such as videos and audios extend the traditional notion of literacy whose emphasis was solely on print media. Changing the meaning of literacy can include many of the symbolic representation systems appropriate to a specific local community.

New literacies involve improving our syllabuses by focussing on assisting students with a variety of skills. These include comprehending genre; understanding the conventions of visual representations; comprehending sentence structure, practising critical writing and applying knowledge appropriately and creatively.

Shifting from reading and writing to 'literacies' entails what Gee calls the 'social turn' and he shines a spotlight on the socio-cultural facet of reading and writing practices (Gee, 2010). This perspective goes beyond viewing reading and writing as being the 'mastery of easy cognitive and practical skills' whose advocates – particularly those who espouse 'new literacies' – would consider as a sign of mere proficiency (Gee, 1991, 1996; Street, 2003).

It is my view that Gee's argument might signal the inclusion of 'digital competence'. This skill-set offers a fundamental knowledge of the way the World Wide Web functions (for example, hyperlinks) and facilitates an achievement of the practical abilities that accompany its navigation.

Another 'new literacy', visual literacy, also demands attention in the language classroom. New technologies are making it possible for the presentation of information and facts in many more complex formats than uncomplicated plans and basic roadmaps. A good example of this is a roadmap on which the measurement of nations is adjusted in order to mirror their populace. In cases like this, India would seem to be large, in contrast to Australia, which would appear smaller certainly.

As in the past, we have to be aware of numerous novel ways by which data is being presented. This would enable us as teachers to assist our pupils to acquire the necessary literacy skills to comprehend a variety of representations.

3.3.1 Multiliteracies

Multi-literacies is a term referring to a pedagogy of language and literacy teaching concerned with the modes in which more than one linguistic text is represented. The concept of multi-literacies accounts for the context of our culturally and linguistically diverse and increasingly globalised societies, multifarious cultures and the plurality of texts in the information age (Cope and Kalantzis, 2000). The expression multiliteracies, invented by The New London Group (NLS) (1996), features both meaning-making in texts as well as in the multimodal nature of texts themselves to clearly determine how 'meaning construction in diverse cultural, social or domain-specific contexts' is created as a result of various textual modalities.

Thus, what has come to be termed the "New Literacy Studies" (NLS) (Gee, 1991; Street, 1996), actually represents a new tradition within which to think about the nature of literacy, with an emphasis not so much on acquisition of skills but rather on what it means to think of literacy as a social practice (Street, 1985). Street explains that "(t)his entails the recognition of multiple literacies, varying according to time and space, but also contested in relations of power" (Street, 1996).

This includes written-linguistic modalities, oral, visual, audio, gestural, responsive and spatial. It is no wonder then that the ways through which information is accessed, ingested

and disseminated are also transforming society considerably. Learners' interactions with such texts, both in the educational setting and in their own homes, have transformed and shifted general education substantially from the traditional towards the multimodal. Consequently, educators ought to adjust their pedagogical practices to enhance students' multimodal multi-literacies across a number of platforms and settings (Cope, and Kalantzis, 2000; Iyer, Radha and Luke, 2010).

A pedagogy of multi-literacies features in well-balanced classroom variety usually manifest through four key elements: 'Situated Practice, Overt Instruction, Critical Framing and Transformed Practice' (The New London Group, 2000). 'Situated Practice' includes learning that is based on the learner's personal life experiences while 'Critical Framing' helps learners to question prevalent perceptions and suppositions within discourses. 'Overt Instruction' is the direct instruction of 'metalanguages' in order to assist individual learners to acquire an understanding of the elements of expressive forms or grammars. And 'Transformed Practice' occurs wherever learners interact in situated practices. It involves constructing a new understanding of literacy practices. Learners are expected to draw on their unique personal experiences and semiotic literacy techniques to depict and convey meaning. From this perspective, teachers ought to engage learners in multiliteracies through the curriculum (The New London Group, 2000).

However, Walsh (2010) argues that in many countries the educational policy and national testing are still focused on reading and writing of print-based texts. Early literacy has a long-term effect on the children's educational goals or attainment (Feiler, 2005) which he says prompts questions about linking learning practices in school with home practices. He states evidence suggests that when flexible, negotiated collaboration between school staff and families exists, it is possible for home-based practice to reinforce and influence the school literacy curriculum (p.146). Similarly, Comber and Reid (2007) observe that the experiences learners bring to school play an exceedingly important role in how they (children) connect and engage with their learning environment. The diagram in Figure 2 depicts multiple literacies and how they are all implicated in relation to each other.
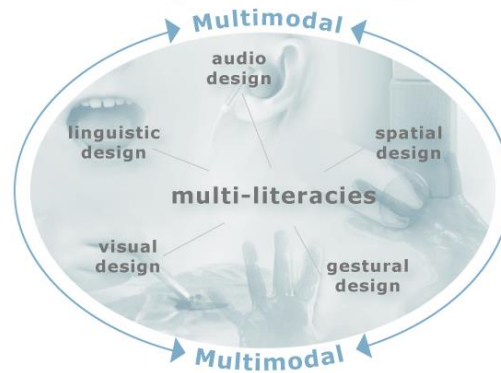
Figure 2 Multimodal Approach

Figure 2 illustrates how the terms multi-literacies and multi-modality are intertwined. In order to acquire multi-literacies, the tools of multi-modality become necessary.

The term multi-literacies was developed by the New London Group (NLG). This is a group of ten educators, researchers and visionaries based in the United States of America, New London, New Hampshire in 1994. The NLG developed the multi-literacies approach premised on their assessment of how the new emerging technologies were influencing society and teaching and learning at large.

In their assessment of a pedagogy of multi-literacies, the NLG accepts and encourages the use of a wide variety of linguistic, communicative, cultural and technological perspectives and tools to enable and assist learners to better prepare for a fast mutating and globalized world. Thus, education and school ought to adapt to the increasing availability of new (emerging) technologies for teaching and learning. This is how to keep learners prepared for any of a number of opportunities. This is how to assist them to create their lives and to contribute to their society and its future.

In the teaching and learning of literacy skills, multi-literacies are usually encouraged for teaching and learning as they involve different forms of expression and are linked to multi-modality. In this study emerging technologies such as the ZEduPad form one of the many communication channels people use for expressing themselves. Contrasted with traditional and transmission classroom pedagogy multimodality offers a range of perspectives, together with cultural and linguistic diversity exhibited in teaching approaches. In fact, in their home environments, children play and encounter multimodality in the items with which they play.

Multi-literacy is therefore a direct incorporation of diverse modes of communication. Its advancement is owing to novel technological advancements (Sandvik, Smordal, and Osterrud, 2012). The current perspective on literacy encompasses skills needed in the touch-screen era (Pacino and Noftle, 2011). The caption accompanying Figure 2 is testimony to the multimodal developments which form an integral link between literacy and technology (Sandvik et al., 2012; Walsh, 2010). Notably, a social shift has occurred, in which learners across the globe are viewing diverse texts via different modes, from print to touch-screens (Sandvik et al., 2012; Walsh, 2010). The upshot of this is that current texts have become sharply unstable when compared to the traditional mono-modal approaches to the teaching and learning of literacy. This is a consequence of how literacy is presented to children in- and outside the classroom (Kress, 2005).

Such changes have transformed the way learners are now learning about reading and writing (literacy) as they encounter these in various multi-literacies and modes such as music, images, sounds, graphics (Walsh, 2010). Consequently, technologies such as the emerging iPad technology encompass most of the sounds capable of presenting learners with authentic literacy materials. Materials may be presented in more than one mode on an iPad such as the ZEduPad.

3.3.2 The Multimodal approach

According to Bauman:

> (Multimodal literacy) focuses on the design of discourse by investigating the contributions of specific semiotic resources such as language, gesture, images co-deployed across various modalities such as visuals, aural, somatic as well as their interaction and integration in constructing a coherent text. (Bauman, 1998)

One of the most remarkable developments of today's "global fluid" (Bauman, 1998) society is the reconstruction of the communication and representational resources of images, actions and sounds in new multimodal assemblages. In Castells and Cardoso's view (Castells and Cardoso (2005) and Castells, (2001)), the global society is networked to the extent that it supports the emergent information economy. The latter they argue, is formed by the social as well as the technological powers of late capitalism. It is these paradigm shifts and this growth that have pointedly affected communication in the 21st century.

The topography of information and communication has therefore evolved radically, extending from educational institutions to the ubiquitous aspects of daily lives. Luke and Carrington make the point that it is more the fact of, and less the rate at which these multi-dimensional changes are taking place that matters (Luke and Carrington, 2002).

From within the concerns created by this milieu, the section that follows explores classroom multimodality with regard to literacy, as well as activities that reconfigure literacy in the classroom. In it I enquire what it means to be literate on 21st century technological terrain, and why digital literacies matter in the classroom.

3.3.3 The Significance of Digital Literacies in the language classroom

Speaking of the importance of digital literacies in the 21st century and in the language classroom is arguably like talking about the importance of today's agricultural technologies for maximised production. In this period, language teachers (especially of English) are called to work in the sphere of global communication. This is because being a language and literacy teacher exerts the stress of lifelong learning necessitated by information and communication technologies (ICTs) and the acquisition of skills in all spheres of learning around the globe (Crystal, 1998). Largely this is because communication is progressively digitally mediated.

Thus, Zambia like many other developing countries realises that if we are to prepare future leaders through education to function fully in the 21st century, our learners should be digitally fluent and skilled.

From this perspective, promoting digital skills thus requires that we integrate these skills, as with teaching English as a second or foreign language. The teachers with whom I interacted during the data harvesting, asserted that integrating literacy with digital skills would assist several of our language learners. They expressed the view that it would prepare learners for their eventual work-place and improve their access to potential employment opportunities. Additionally, the teachers argued that digital literacies could make literacy teaching a little more authentic, relevant and interesting provided they themselves were digitally fluent (Chabinga, 2015).

Jenkins brings a particular slant to the discussion when he states that "(w)hat students do in their online lives has nothing to do with what they are learning in school, and what they are learning in school has little or no value to contribute to who they are once the bell rings"

(Jenkins, 2009). However, by integrating digital literacy activities with literacy teaching, the latter becomes a little more relevant to who the learners are when they are outside the classroom.

As Kress (2003) remarks, it is increasingly difficult today to imagine literacy as separate from competence in wide-ranging technological, social and economic domains. In fact, two divergent but associated factors have to be emphasised: one is a broad move from the long-standing supremacy of writing to the new dominance of the image. Another is the shift from the supremacy of the book as medium, to the dominance of the touch-screen as a medium.

These two factors are creating a revolution in the effects and uses of literacy and related ways of representation and communication at all levels. My points here are that the way we present knowledge is by selecting the mode and medium, and that what we select is important to the subsequent construction and instruction associated with that knowledge. The form of knowledge representation is an integral aspect to meaning making (Kress, 2007) as a semiotic resource.

So ZEduPads were highly recommended as a resource for teaching literacy in rural areas. The hope too was that these tools would promote social interaction among the learners.

3.4 Literacy as a social practice: An Extended Meaning

As hinted at earlier in this Episode, literacy is best understood as a set of social practices observable in events which are mediated by written texts (Street, 1995, 2006). Clearly, seeing literacy as a social practice offers a powerful way of conceptualizing the connection that exists between the activities of writing and reading and the social structures in which they are embedded. Moreover, literacy studies have long challenged notions of literacy as the decontextualized skill set (Barton, 2006; Street, 1984) it had previously been perceived to be.The social process or practice is a concept or theory in Psychology that attempts to establish the link between practice and context in social situations. Social practice which emphasises a commitment to transformation, occurs in two general ways: activity and inquiry. According to Smolka, the fact that the social process is frequently employed in the framework of individual advancement, means it must involve knowledge generation along with the theorization and evaluation of both institutional and mediation practices (Smolka, 2001).

In trying to understand and create a decent life for all regardless of background, Sylvia Scriber (1923-1991) used anthropological research and psychological experiments to probe individuals' mental function and construction in differentiated social and cultural contexts. Against this backdrop, Scriber selected a moral orientation to enact social change and community advancement. Her focus was to find out how the interaction between historical and social conditions of various institutional settings, and human social and cognitive functioning and advancement. The basis for her research and similar studies confirmed that social practice is indeed a space and place where participants enact and negotiate meaning.

Social Practice as Activity (SPAA) thus includes involvement with communities of interest. This entails developing connections amongst a community of practitioners in which there continues to be an emphasis on the abilities, knowledge, and comprehension of individuals in relation to their personal, family, community, and working life. Within this strategy or social process, activity is employed for social transformation without bearing the imperative of research. The Activity concept proposes reliance on a system of individuals who perform tasks involving a physical object or objective, which brings about some transformation in the local community (Hung, Tan and Koh, 2006).

In research, Social Practice as Inquiry (SPAI) aims to incorporate the individual in his or her surroundings whilst examining how context and culture link to the prevalent behaviour and practices of the person. Inasmuch as social practice is an activity in itself, this kind of inquiry emphasises how social activity happens, and pinpoints its primary causes and results.

It has been proposed that social research be guided by a particular theory in which study applications are explained, not through philosophical models but through investigators' obligations to particular forms of social action (Herndl and Nahrwold, 2000). In other words, each study would be designed according to a unique theory of social practice.

In education, literacy as a social practice increasingly focuses on community transformation and lifelong learning. Reading and writing, and numeracy are viewed as sophisticated abilities instead of easily fixed basic competencies. Therefore, the social interactionist technique in language and language acquisition typically takes us clear of any understanding of language as an impartial meaning system – a channel or conduit which transfers pre-specified connotations from sender to receiver.

The import of this view is that language is not impartial and meaning hardly ever pre-specified. Each time we communicate, write, or apply any techniques for communication, we make decisions that are not arbitrary. We construct our communication to fit our motives, our constraints and prospects, our position and our relationships. This is what is meant by interpersonal language or language activity evaluated as social practice. Language may be seen as the most powerful component of the social process and practice at personal, party and institutional stages.

Given these complications, similarly persuaded, authors such as Rodriguez Illera (2004), and Scribner and Cole (1981) have asserted that literacy ought to be comprehended not quite as a 'state' which one was able to achieve, but rather as a 'process'. Illera (2004) proposes that individuals reconsider or reconceptualize the term 'literacy' as 'literate practices' instead; in other words, as 'a practice and not merely as a state, and (that they emphasize) its various character(-istics), ... most importantly, its sociable dimensions.' (2004, p.58-59).

Illera goes on to quote Scribner, and Cole, (1981) who state that: "Literacy is not merely learning how to write and read a particular textual content but instead the effective use of this awareness for specific purposes in specific contexts." This appears to address Kress' dilemma about literacy's connection to knowledge; it foregrounds the social context which a great number of authors on literacy consider essential. It does not however, move far from a knowledge-centred concept of literacy.

It becomes clear that literacy as Social Practice (LPS) is a modern view of literacy which acknowledges that the meanings represented in oral, written and visual texts are not decontextualized but rather, socially constructed and situated (Diaz, 2007, p.32). Scholars who support this view argue that actually, early literacy development theory has evolved to recognise the importance of social practice (Feiler, 2005). For instance, Rivalland draws attention to the point that indeed social practice is shaped by the cultural context in which learning takes place (Rivalland, 2004).

Together these views contribute to the argument that a perspective on literacy must take into account the social practices and situations that surround our daily use of the text and this includes listening, talking, critiquing, viewing and drawing. Literacy is a social tool that we use on a daily basis. Thus, it does not exist in isolation but rather reflects political and social agendas (Diaz, 2007).

Jones Diaz argues that many of the literacies we use on a daily basis are multimodal and technologically based, and therefore require a collage of visual, audio and graphic forms of textual representation. Likewise, the New London Group (NLG) (Cope and Kalantzis, 2000) states that literacy practices are not limited to print but include Multimedia and Information Technology. They coined the term 'Multi-literacies'. Old notions of what literacy is are questioned, old authorities challenged and long-sanctioned narratives of what has been and will be, reviewed. Current trends regarding literacy in the postmodern society constitute a rejection of mere acquiescence to old conventions. Postmodernism favours open spaces that are influenced by multi-perspectival responses, heteroglossia and the sharing of various points of views.

These points will be explained in the section that follows.

3.5 Postmodernism and Literacy

Postmodernism like many other terms is a difficult concept to define. It marked a significant departure from modernism's utopian aspirations that had been determined by principles of clarity and simplicity.

Postmodernism initially made an appearance as a philosophical expression from the book The Postmodern Condition (1979) by Jean-François Lyotard, the French thinker. It is a late 20th-century style and concept in arts, architecture, and criticism characterized by the questioning of earlier styles and conventions relative to new ones. It is a movement in favour of a fluid, novel and anarchic collage of anonymous experiences.

At its very best Postmodernism champions the phenomenology of lived experiences and exposes the trajectory of power generated by top-down personality-cult regimes as well as their fraudulent historiographies. Postmodernism signifies a response to the theoretical idealism of modernism (Parton and O'Byrne, 2000). It queries a perception of inequality, which typically forms from the idea of there being structural commonalities amongst communities: "A postmodern perspective rejects objectivism and absolutionism and stresses pluralism, relativism and adaptability," (Greene, 2009; Pardeck, Murphy and Meinert, 2012). It is a movement framed by a social constructionist theory of knowledge. Its emphasis is on transforming the perceptions and fixed ways of looking at reality as objective, by applying plural perspectives to orientations and to points of view (Berger and Luckmann, 1991).

At the heart of postmodernism is a view that "the social arrangement for literacy learning is neither natural nor unchallengeable." This view is established on the critically involved and socioculturally grounded studies of literacy.

As opposed to the modernist or structural perspective of the social world, the postmodernist one offers the view that our experiences of the world (reality) are largely socially constructed and can therefore be deconstructed and reconstructed in an ongoing human enterprise. This is a shift from seeing the world as an objective reality. It is different from a philosophical notion that reality exists separately from any human consciousness to perceive it (Mead, 1927). The postmodern view, therefore, perceives people as agents implicated in effecting change in the social as well as institutional contexts.

Within the context of the postmodernist world it is imperative to deconstruct current pedagogical practices in the teaching and learning of literacy. A key reason is for this is the pervasive influence on literacy pedagogy through the continual development of 'new technologies'.

A deconstructionist approach is a way of examining texts in an attempt to understand how social life is linked to power. As a mode of inquiry, it closely examines artifacts such as photographs, legislation, school curricula and technology to determine what these reveal about structure and ontology (existence) (Guinier and Torres, 2003). It is thus one way of explaining and interpreting received understandings and meanings of the world (Guinier and Torres, p. 35) as represented by cultural artifacts. In other words, it an attempt to perceive them (artifacts) not as neutral objects but rather as semiotic markers and products of a particular social context.

Furthermore, the postmodern approach to literacy is a way of disrupting older linear notions or structured practices of learning literacy. As Brian Street warns, viewing literacy as mere technical skills to be learnt decontextualises literacy as expounded in the autonomous mode of literacy (Street, 2003, p.77-85). Thus, researchers who are responsive to a postmodern approach and sensitive to the sociocultural views of literacy as social practice endeavour to embrace the diverse influence on literacy of cultural artifacts such as technology. By implication, postmodernism helps teachers to deconstruct their current teaching strategies that tend to deploy pre-packaged ways of language and literacy learning.

In my view, rather than an extension, modernism and postmodernism create a space for novel innovation, then oscillate and swivel between the traditional (old) and the New Pedagogical Approaches (NPA). The novel space is valuable because it allows for discussion, reflection and often movement towards transformative pedagogical practices. With respect to literacy and literacy teaching, it is therefore inevitable to think in multiple and novel ways about keeping up with current changes in educational practice through advancement in technology. Figure 3 that follows, illustrates this idea visually.
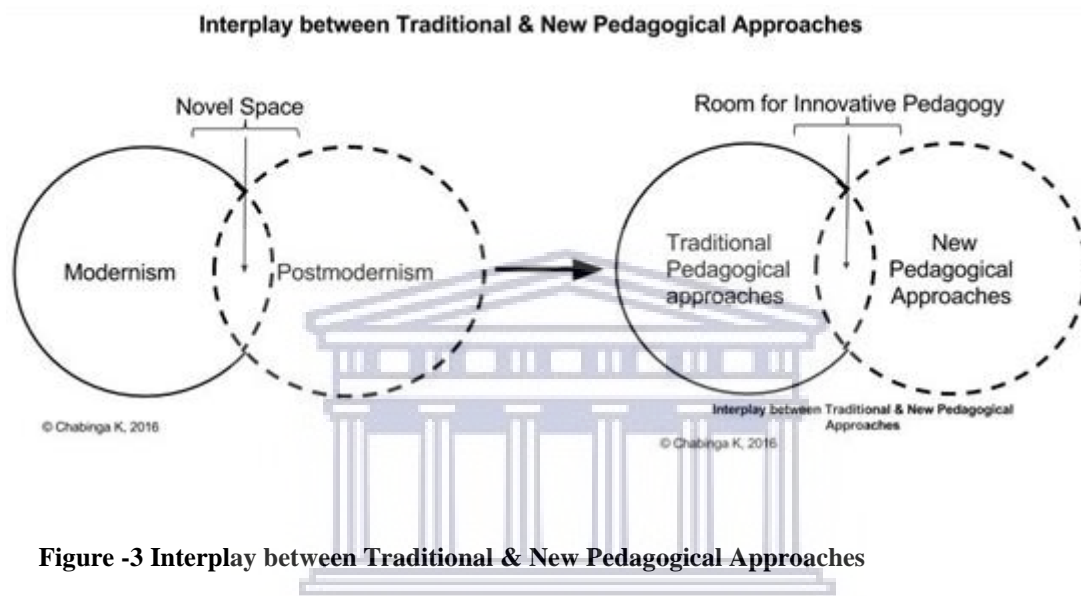
Figure -3 Interplay between Traditional & New Pedagogical Approaches
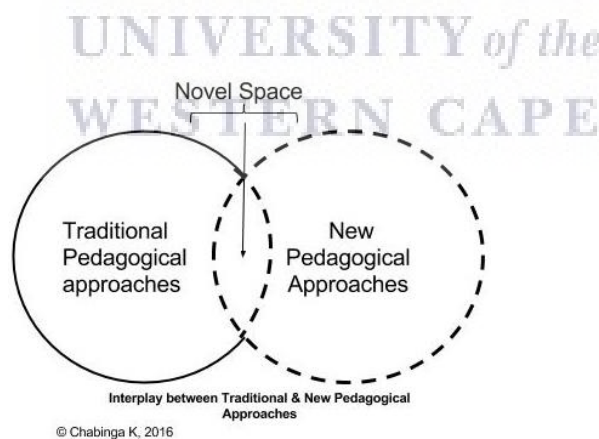
Figure 4 New Approach

In an information age, collaboration, engagement, inventiveness, problem-solving and lifelong learning are some of the most highly sought-after skills in the 21st century. These

skills enable an individual to gain socio-economic standing and to participate fully in society. It is indisputable that technology has the potential to stimulate and foster such skills.

The instructional use of emerging technologies such as the iPad appears to be a viable opportunity for Zambian primary schools, a context in which teaching is usually done by rote. However, the successful use of emergent technologies requires that teachers possess digital fluency, competency and appreciation of its instructional attributes as well as its affordances for teaching and learning. Consequently, in the discussion and investigation of the role and use of iPads as teaching tools, I contend that while emerging instructional technologies are an indispensable feature of the instructional constructs in the net-generation, teachers' lack of digital competency and fluency in teaching and learning hinders integration.

Furthermore, teachers' lack of e-Pedagogical skills and their inability to design authentic learning materials reduce the potential of technology. What adds to the challenges is the absence of an educational ICT policy that may have provided guidelines for the integration of technology into curricula. This presents yet another drawback.

The value of this research lies in the realisation that illiteracy in Africa – particularly in Zambia – could be eliminated through the devices available in the information age. Education therefore, is a conduit through which this task may be realised. One way of doing so is by recognising the learner's potential to play an active role in constructing their own views of the world through educational processes. Thus, iPads are a strong launching pad for this exploration of the world, especially when supported by concepts that facilitate literacy development.

In the next section, I highlight some language learning theories that illustrate how an understanding of language learning and acquisition may be improved by making connections with emerging technologies. Appreciating these theories provides sufficient basis for understanding the premise of the theories underpinning this current study.

3.6 Interdisciplinary Learning Theories and Technology: An Appraisal

This section introduces the interdisciplinary concepts which form a basis for understanding the significance of the study. If new teaching practice and policy-making is to evolve in Zambia, I argue that it is crucial to investigate the role of emerging technologies for language and literacy development. This section thus introduces the theoretical framework. It is based

upon the Comprehensive Input Hypothesis (CIH)[7] by Steven Krashen and the Affordance Theory (AT) by James, J. Gibson. It establishes a conceptual paradigm for the discussion that will explore the inquiry at greater depth in Episode 4.

Hence, in a quest to triangulate and strengthen my argument, two other theories – the Interactionist (IT) and the Actor-Network Theories (ANT) – are discussed in Episode 4. I argue that an interdisciplinary approach to teaching and learning, specifically language and literacy development, potentially fosters and stimulates multifaceted critical intellectual abilities. Until recently (see policy trajectory) when the Zambian primary curriculum was pre-loaded on an iPad technology, only a few selected schools taught computer studies – as a subject separate from the rest of the curriculum (Ministry of Education Science Vocational Training and Early Childhood, 2013).

In my view, this is an illogical practice because technology is intricately intertwined with virtually all areas of daily human activities. The practice of teaching technology as a separate subject perpetuates and maintains misconceptions regarding the state of affairs in a technologically saturated world. The focus should be what learners could do if the technology is placed in their hands.

According to Gagné (1974) the primary concerns of instructional technologies are how learning resources could be effectively applied to enhance learning. Generally, in most conversations about using technology in teaching, learning challenges continue to present themselves (Bransford, Brophy, and Williams, 2000). Seeking the connection between learning theories and technological innovation is at first glance an interesting undertaking which presents potential significance for both instructional theory and practice. Nevertheless, working with this challenge involves a sophisticated level of engagement with numerous questions concerning the connection between learning theory and technologies (Perkins, 1991; Salomon and Ben-Zvi, 2006).

A discussion on theory raises questions relating to those which have been selected for this study and the reasons involved. Do learning theories refer to hybrid constructs? Might they present eclectic new designs? Might they simply represent sound judgment practice? How should technologies be conceptualised when used to reinvigorate learning activities?

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[7]Krashen (1972) " 'comprehensible input' is the crucial and necessary ingredient for the acquisition of language."

In response to such questions this study seeks to break new ground because there is limited or no research in Zambia which addresses them adequately. However, a body of existing knowledge about specific practices in ESL and other subjects has been conducted on the role and use of emerging technologies for literacy development in ESL. It is thus hoped that this research study will contribute towards the latter initiatives.

An interdisciplinary approach continues to generate significant discussions and debate as an enriching departure from and modification of standard programmes (Lindbeck, 1972). Arguably, technology should be seen as a set of cultural tools that foster 'creation, utilisation and behaviour of adaptive systems in relation to humans, their society as well as the life-giving and life-sustaining environment' (International Technology Educational Association, 1988, p. 10). However, for a long time this view has been narrowly focused on and aligned with only such subjects as mathematics and sciences. This is evident in many, if not all schools in Zambia.

It is a state of affairs which I argue implies that academic disciplines which deal with aspects of human culture (humanities) are not seen as relevant to technology integration in education. As a cultural invention, language is premised on the technology of communication thus deeming the role and use of technologies in teaching and learning inherently interdisciplinary and significant to the way people acquire knowledge.

As I discuss the link between learning theories and technologies, I pick on two or three interdisciplinary approaches that are contextually concentric. It is important to note that the evolution in modern society and instruction has influenced the choice and application of learning theories and technological innovation, and is interwoven with information and knowledge.

Instructional technological innovation has changed learner assistance from being program or teacher directed towards representing a much more learner regulated distribution of control. Efforts in adopting an interdisciplinary approach to education have escalated in the last half of the 20th Century. In this period, through experiments think-tanks fostered teaching and learning theories that promote contextualised notions of meaningful learning grounded in experience. Theories such as linguistic theory, constructivism, situated learning, as well as experiential learning are widely acknowledged as approaches that support concepts of integrating ideas with problem-solving technology.

Thus, what follows is an exploration of certain learning principles that support authentic instructional practice while using technological innovation.

3.6.1 Social or Situated Cognitive Approach

The terms Situated or Social Cognition (SC) or Social Learning Strategy (SLS) or Social Learning Principle (SLP), here used interchangeably, describe a learning principle which sustains the concept that learning happens only if located in a particular context. It is based on the conviction that learning occurs within a learning community of practice, in which the learners take a productive position within the learning community. It requires the practice of interaction involving the learners in the community, the various tools accessible within the particular situation as well as the physical world. Knowledge is thus situated within this particular lively engagement, this interaction (irrespective of whether with tools, artifacts or any other individuals). Consequently, because the learners get involved and interact in the new situation, their knowledge of the subject improves.

Cognition involves the actions learners take in the local community, whether this is a physical or a reflective process on the part of each independent learner (Myers & Wilson, 2000). Wilson and Meyers state that "the growth and development of knowledge and competence, like the growth of language, entails ongoing knowledge-using activity in authentic situations" (Myers and Wilson, 2000, p.71). In particular, SC also takes into consideration the way of life of the local community and "treats culture as being a highly effective arbitrator of learning and practices, for both learners and teachers" (Myers and Wilson, 2000, p. 83).

The social learning strategy (SLS) places great importance on discovery together with other individuals, by way of social connections, face-to-face or in a group. One drawback of this method is the fact that individuals do not replicate everything they see but have a tendency to become selective with regard to what they decide to replicate. As a result it is essential for some individuals to display the most effective practice while using this method of instruction and to detect flaws swiftly. The social learning method thus takes into account mental processes and appreciates the part they perform in determining when behaviour might be imitated or not. Therefore, SLS offers a more in-depth description of individual learning by realising the function of mediational procedures.

For example, Bandura's (1991) 'Social Cognitive Principle of Self-Regulation' claims that social learning can be a highly effective lever for transformation. He believes that when learners are provided with the opportunity to watch others, they immediately process new awareness and do something about it based upon the essential regulators that include moral expectations and self-efficacy. In the mind of the learner, they are merely participating in a social exercise, but in fact, they are subconsciously learning (Vygotsky, 1962; Marsick & Watkins, 2001).

In experimenting with how social learning impacts on learning, Albert Bandura developed an experiment to demonstrate just how much societal influences stimulate young children. The most famous experiment on the modelling of hostility is Albert Bandura's Bobo doll experiment (Boeree, 1999). To carry out the test, Bandura employed technological media. Nursery school children observed a show in which a grown-up female or male model attacked a clown. The children independently then obtained an opportunity to 'play' with the Bobo doll without the need of mature supervision (Griffin, 1994, p. 372).

The experimental information was surprising in how it revealed that a television clip can so strongly stimulate children. Since children from the control team did not typically say and do these things, the test revealed that the children experienced new, aggressive tendencies by having viewed the film (Griffin, 2014, p.372). The experiment put into perspective what Bandura had assumed, leading Bandura to conclude that reinforcement does not modify the learning of novel responses. Nevertheless, it does 'determine whether or not observationally obtained capabilities are going to be put into use' (Griffin, 2014, p. 373). Children ended up highly influenced by watching various kinds of behaviour from the media channels, which confirms that media channels exert societal influence.

So, what exactly is the function of technology in this particular emerging theory of learning? As previously stated, action is required to enable cognition to take place. This course of action has to be held within a community of practice or learning community. This action frequently involves interaction with tools as well as artefacts that are located within the community (Myers & Wilson, 2000). These resources, as well as artefacts, are crucial elements in the learning process. Without these elements the interactions that they can generate, enable or stimulate, might not happen.

Hence, within this particular learning principle technology is a part of the educational ecosystem that assists in creating knowledge. Myers and Wilson (2000) point out, "These resources and constructed settings represent the channels, forms, or realms by which knowledge occurs. Problem-solving entails thinking about purpose in connection to the resources and tools which a scenario affords." (p.71). They argue that learners who are placed in this kind of learning atmosphere could utilize their "skill and knowledge by thinking critically, implementing knowledge in new scenarios, assessing details, understanding new concepts, communicating, collaborating, resolving challenges, generating decisions." (Honey et al., 2003, p.9) This learning principle sustains the skills essential for the 21st century.

Vygotskian researchers view cognitive development a heightened capacity to manipulate signs (primary language) both for social and psychological capabilities. Modern anthropologists view culture, language, reading and writing as elements of an incorporated symbolic system, jointly constructed and dynamically developing with new everyday living encounters. Anthropologists view literacy as comprising not merely technical knowledge, but also social norms and principles, guiding its use. For this reason, anthropology and psychology share a concern for the function of culture in literacy acquisition. This thesisreport shows that the incorporation of theories from each discipline can significantly enhance our knowledge of how specifically culture impacts on our reading and writing. It shows two case studies where the research of culture was improved through the interdisciplinary technique proposed here.

Technologies offer innovative techniques to generate social learning environments. Technological devices enable interaction and opportunities to observe other people. Human anticipation, values, psychological tendencies and mental capabilities are created and improved by social effects that communicate information and trigger psychological reactions because of modelling, teaching and social persuasion (Bandura, 1989, p.3). Learners are continuously affected by social impact regardless of whether it occurs due to community influence or simply media pressure.

Regardless of the model, the fact that influence is exerted remains. Humans have developed a sophisticated ability to engage in observational learning that permits them to broaden their skills and knowledge speedily via information communicated through a wide selection of models (Bandura, 2008, p.96). There are different types of models both instant and distant

that socially impact individuals' learning or cognition, and modelling is often a significant element of the social learning principle.

In social cognitive theory, gaining knowledge from the consequences of actions is a unique event of observational learning. To learn by direct experience, individuals create concepts of habits from observing the results of their actions; in learning by modelling, by contrast, they obtain the concepts from watching the construction of the behaviour becoming modelled (Bandura, 1989, p. 46). Gaining knowledge from the outcome of actions taken by other individuals can directly influence one's options. Any element that impacts on behaviour can significantly modify the path of individual progress. This is due to the 'social consequences of operating in determined settings which continue to enhance particular abilities, beliefs, and pursuits long after the decisional element has delivered its inaugurating influence' (Bandura, 2001, p.10-11).

On the strength of this argument, technological innovation is a wonderful medium for engaging learners actively. Through technological innovation in addition to having time for reflecting and sharing, individuals have the opportunity to construct meaning based on the learning they may have acquired. This implies that constructing meaning originates from interacting with others to clarify, defend, explore, and analyse our thoughts and challenge, query and grasp the concepts of others (Sherman & Kurshan, 2005, p.12). Social interaction generates learning wherever learners are enabled to apply meaning and to comprehend thoughtfully. This, however, is not decontextualized from the environment, and in this respect is thus consistent with the tenets of constructivism.

3.6.2 Constructivism: From Individual beliefs to theoretical principle

Learning designs, according to the constructivists, attempt whenever possible to integrate instruction with the reality in which the learner will function. For this reason there are realistic sessions in virtually all subjects within the constructivist learning principle. The most beneficial instance is through school curricula in which the pupil is expected to embark on a professional attachment so that they get to experience that actual environment. This ingestion of the real work environment is designed to engage yet still 'time-challenge' the learner whenever possible (Pavlova, 2005). As outlined by John (2005), both the environment and the activity of learning ought to reveal the complexity of the real out-of-class setting.

Learning, as outlined by the Constructivist principle, happens as a result of stimulating an individual's thoughts. Accomplishing this enables learners to contemplate how their new thoughts, actions and encounters become a construction of their own psychological models. The primary difference between the behaviourist and constructivist methods is that in the former a person perceives the learner to be a somewhat passive store of knowledge while the latter affirms the learner as an indisputable active inventor of their own knowledge. In reality, most circumstances appear to call for a combination of the two.

Learning by performing and active participation are essential to the constructivist model (Bredo, 132). Consequently, the process of active engagement in online chat might constitute a replication of what is valued in a constructivist model. An online program might have an influence on the education of learners due to the active participation required in online interactions. For some individuals, active involvement might be challenging or undesirable for various reasons. For many, discussing study course subjects on the internet may turn out to be an entirely different encounter than interactions in a face-to-face setting.

In reality learning activities within a social constructivist instructional setting are based on shared activities involving teachers and learners who are equally exploratory and collective (Wells, 2000). In this framework both learners and teachers are believed to be active brokers regarding knowledge construction.

As indicated earlier, constructivist learning has evolved into a very interesting method of teaching. Based on Vygotsky's ideas, learning happens through interaction with the natural environment along with the individuals it. In constructivism, 'knowledge' is actively created by learners as they are attempting to make sense of their experiences (Perkins, 1991). The constructivist method also draws attention to the significance of context in learning (Duffy and Jonassen, 1991). It highlights the incontrovertible fact that gaining knowledge might be realised through participating in purposeful actions, knowing that learning is often a continuing, life-long practice as a result of working in specific situations (Brown, 1989).

Technologies could improve learning if the devices are carefully presented through a pedagogy put into practice in a properly organised, learner-driven curriculum. As proposed by Riel (1990), new resources like those offered by technology do not transform instruction abruptly. Constructivism is a learning principle that concentrates on knowledge and examines how individuals learn. It demonstrates that individuals create meaning via their interactions

and encounters in cultural settings (Manus 1960). Additionally, it highlights the value of preceding knowledge in learning and ways in which prior experiences contour subsequent behaviour. This implies that learning is centred on learners modifying their intellectual style to support new experiences.

To be able to comprehend how learning takes place within a constructivist approach, an entire learning ecosystem should be screened. However, the expansive diversity of constructivist landscapes makes the undertaking complicated and takes it beyond the scope of this study. Still, this paradigm highlights the position of the teacher and the learner in relation to the social embeddedness of learning (Duffy & Cunningham, 1996; Honebein, Duffy, and Fishman, 1993; Simons, 1993).

With these parallels as pointers, this study shows the connection between constructivism and other interdisciplinary theories, with emerging technologies by making the following points: (a) technology consists of cognitive tools; (b) technology represents a constructive approach to the practice of thinking; and (c) technology revitalises the position of the teacher. The constructivist method stimulates higher-level thinking abilities. It does so through the utilisation of emerging technologies, for instance, blogging platforms stimulate constructivist-learning concepts within the classes. IPads can be viewed as 'intellectual partners' in the collaborative learning process, to enhance critical and higher levels thinking (Voithofer, 2007). By employing visuals, photographs, animation and videos, learners acquire layout skills and create projects at a sophisticated level.

An application of the constructivist method along with the utilisation of emerging technologies such as the iPad thus offers learners a "complex laboratory in which to watch, query, practice and examine knowledge" (Dillon, 2004). Working through constructivist pedagogy to facilitate the utilisation of technological innovation motivates teachers and learners to focus on the best way to think and comprehend, in lieu of the memorization of tracts of information.

From a constructivist standpoint, learning is not the stimulus-response phenomenon it is defined as being by behaviourists. According to a basic constructivist principle, the learner takes a dynamic position in building their knowledge, rather than 'obtaining it' from someone who is thought to 'possess it'. Asvon Glasersfeld (1995) states that a constructivist approach entails self-regulation and the construction of conceptual constructions via reflexivity and

abstraction. Apart from effectively realising the intellectual elements of learning, an essential focus of the constructivist principle is situated learning This means that learning is contextual, and content is placed in an established situation; it means the process of education considers the learner's values and their perception of knowledge (Ernest, 1995).

Hence, learners discover by observing, assimilating and interpreting, individualising the content into knowledge. In line with constructivists, learners experience information through the exclusive individual perspective of their prior experience.

Basically, constructivist principle prides itself in locating the teacher's role as a provider of possibilities and experiences for learners through which to learn. The primary objective of the facilitator is to create an alternative support in the learner's mental framework or their means of knowing and arranging the world. Rather than instructing, the teacher facilitates and guides learners to draw their personal conclusions. In keeping with this principle, De Vesta (1987) suggests that teachers offer learners a learning ecosystem that could assist and challenge their thinking. Teachers assume the role of facilitators who support learners in achieving their personal comprehension of knowledge (Bauersfeld, 1995). They attempt to give learners control of their learning practice as an opportunity to be/become effective or critical thinkers.

For the social constructivist principle, cognition and learning happen in a dialectical partnership with the social world, in which particular case dialogue is implemented to fix mental discord. The consequence is that this generates higher levels of intellectual functioning. Conflicts are remedied via a social approach and knowledge is one thing that is dispersed across, amongst and within persons as well as the group. In this case, knowledge is not transmitted from the social world to the novice, but is appropriated and modified as people connect with other individuals through an engaged approach to learning (McMahon, 1997). Consequently, understanding is emergent because the learner operates in the social context and the social context acts on the learner.

The learner in a constructivist paradigm is regarded as an independent, intricate person who has specific needs and a particular background. The historical and past experiences of the learner thus model the skills with which the learner designs and discovers during the exploratory course of action (Wertschs, 1997). The learner is an active and dynamic participant in the construction of new knowledge and understanding on account of their

experiences and interactions with other individuals (Glasersfeld, 1989). The pursuits, ideals and historical past of the learner have emerged as a fundamental part of learning, given that these elements engage the learner through the process of learning.

By employing technologies within the constructivist educational setting, teachers will engage learners in the lessons a lot more actively, perform collaboratively and create more complex thinking abilities. Constructivists assume that technologies ought to be utilised by the learners as resourceful tools to investigate, challenge, remedy, and provide new information (Kress, 2003, 2007). When this is accomplished, the learners may then apply their unique new understanding to new contexts and tasks. The constructivist method, therefore, facilitates child-driven discovery, and through the newest technological innovations offers young children the facility to access information instantaneously. Thus, this positions them to be completely in charge of any information to which they may gain access, and the manner by which they might obtain such information. It shares concentric foundations with sociocultural theory.

3.7 Episode Summary

This Episode highlighted literacy as a socially contested construct. In discussing literacy acquisition, an attempt was made to explore several literacy definitions. This included how a change of meaning in the face of globalisation and the information age more generally, affects literacy acquisition today. Following this, approaches to literacy acquisition such as the idelogical and autonomous, plus the functional, transformative and the sociocultural approaches were highlighted. This was followed by an acknowledgment of the many forms of literacy acquisition in the 21st century, such as multiliteracies, transliteracies and multimodalities.

Several learning theories were discussed to provide the outline of a framework for this study. These included the social cognitive, constructivist, linguistic theories, and the principles of neuroplasticity. It is hoped that introducing these theories would provide a broad understanding of what language learning can entail.

Central to the framework are two theories which give structure to this study, namely the InPut Hypothesis and the Affordance theories. These were discussed to highlight a broad picture of literacy acquisition in the context of the use of ETs for education, and hence for literacy development.

EPISODE 4: TILLAGE IMPLEMENTS: THE THEORETICAL FRAMEWORK

4.1 Introduction

In the previous Episode I focused on the term literacy to assess how it and associated terms such as literacies and trans-literacies have come about in the information age of rapid transitions. I argued that reconceptualizations of literacy in the 21st century have influenced the classroom and the way in which literacy might be perceived and taught. Hence, some theories of learning were foregrounded to introduce the tillage implements in the form of theories that underpinned this study, namely the Comprehensible Input and the Affordance Theories.

In the quest to explore the objectives of this study, the role and use of ZEduPads as an epistemologically enabling artefact to literacy access and skills development, I revisit the theories that underpin the investigation. Through focussing on the tools that make acquiring literacies possible and accessible, I examine certain theories that open multi-directional windows and exploratory opportunities in the information age. This is especially relevant in developing countries such as Zambia.

It is important to state, as reflected throughout, that this study is not committed to solo theories of language learning but rather is interested in a multidisciplinary approach regarding the role and use ZEduPads have in enhancing literacy performance levels in primary schools in Zambia. Thus, this Episode examines theories of literacy development from a multidisciplinary perspective. To reiterate, Comprehensive Input Hypothesis and Affordance Theory underpin my study.

While the Input Hypothesis Theory has been used in discussions about language acquisition for decades, the theory brings a new dimension to this study in that it focuses on the use of emerging technologies to enhance input for literacy acquisition. Here the aim is to see how teachers use emerging technology to facilitate comprehensive input in literacy development. The i+1 formula (Krashen, 1985a) is of particular interest to this project as it advocates input must be on a slightly higher level of linguistic competence than that which the learners possess at the time.

The current study is an attempt to probe emerging technologies and their affordances for multimodal and semiotic possibilities (Chen, 2013; Hammond, 2010; Van Lier, 2000). In the classroom, technology has clearly taken the traditional and transmission pedagogical approaches into an information age in which teachers are now working with multi-modal and semiotic digital tools to enhance the teaching and learning of literacy.

One of the positive effects of emerging technologies on the acquisition of literacy is the amount of one-way comprehensible input available. This is especially true in the case of disadvantaged rural children. Based on Krashen's (1985a, 1985b, 1994) input hypothesis, language acquisition can take place when the amount of one-way input received is comprehensible.

Furthermore, what is particularly interesting about the input hypothesis in relation to the current study is that language acquisition can be reached at a higher level with the additional assistance of ETs taken from adequate and appropriate comprehensible input. It is highly probable with the aid of emerging technologies that teachers can provide literacy learners with comprehensive input for effective literacy development. Therefore, I argue that the Input Hypothesis together with the Affordance theories are crucial to facilitating and enhancing interaction on a social platform. Speedy literacy acquisition may thus be enabled by ETs. Within the two theories, are woven other relevant conceptual frames, such as the actor-network and the socio-interactionist theories.

In the section that follows, I focus on the main theories underpinning this study – the Comprehensive Input Hypothesis and the Affordance theories. I then examine how these borrow concepts from multi-disciplinary approaches. The discussion is an attempt to explain how literacy development can be achieved for maximum results through comprehensive input.

4.2   Problematizing Input

In my quest to understand what the research process produced, I found it important to foreground significant questions concerning input, such as: What counts as input? Why is it important? Input is arguably pivotal to language acquisition for the development of an essential mental or perceptual system of representation. A possible rationale for this, albeit not conclusive, may be seen in theoretical and evidential dimensions. Loewen and Sato argue that language acquisition is theoretical since the innermost "processors as well as the

architecture" accountable for language operate on a particular form of data only (Loewen and Sato, 2017). This is consistent with the information processing theories on input (Bransford, Franks, Morris and Stein, 1979; Morris, Bransford and Franks, 1977), and it is similar to the analogy of the highly selective bar code scanner – explained in more detail later(Loewen and Sato, 2017). Both theoretical positions analyse the manner in which learning takes place, with a special focus on the way the memory encodes and decodes material.

The basic and key concept of the information processing theory relates to how the human mind can be equated to a computer or an information processor. As indicated earlier, this is dissimilar from the behaviourist concept whose claim is that people simply respond to stimuli. In equating thought processes and the brain's mechanism with that of a computer, they argue that the human mind receives input, and prepares it for the output.

This line of thought was developed by Craik and Lockhart (1972) who highlight that any information input is processed or expanded upon variously through attention, labelling, perception as well as meaning-making, which in turn affects how that particular information is retrieved later on. Simply put, the extent to which information is explained has a bearing on how it is acquired. However, there must be evidence that adequate linguistic input was available. This point leads me to the second point: why evidential input is necessary.

An evidential account holds that in the absence of adequate or copious quantities of input learners cannot become advanced language speakers. That is to say, copious input is a requirement for language acquisition. This will be elaborated upon later. Meanwhile, another important concept closely related to input is the concept of intake.

It is argued that intake extends from input. In other words, intake is that filtered and picked fragment of input that is processed (Corder, 1967; Sato and Jacobs, 1992; VanPatten, 2002). This perspective raises the question as to whether all that learners require in order to acquire language is simply input. It is possible to think of input in this kind of simplistic reductionist view.

However, I argue that input goes beyond the simple availability of a quantity of linguistic material. From the quantity of input, not everything is processed, converted or represented. This is akin to the bar code scanner analogy referred to earlier. The analogy is of the infrared bar code pricing scanner. For example, on a Crown 2 litre of blended cooking oil, the scanning device selects only the bar code number for the computer while excluding all other

inscriptions on the label. Only the relevant information is communicated to the computer processor. The internal mechanism of the computer represents the internal mental linguistic representation when adequate input is supplied. However, of the quantity of input available, not all is processed and converted into mental linguistic representation.

Moreover, in establishing the relationship that exists between input and intake Corder (1967) argues that learners cannot absorb every aspect of the input presented to them because they are in control of what they can take in for language development, and that may be limited. Here, Corder (1967) refers to anything that 'goes in' as intake.

For Sato and Jacobs (1992) intake is described in terms of an "information processing product on input". A more detailed but similar description of intake is exhibited by Ying (1995) and VanPatten (2002). For example, VanPatten (2002) views intake in terms of the linguistic information sorted from the input but kept in the working memory, also known as the short-term memory for additional processing (p.757). In Psychology, the working memory relates to the short-term memory concerned with here-and-now conscious mental linguistic processing.

Alternatively, intake relates to a subsection of input internalised by learners after linguistic processing, argues Ying (1995). Ying adds that 'mere exposure to input is insufficient to qualify as intake'. Similar thoughts are held by Sharwood-Smith (1993). According to Sharwood-Smith (1993), intake is an extension of [i]nput which has been processed by the learner and transformed into some form of knowledge (p.167). This means that learners are in charge of the input-intake process.

This claim is consistent with the view that learners are active as they interact with input and make decisions about which elements of input to process into intake (Beebe, 1985). Beebe (1985) views these as learners' dynamic inclinations and emphasises appreciating several factors that contribute to shaping these preferences, including personal variations. This underscores the role of input in language acquisition, a section discussed at greater length later. As I have explained, input is both theoretical and evidential, or empirically based.

In explaining input, inevitably aspects of its definition arise. Krashen (1982) is clear about what input is. He defines input as optimally comprehensible, interesting as well as relevant; not grammatically sequenced, but in good supply. According to Stephen Krashen, if these features appear as a learner is exposed to input, acquisition is likely to be guaranteed. Of

equal significance is that input does not mean mere exposure to just anything – a point that will further be explored under the role of input later. Consequently, input is not input if it does not meet certain conditions. In this case, what counts as input is exposure to authentic linguistic material.

Loewen and Sato (2017) describe input as language material which learners listen to or see, notably in communicative settings, in which they would process it for meaning.

This contradicts the concept of explicit language teaching discussed under 4.4 in this Episode. Input can thus come from various sources, such as the teachers, fellow learners, the environment and/or the material culture surrounding the pupils. According to VanPatten (2017), such sources include watching television and using other related technological devices, a point which is more fully later in this Episode.

However, in this case study, the source of input in most disadvantaged schools – like those in the rural areas of Northern Zambia – is the teacher.

Teacher talk provides opportunities for the learners in the classroom, yet this appears to be yielding very little in terms of literacy development performance. Hence, there appears to be a need to turn to technology as a potential intervention to improve pupils' chances in the face of this low performance.

To examine this more closely, in the next section, I focus on Krashen's Comprehensive Input.

4.3   Comprehensible Input Hypothesis (CIH)

Amongst the many principles and practices of second and first language acquisition such as the Chomskyan innate language learning theory, behaviourist, cognitive, constructivist, Stephen Krashen's Input Hypothesis (IH) theory captured my attention. The appeal of his theory lay in how it relates to the low literacy performance in Zambian primary schools, the effect of which is manifest in the Grade 9 and Grade 12 literacy survey marking exercises where I participate at a national level.

As stated in Episode 1, the national literacy survey shows the same trend of low literacy performance amongst learners, especially those in disadvantaged areas. The low literacy performance is particularly evident in rural disadvantaged schools. Among other factors, this is attributed to inadequate teaching and learning materials, especially those emanating from

the 2014 revised curriculum framework. This relates directly to the lack of adequate input, a critical perspective cast by Steven Krashen who suggests that incomprehensible input is a recipe for low literacy achievement.

Over the past several decades, researchers of language acquisition have advanced several contending second language acquisition (SLA) theories. Even though these theories have little agreement with any of the other theories (referred to earlier), they all have something in common, that is, they are all traditionally centred on nature and nurture. Simply put, these theories tend to agree that successful language acquisition should proceed from a centrifugal rather than from a centripetal movement. Some perceive literacy not only as cracking a linguistic code but also, as Freire (1987) puts it, as indispensable to "reading the world" before "reading the word".

In second language acquisition, the Comprehensibe Input Hypothesis is one of the most significant concepts. It consists of five hypotheses, namely 'the Acquisition/Learning hypothesis,' (explicit and implicit acquisition); 'the Natural Order Hypothesis,' 'the Monitor Hypothesis,' 'the Affective Filter Hypothesis' and 'the Input Hypothesis'. All are seen as contributing to comprehensible input, the benchmark for successful language learning. Kraschen's hypotheses have grown increasingly popular since the 1980s, and have been used to a significant extent in language and teaching, especially in English Second Language (ESL) and English as Foreign Language (EFL) research studies. This is explained further in Section 4.6.

The Comprehensible Input Hypothesis places less stress on meaning when acquiring a language (Krashen, 1981). Falling under the nativist view on language acquisition, the theory claims that internal natural mechanisms actively function on comprehensible input leading to competency of language.

From this perspective, learners can pick up (acquire) a language naturally through incidental communicative interactive classroom activities. It can further be argued that it is first important to know the words in a communicative setting before reading the words. That is, what is crucial for language acquisition is what is spoken, and not how it is spoken, in real life activities. It is important to stress that acquiring language is more significant than 'learning' language, because 'learning' it makes us acquire it less effectively. In other words, the comprehensive Input Hypothesis is an effort to explain how learners acquire or learn a

second language. The Comprehensible Input Hypothesis is thus primarily concerned with acquisition.

According to Krashen (1981), the hypotheses enable language learners to develop and improve through the natural order each time they get comprehensive input in their second language one step above their existing linguistic stage of competence. This is further explained later in this section.

Krashen stresses the need for making our messages more comprehensible or easily understood through meaningful and authentic activities, in order for successful language acquisition to take place. This condition must be met to facilitate language acquisition. The positive impact on language acquisition is only in evidence when learners are then able to assimilate the input comprehensively.

Krashen's (1985, 1985, 1994) theory implies that there is one way of acquiring a language. He describes acquisition as the point when we are able to understand the input of messages through listening or reading comprehensively. This is what Krashen refers to as Comprehensive Input (CI). Krashen's assertion begs the question: since acquisition is the kernel of this proposition, how then do we acquire language?

According to Krashen's Input Hypothesis, we progress from one level of comprehension to another. Specifically, we attain new rules through comprehending texts that encompass these rules. The hypothesis identifies "í" as the level from which we progress. It denotes our present and current mastery of the texts, or our present level of competence (Krashen, 82). The next stage is the plus one (1) which gives us the formula "i+1."

Krashen posits that the teacher must use 'comprehensible input' to facilitate language acquisition. As discussed later in this Episode regarding input and intake, Krashen also refers to "comprehended" input (Krashen, 1987, p.33). His i+1 formula suggests that learners are not tabula rasa (empty slates). They possess initial linguistic competence. That is to say, any learner can be at a level called "i" and the duty of the teacher is to scaffold that learner from the 'i' level to another level a notch above 'i' herein +1. This is possible if the teacher has some knowledge of the language learning theories regarding adequate input, as explained in Episode 3 and explored further in this Episode. What is required is that the teacher must ensure the language received by the learner is slightly above 'i' thereby facilitating further acquisition to the next level '+1' (Krashen, 1987).

In this thesis therefore, the formula "i+1", or "comprehensible input" (CI) or the Input Hypothesis (IH) are synonymous, and thus used interchangeably (Krashen, 1978; Krashen, 1987). But just how is language acquired? What standards or conditions should be met in order for learners to acquire language? According to the hypothesis, resources that aid comprehensible input consist of images, graphs and many other items. These aid language acquisition provided they are presented in adequate proportions.

However, further questions arise, such as: 'How adequate should the CI be? 'Who determines what could be perceived as adequate? and 'How adequate is adequate? The Input Hypothesis claims that humans acquire language in only one way, that is, by understanding messages, or receiving "comprehensible input." If acquisition is the core of this theory, the crucial question is: How do we acquire language?

Krashen hypothesizes that we acquire language via "comprehensible input." That is, input just a little beyond the learner's competence level, is presented, performed or participated in through reading, as well as listening for meaning and understanding. This is aided through an extra linguistic milieu, previous language level of competence and knowledge of the world including socio-cultural artefacts. How is input made comprehensible? Krashen's Input Hypothesis explicates that gestures, pictures and many other varieties of input, with careful preparation are used and valued by all language teachers and learners.

However, several teachers of a second language teach grammar structures while compelling learners to memorize these rules and structures via drill and practice. In these ways they expect learners will develop fluency.

Strikingly, the Input Hypothesis promotes the opposite: It advocates meaning first, and as a consequential outcome, structure acquisition (Krashen, 82). From this standpoint, it is clear that learners are capable of comprehending language which contains untaught grammatical constructions through context, extra-linguistic material as well as earlier acquired linguistic competency. Unlike other scholars who advance output such as competence in speech, according to Krashen, this does not advance language acquisition; it emerges on its own when one acquires comprehensible input (i+1).

Comprehensible input is achieved by providing context and background information that help to make input comprehensible beyond the student's current level of understanding (i+1). What appears to be a significant recommendation as earlier alluded to, is that speech

production or speaking should not directly be taught or be an urgent thing in class. Krashen (1982, 1985, 2004) contends that language education should not be centred on learning but rather acquisition. The latter is more significant than the former, in his view.

In this theory, learning and acquisition are two dissimilar processes. *Acquiring language* entails absorbing language unintentionally through practice with the outside realm, in addition to acquiring the ability to use it effortlessly and acceptably. *Learning language*, by contrast, entails studying a language deliberately in order to master its conventions. To reiterate, according to Krashen (1982), learners are able to study language through comprehensive language input, as an indispensable factor for acquiring a language.

Only when input material is articulate clear and comprehensible, supported by digital or non-digital artefacts, can learners acquire the language speedily. This implies that incomprehensible input slows the rate at which learners acquire the target language and therefore they cannot produce it in meaningful conversations.

In the next section, I discuss characteristics of CIH, and explore its role in language acquisition.

4.3.1 Krashen's Input Hypothesis: The Characteristics

The input hypothesis strongly asserts that SLA is likely to occur if language learners are exposed to the type of second language information that they are able to understand. Stephen Krashen recognizes comprehensible linguistic input as "the only instrumental variable in Second Language Acquisition" (Krashen, 1981, p.57). As earlier mentioned, Krashen argues that for language acquisition to take place, language learners should be exposed to adequate language input that includes but is not limited to structures of language slightly above their current level (i+1).

Thus, the Comprehensible Input Hypothesis offers three characteristics as a requirement and catalyst for potential language acquisition. According to Krashen (1982), messages must have the following four elements to facilitate literacy acquisition: optimum comprehensive input, interest value, adequacy and authenticity. In the following paragraphs I discuss these four tenets and assess how they contribute to literacy development.

Comprehensible Input presents several points to take from Stephen Krashen's Comprehensive Input Hypothesis in language acquisition. I explore these at some length here.

The first point is that Krashen underscores the importance of comprehension. According to Krashen (1982), for someone to acquire language, it is crucial to appreciate the code of language input. In other words, incomprehensible input is input that is meaningless – without meaning – to the learners and a waste of their time. Krashen's point appears to 'engage' he information processing theory referred to earlier.

The information processing theory emphasises first understanding input and later producing it (Carroll, 1990). Information processing thus requires that in order to comprehend and therefore acquire language, learners are able to withstand the rate of exposure to input or content that is slightly beyond their linguistic competence. The implication of this assertion for teaching is that the selection of linguistic material in a classroom set-up, which while being a little challenging, should not be unnecessarily cognitively demanding on the students.

While some research study findings argue that a huge amount of exposure to a second language results in some levels of language proficiency, others doubt whether this is purely exposure to input, in the absence of intake or comprehension. This view can be seen from the investigation into first language acquisition by 'Motherese' (Snow, 1977) and extended to approaches to second language acquisition.

Furthermore, psychological results (Carroll, 1990) have offered data which indicates that if the meaning of an utterance cannot be understood and processed, it cannot be deposited on the permanent or long-term memory. Synchronous with this, Krashen's (1978) interpretation is that a learner's mind works in ways similar to the filter of information input-intake from the peripheral world. Here the part that is comprehended (intake) becomes part of the learner. Incomprehensible linguistic material not only inhibits acquisition but forces learners to apply themselves in order to filter input. It can be concluded that incomprehensible input contributes little to the acquisition of a language, and only hinders it by frustrating the learner.

As already indicated, Corder (1981) also pointed out that mere linguistic presentation to learners in the classroom setting does not automatically qualify as input. Any language forms that the learner cannot process cannot be part of the intake. Another way of looking at this

concept is to acknowledge that comprehension comes before production and that any input that cannot arouse interest in the learners is likely not to be filtered as intake.

The second important key point Krashen (1982) emphasises is interest and relevance. This raises questions regarding the choice of input and the manner of presentation. In theory it sounds easily attainable; however, in practice teachers have challenges implementing it. It implies that the input message should present material where interest-value and relevance correspond, both within the genre and in relation to the learners' experience. When input is interesting and relevant, learners are able to pick up language more naturally.

With fourteen years of teaching experience, I have observed that input available for the learners in the rural disadvantaged communities seldom meets Krashen's requirements. The current text books appear to be planned to satisfy the prerequisites for examinations. Conceivably, all the English examinations across levels, except for Grade 7 – a multiple-choice examination – are structured in similar ways which follow a pattern comprising reading comprehension, structure, vocabulary, close test and composition writing consisting of 200 and 350 words respectively.

This orientation, especially in the case of the Grade 7 examination which involves no writing, has destroyed both the learning and the teaching because teaching is biased towards examinations and not based on lifelong skills. Passing these exams calls for learners as well as teachers to drill the learners through simulated past examination papers at the expense of them reading interesting and authentic linguistic materials. Whether or not these materials are in sufficient quantities can be told from the low performance results usually reported annually at all examination levels.

The third point Kraschen argues constitutes a fundamental and significant principle in the acquisition of a language: it is the importance of receiving adequate and sufficient comprehensive input. This approach assumes that language teaching based on drilling grammatical structure is somewhat flawed. Krashen is of the view that if language teaching adheres to grammatical outlines this may destroy real communicative efforts on the part of learners (Krashen, 1982). If grammar is over-emphasised, this may render the material input boring and delinked from everyday life. So Krashen advocates a sufficient quantity of language input packaged in communicative classroom activities. This, he emphasizes will yield positive learning results where a strict adherence to grammatical drills might fail.

Krashen states that acquiring a new language requires not only multiple practices but also reading material that is interesting and content-rich, as well as constant dialogue (S. Krashen, 1982). Clearly, this means that teachers can only enhance the chances of acquiring literacy via compound conversations and reading that can provide i+1 to the learners. However, this cannot take place in isolation.

From the information processing theory perspective, Carrol (1990) argues that comprehension and production cannot take place if the learner fails to contain the rate at which input and exposure of content are delivered if this is beyond their linguistic capability. This is what Krashen (1982) describes as optimal input. Optimal input as noted earlier, ought to be not only adequate or comprehensible, but also interesting, stimulating, relevant and sufficient albeit not grammatically sequenced. Findings from psychological research (Carrol, 1990) suggest that whenever the meaning of an expression is understood and processed it creates a mark and is stored in the long-term memory.

Taking this stance, Krashen (1978) posited that the brain of a learner operates in a filter-like manner, filtering information or input from the world outside. Through this perception, only the information that is understood has the potential to be filtered, to become part of the learner's learning experience. Incomprehensible messages not only fail to facilitate acquisition, but also make it difficult and demanding for the learner to filter out. This means that not only does the incomprehensible input contribute less to acquisition, but that learners are also frustrated by the fact that they cannot comprehend the message.

As pointed out by Corder (1981), merely presenting a particular form of linguistic material to learners does not essentially qualify it as input. Clearly, input is what is assimilated and not merely what is available or only presented to the learner. That is to say, any linguistic material which is unprocessable by the learner is by no means input. As stated, Krashen (1982) argues that there can never be speech production without adequate intake of quality linguistic messages. No language acquisition can take place if the learner is not exposed to adequate linguistic input commensurate with the prescription as propounded in the comprehensible input hypothesis model.

Furthermore, within this framework, there are factors which have to be met in order for learners to acquire language. Krashen (1982) argues that input should not only be optimal, interesting and in sufficient quantity but also authentic. Among the necessary factors is

affording learners opportunities to make associations, as advanced by the affordance theory. Thus, in the next section, I focus on the theory of affordance in relation to language learning and acquisition.

In a sense, the main aim for language teaching is to give learners plenty of language material from which they can benefit. If, however, adequate input is not guaranteed, this is not optimal. Krashen (1982, p.71) argues for optimal input in sufficient quantities. In the case of my study for disadvantaged schools in rural Zambia sufficient input is my main argument because learning a second language such as English which is taught as a subject, depends on the input to which learners are exposed during classes. This is what has kept rural language learners disadvantaged.

Learning in rural Zambian schools where there is a lack of teaching materials, is dependent on a few textbooks, and on whether the teacher is in good mood. There is no learning after classes. Because learners have little access to the textbook within, and outside of the classroom, it is difficult for them to practise literacy skills as they have this form of practice in class 2only. Even when they do learn, teaching follows a rote teaching model, drilling learners for decontextualized grammatical features after which they are given written exercises. The implications of this render the material being taught inauthentic.

Finally, authenticity of language material is one of the most important aspects of successful language acquisition (Krashen, 1982, Richards, Gilmore, 2004). Authentic material used for second or even foreign language teaching dates back to the end of the nineteenth century. Henry Sweet, regarded as one of the earliest linguists, was aware of the potential of authentic materials. Opposed to the use of contrived ones, Sweet used authentic materials in his books (Sweet, 1899, p.177), remarking:

> [T]he countless benefits of using natural, idiomatic materials over artificial approaches or series is that they do justice to every feature of the language…On the other hand, the artificial system leans towards causing incessant repetitions of particular grammatical constructions, certain elements of vocabulary, certain combinations of words to the almost exclusion of others which are equally or perhaps even more, essential. (p.177)

The foregoing quotation hints at how language features should be used in real communicative situations.

Even though Sweet encouraged the use of authentic materials as far back as 1899, their use sparked fresh interest in the 1970s when the aim of teaching language shifted to an emphasis

on real and actual language use. As remarked by Hymes (1972), communicative proficiency not only entails knowledge of the language structure, but it advocates contextualized communication above form. It also means advancing ideas through those authentic materials should be appreciated for the value they communicate as opposed to the linguistic forms they illustrate.

To learn a language in the most successful way, exposure to authentic material is key. In the light of this, the nineteenth century spawned several approaches or attempts to teach language successfully. The approaches included the audiolingual, and 'the new methods', among others (Richards and Rodgers, 1986) imposing carefully organised and therefore contrived texts, as well as prescriptive behaviours for learners and the teachers.

This led to Howatt (1984, p.267) to describe such materials as cult materials, because the authority of such approaches in attempts to teach language was misplaced. The critique centred on the authority of such methods as enshrined in the texts themselves rather than in the actual lessons delivered by the teacher using them. This kind of thinking paved the way for the idea that machines would supplant teachers through language laboratories and other devices (p. 267). It is consistent with what I have argued for in Episode 2 where I refer to the use of technology as dating back to World War 2.

However, what is authentic material?

For most teachers, amongst whom I include myself, defining what authentic material is has become increasingly complex and ambiguous, so to speak. Scholars define authentic material in a variety of ways. For example, according to Nunan and Miller (1995) authentic materials are defined as materials originally intended for native speakers, which have not been transformed for learners of language. Van lier (1996) sees authenticity as the kind of interaction teachers have with learners. Authenticity also relates to the kinds of exercises chosen by the teacher for the learners (Breen, 1983; Bachman, 1991; van Lier, 1996, Benson and Voller, 1997; Lewkowicz, 2000, Guariento and Morley, 2001). Others describe authenticity of materials or texts in relation to those qualities conferred on the material by the recipient since authenticity is not seen as inherent in the material itself, but rather attributed to it by the reader (Widdowson, 1978/9; Breen, 1983).

Furthermore, the concept of authenticity originally distinguishes between texts that are artificially simplified and texts that are unmodified actual material (Thornbury, 2006). Adams

echoes the view of others as he states that materials are authentic when the content is unmodified and maintains the author's original purpose, created for native speakers not for second or foreign language speakers (Adams, 1995). Such materials can be spoken or written provided they were produced not for the purposes of teaching but for conveying real messages that reflect real-world use of language.

From these definitions, the key point is that authenticity relates to materials not meant for second or foreign language teaching but texts created for the native speakers of that target language. One thing that can be observed by this then is that the language structure of such authentic material could be pitched at a high level. It is disputable however, whether these materials would still be considered authentic if they were intentionally created for native speakers, and later were modified and removed from the native speaker's context.

In the opinion of Chavez (1998), any material that has been processed and transformed methodologically to suit classroom use can no longer be described as authentic. However, there are authentically produced materials to directly impact acquisition of language in a classroom. These authentic materials are specifically designed to facilitate language acquisition with appropriate real-world conservational language, appropriate syntax and semantic impact.

In my study, I argue that in the face of advanced technology, there are diverse authentic materials that can be created for language acquisition in a classroom set up. Thus, my use of the term authentic is taken from van Lier (1996) who argues that authenticity should be about the kind of interaction that the teacher creates between themselves and the learners, and authenticity may be seen as a social situation of the classroom (Breen, 1983; Anord, 1991; Guariento and Morley, 2001).

van Lier argues that an 'authentic text is also a more detailed text, designed to deliver a real message by a real speaker. Richards (2006) supports the concept of authentic material for language acquisition due to its various benefits. He asserts that;

> authentic material provides cultural information about the target language, provides exposure to real language, relates more closely to learners' needs, supports a more creative approach to teaching, stimulates motivation and introduces contemporary language as well as access to current issues and themes (Richards, 2006, p. 20).

This implies that day-to-day objects form part of authentic material for teaching and learning; it explains why they should be used in the classroom.

Authentic materials provide a catalyst for learners to enjoy the stimulating aspects of the structure of language and eagerly to await the chance to interact and communicate in the new language. Consistent use of materials that are authentic thus keeps learners immersed in the real world of language use. Authentic language use further enables learners to become familiar with aspects of the culture associated with a particular target language.

In light of the foregoing, scholars such as Ellis and He, (1999), Gass and Varonis (1994), as well as Long (1982), have supported the concept of the input hypothesis by advocating modified input, and 'interactionally' modified input as a rich source of comprehensible input for language acquisition. Here modified input denotes a form of language input simplified or modified in some ways before exposing learners to it. While 'interactionally' modified input denotes input initially emanating from the modification of input that takes place when learners of language encounter difficulties in understanding texts as they interact with fellow interlocutors (Ellis and He, 1999; Long, 1996).

An additional feature of the input hypothesis, proposed in my study is an aspect of language acquisition outside of both the classroom and informal settings through direct exposure to the source of the language input. It derives from Krashen's (1981) argument that if the language learners are directly exposed to intensive linguistic input in informal settings, acquisition can occur.

However, critics of the input hypothesis claim that the theory fails on several grounds.

Although Stephen Krashen's Input Hypothesis plays a major role in our understanding of how language acquisition occurs, the theory has been challenged by several scholars. For example, it is argued that priority emphasis should be placed on the notion of *comprehended input* (Gass, 1988, 1997) as opposed to *comprehensible input* (my italics). Gass suggests that the only input necessary for language acquisition is comprehended input.

As discussed earlier, comprehended input is consistent with intake. Clearly, the fundamental linguistic input necessary for language acquisition is probably beyond the borders of comprehensible input. Furthermore, scholars argue that the critique has been provoked by the theories' vast number of assertions regarding the form and qualitative element of the vital and

particular linguistic input required for language acquisition. However, they do this without giving firm empirical evidence.

Researchers argue that the input hypothesis reduces 'language acquisition' purely to 'contact with comprehensible input'. In the main, criticisms regarding the input hypothesis focus on the kind and form of linguistic input that constitutes the primary information for language acquisition. Moreover, even though researchers of language acquisition and the critics of Stephen Krashen's input hypothesis emphasise the significant role of input in language acquisition, and acknowledge that linguistic input is a significant factor in language acquisition (Salaberry, 2003), still they assert that mere comprehensive input does not lead to language acquisition.

In addition, other serious issues concerning the input hypothesis are articulated by McLaughlin (1987). In his claim, McLaughlin demonstrates how difficult it is to define the idea of the learner's i+1 level. He points out that this concept confines the application of the input hypothesis rule to the classroom setting yet the learners' individual differences should be factored in when ascertaining their current levels. Not only is determining the language learner's current level difficult, but so is providing i+1 linguistic input separately for every single learner. Furthermore, it is argued that the input hypothesis presents problems concerning clear ways in which language input which matches the i+1 level can be provided for learners. However, these critiques fall short of their claims because evidence supporting the significance of input in language acquisition is overwhelming. Clearly, the input hypothesis plays an exceedingly crucial role in language acquisition.

4.3.2 Role of input in Language Learning

As briefly established in Section 4.2, the role of input has been highlighted by several scholars such as Beebe (1985); Ellis (2015); and Gass (1997). Literature concerning acquisition and input highlights the point that research in this area is concerned with the role of input. Studies also commonly focus on how linguistic input is processed (Doughty and Long, 2003; Ellis, 1997; Gass and Selinker, 1994; Gass, 1997; Grady, Lee and Lee, 2011). Based on this research, it can be argued that any second language acquisition class cannot be taught in isolation of some form of exposure to language input (Gass, 1997).

Conversely, while various theories advocate for the significance of language input, some attach very little or no importance to the *role* of input, and others attach great significance to

its role. In this respect, Ellis (1994; 2008) advances the view that although theories of second language acquisition have some common agreement regarding linguistic input, they attribute diverse significance to the role of this input in the acquisition of language.

Generally, most second language acquisition (SLA) theories view input as a highly necessary factor for the role it plays in language acquisition. Other SLA approaches consider input as having a secondary role. What has changed theoretically, relative to the role the input plays in language acquisition, is how input is conceptualised in relation to how linguistic input is processed (Doughty and Long, 2003).

The role of linguistic input has been perceived from the behavioural, mentalist as well as the interactionalist pradigms (Ellis, 2008). This insight is consistent with the argument the study set out to explore: the idea that no one theory is appropriate for all contexts, in terms of the language acquisition journey. This point is taken further in section 4.5 of this episode.

According to the behaviourists' perceptive on language acquisition, the environment has a role to play in controlling various stimuli and in giving feedback on the kind of language input to which language learners are exposed. For the behaviourists, there is a direct link between input and output. Their approach ignores the cognitive processes required to acquire the language and focuses instead on external factors that have control over the acquisition of language. Such factors consist of stimuli and feedback from language input (Ellis, 2008). This view was initially advanced by Skinner (1957) who attributed language acquisition to environmental influences.

Skinner suggested that young language learners acquire language premised on the behaviourist reinforcement codes or principles through word association with meaning. He further suggests that correct utterances be positively reinforced every time a learner picks up the communicative value of phrases or words. However, this has been challenged and criticized by world-renowned linguist, Noam Chomsky.

In the 1950's, in line with the cognitive revolution, Chomsky argued that learners cannot acquire the necessary tools for processing an unlimited number of words and sentences if the acquisition of language apparatus was dependent on language input only. The Chomsky innate cognition revolution is also known as the Mentalist theory.

Over the decades, theories of language acquisition have evolved. But the process by which this happens, that is, maintaining how input is presented, remains an important aspect. The question is, 'What makes input more meaningful for it to form part of intake?' This study sought to dissect whether emerging technologies might be viable tools for teaching the acquisition of language and literacy development. The lenses of the input hypothesis and affordance theories proved valuable in this endeavour.

The cognitive view of language use and acquisition is that it is internally rule governed, and the mentalist view of acquisition is that this occurs through an innate mechanism in the brain. From their standpoints both these theories critique the behaviourists' failure to account for the creative and innovative or natural use of language, as they see it. As stated earlier, Chomsky, who promoted the mentalist position is of the view that the mind has an inborn disposition to acquiring a language or that the mind is somehow programmed for language acquisition. The predisposed mind is said to account for the speed and uniformity with which children learn languages especially their native tongue.

The mentalist theory, in terms of language acquisition, calls for a re-evaluation of current classroom activities as well as materials. Specifically, it suggests more importance should be placed on the learner's competence rather than on their performance. The mentalist theories further believe that input is necessary for Second Language Acquisition; however, they claim that because children's brains are loaded with an ability to acquire just about any language through innate ability, the linguistic input is but the trigger of an inborn mechanism (Ellis, 2008). However, this is not the view held by the interactionalists.

The interactionist's theory of Second Language Acquisition by contrast, places importance on the input as well as the internal mechanism for language acquisition. The interaction hypothesis as well as the social interaction approaches emphasise the importance of interaction in a learning situation. For example, the social interaction theory espoused by both Vygotsky and Long, argues that environmental factors are significant in the language acquisition enterprise.

For the interactionist, language acquisition is a result of interactions between the learner's cognitive capabilities and the linguistic environment where input affects them, or is affected by the nature of internal cognitive processes (Ellis, 2008). Given the significance of social

interaction in the process of language acquisition, Vygotsky proposed a theory known as the zone of proximal development (ZPD).

The theory of ZPD applied to language acquisition as a process, concerns how language learners acquire new language via socially mediated interactions (Ariza and Hancock, 2003). The input hypothesis and the interactionist theory therefore concur on the basis that language acquisition occurs during interaction – as illustrated in the diagram later in this episode, which outlines the link between theories regarding the provision of adequate input. Other theories that accentuate how important input is in language acquisition are the skill acquisition and information processing theories (Nassaji and Fotos, 2010).

The role of input in language acquisition – in information processing theories – is seen by its very nature of information-embeddedness and its frequent usage, as being enabling of learners' acquisition of linguistic knowledge (Nassaji and Fotos, 2010). Regarding the skill acquisition theory, linguistic input is essential because it forms the basis for the learner's acquisition of declarative knowledge, the knowledge about language.

Linguistic input is the main source of information for learners of language towards forming their cognitive representation of language, premised on the illustrations through linguistic input (Patten and Benati, 2010). Grady et al. (2011) stress the role of linguistic input for language acquisition observing that in some instances there are signs that certain elements like lexical enhancement, are directly fashioned by the input.

In other words, the language acquisition process is dependent upon the availability of appropriate language input. Various language learning approaches and models thus view linguistic input as having an initial role in providing the necessary information for language acquisition within particular frameworks. Several scholars have documented literature on the role of input in language acquisition (Gass and Selinker, 1994) and Ellis, 1997) proffering two contexts namely linguistic input and frequency of use.

Researchers of spoken languages have suggested that the quantity of linguistic input and the frequency with which it is used are essential factors in language acquisition (Hart and Risley, 1995; Ellis, 1997). Gass (1997) argues that the role of linguistic input in the input-interaction model, the input hypothesis, the information processing model and the universal grammar model treated differently. Regarding the input-interaction model for example, Gass (1997)

points out that the received linguistic input is reinforced by manipulating the kind of interactions learners are exposed to as they acquire language.

However, according to Krashen's (1981) input hypothesis, second language acquisition occurs when there is adequate comprehensive input. As indicated earlier, this means giving linguistic input slightly above the learner's linguistic capacity. Gass (1997) describes the thirds model as the universal grammar model which recognises linguistic input as an important factor but further argues for additional language input in order to make acquisition more effective.

It is clear from what has been discussed thus far that an innate ability enables learners to acquire language.

The information processing model is premised on the idea that the learner should be able to identify the learning that is required of them. This model proceeds by drawing the learner's attention to the particular aspects of the input outside of the already existing and internalised abilities. In this model, Gass (1997) avers that linguistic input is crucial for it provides necessary information for linguistic construction.

According to Long, (1982) as well as Pica, Young and Doughty (1987), the role of input is embedded in its facility to offer primary data for language acquisition. Stressing the significance of comprehensible input as a major factor in language acquisition, Long (1990) goes on to argue that input as well as interaction are crucial. From this perspective, episode 5, focuses on methodology which shows how ZEdPads provide input for literacy learning. In this case, the Input Hypothesis Theory influenced the choice of my research methodology and the pragmatic approach to data harvesting. However, there are concerns regarding how input is made comprehensible (Ariza and Hancock, 2003). Clarity is offered by Krashen when he makes a distinction between language acquisition and language learning.

4.3.3 Theorizing Literacy Learning and Acquisition

Theorizing learning and acquisition beg a number of questions, such as: 'What does a more theorized understanding of learning and acquisition mean?'; 'Are there any differences between them?'; 'What role do the concepts of learning and acquiring a language hold in Second Language Acquisition?'; and 'When do these broad concepts of learning and acquisition meet?' Attending to these questions can shed light on literacy development.

The past decades have seen a rapidly growing interest in how explicit and implicit language learning is occurs. Conventional knowledge suggests that language learning in children is implicit rather than explicit, in other words, concepts of acquisition and learning are invoked. However, more often than not the concepts of learning and language acquisition tend to be conflated.

To fully understand the role of the concepts of explicit and implicit learning in relation to language acquisition and learning, it is appropriate to start in the field of Cognitive Psychology. This is because dissimilarities between implicit and explicit in relation to acquisition and learning emanate from the field of Cognitive Psychology. The focus of cognitive psychologists has been on enquiring whether implicit learning does take place. Their query has centred on whether it takes place and if so, how we might explain what is 'implicit' in learning. In their research, psychologists disassociate implicit from explicit learning in two principle ways.

Firstly, the knowledge gained in implicit learning is 'sub-symbolic' as rules are generalized from memorized utterances. This takes place in a set of schematic linguistic productions such as functional conversations Ellis (2008, p.125). It is an approach which proceeds exclusively from a fundamental awareness of existing or required resources. (Ellis, et al., 2009), While explicit learning is one that engrosses memorization of a series of facts that make weighty demands on the operational memory, this type of learning on the other hand, calls for consciousness in the process of learning. As a result, knowledge is represented in explicit manner and therefore symbolic in nature.

Secondly, learners in a context of implicit learning are arguably unaware of the learning taking place which is noticeable only through behavioural responses learners make. Learners may be unable to verbalize content they have acquired during the process of learning (Ellis, et al., 2009). By contrast, learning is conscious in the explicit approach and learners are aware of their acquired knowledge and can make conscious verbalization of the learned knowledge.

Thus, the two-principle perspectives regarding learning and acquisition in relation to explicit and implicit knowledge can also be viewed in terms of external and internal conditions of the learning curve.

Jerena Zascerinska conceptualizes learning and acquisition in terms of internal and external perspectives as the sustainable main condition on which every person develops (Zascerinska,

2010). Thus, following this logic, the pursuit of the synergy between acquiring and learning a language requires a process of analysing the two concepts of learning and acquiring. As can be observed from the diverse perspectives of the concepts of explicit and implicit learning and knowledge, there is no one commonly agreed upon definition of these concepts, or indeed of learning and acquisition either. However, the terms can be separated on the basis of conscious and subconscious properties.

With regard to literacy learning and acquisition, whether explicit or implicit (Lankshear, 1997; Prior, 2006, Street, 1995), learning literacy is a complex social practice implicated, influenced and determined by socio-cultural and historical contexts. Similarly, it can be argued that learning and acquiring language are products of social properties determined and influenced by a diverse range of socio-cultural and historical contexts and analyses. While various perceptions are expressed about acquiring and learning a language, scholars do appear to agree that these concepts are in themselves value-loaded. Like cognitive psychologists, linguists make an important distinction between learning and acquiring a language. This distinction lies in whether the acquisition is conscious or subconscious.

As already noted the concept of learning as it is perceived currently derives its conceptualization from psychological research into the process of learning, and is now more widely interpreted. From a psychological standpoint, learning goes beyond information imbibing directly from the educator, beyond reading or even practice. In fact, when learners are learning reading and writing, they learn past the system of language (Gao, 2010). For instance, Krashen (1982) distinguishes acquisition from learning, a second language with the former being a subconscious activity that takes place on the social plane (Vygotsky, 1981). Unfortunately, the concept of learning has been victim to a reductionist mental construction.

Learning is not reducable to simply learning how to ride a bicycle, or driving a car or indeed acquiring information. It is arguably about learning how to learn as well as learning to think. Learning encompasses modifying attitudes, acquisition of social values, interests as well as changes in personality. Clearly, language learning is non-mechanical and non-communicative. It is about direct explicit instruction regarding the language rules because the language learners are exposed to conscious knowledge of the new language.

The Collins English Dictionary has a similar definition of learning: "the act of gaining knowledge" (Collins, 2019). Scholars such as Vygotsky and Piaget, refer to knowledge

growth in relation to the process of learning based on the concept of general development. Concepts must be understood as elemental units of knowledge a student can build upon, refine gradually and assimilate to form richer cognitive structures. Explicit learning as noted earlier operates within psychological definitions which underscore the presence of active or conscious process.

In Nick Ellis' terminology, explicit learning is highly characterized by conscious processes in which, in search of structure, a person makes and tests hypotheses (Ellis, 1994). Accordingly, Laufer and Hulstijn (Laufer and Hulstijn, 2001) and Hulstijn (2013) describe conscious or intentional language learning as the process of acquiring words or expressions through active intent to commit the same to mind through rehearsal. However, one problematic issue about this concept of learning is that it makes us think of learners as 'containers' into which knowledge should be put and who in turn own this material. The danger of this kind of thinking is that teaching becomes mechanical and takes the form of a transmission model. The teacher is at the centre and is all-knowing.

By contrast, implicit or incidental learning refers to an unconscious and informal way of picking up words or expressions, dates, descriptions arguably without effort (Hulstijn, 2013). In the heydays of American Behaviourist Psychology in the mid 20th century it conceptualized learning in terms of stimuli and response (Postman and Keppel, 1969). It experimented with how individuals responded in cases when they were or were not told in advance of the purpose of a particular test.

This application of conscious and unconscious testing was later modified by other scholars who used it to rate pleasantness of words in a given list, and transfer appropriateness regarding compatible and incompatible learning-and-recall tasks (Bransford, Franks, Morris, and Stein, 1979; Hyde and Jenkins, 1973). However, Ellis (1994) postulates that implicit language learning is a process of gaining knowledge through natural means without the active involvement of cognition. In other fields such as vocabulary acquisition, the term implicit or incidental acquisition is broadly described as a by-product of any action not overtly directed towards vocabulary acquisition (Rieder, 2003). Other scholars acknowledge incidental language acquisition through reading at a slow pace.

The speed of language acquisition is a matter for another paper. In any case, acquisition is arguably a subconscious process when language learners are unaware of the rules of

grammar. Similar to the way they acquire their first language, language learners require as much as possible of the comprehensive natural input.

Against this backdrop, the language input is not particularly centred on form. The processes of language acquisition include diverse forms of learning for which no structured provision is made. An individual may in his or her lifetime acquire new gestures, slang, jargon, registers and learning to function in more than one language, without direct teaching but via informal and unplanned imitation (Ferguson, 1962.6). While explicit learning involves input-processing, implicit learning involves processing input in the absence of a deliberate intention to focus on form.

Implicit learning as advanced by Reber et al. (1999) is knowledge gained independently of overt awareness of this process. Studies of implicit learning describe it in terms of general plasticity aided by different memory interactions within complex pliable cognitive processing networks that enhance function through experience (Reber, 2013).

In children, language acquisition is said to be highly non-declarative. This non-declarative language learning taps into biological and neurological changes (Lichtman, 2013; Reber, 2013). A key insight that derives from these discussions about language learning and acquisition is that the various theories dealing with Second Language Acquisition (SLA) investigate and explore methods that help in the process of acquiring or learning other languages. These investigations are all honed to finding ways of enhancing knowledge of the challenges learners go through in learning or acquiring a language. Also, the investigations seek to equip educators with expertise in facilitating such acquisition and learning processes in meaningful and accessible ways.

This indicates that second language acquisition introduces several diverse incongruent and thought-provoking notions from a wide range of authorities in the field, some more generally acknowledged than others. However, all bring to the debate some prudently considered features of linguistic – as well as psychological– philosophies.

For example, the behaviourists' approach to language learning and acquisition advances the idea that language can be learned through positive and negative reinforcement because it is behaviour. It is argued therefore that educators in schools should be implicit in their approach with less focus on time-pressured situations and non meta-language use, on form rather than meaning. So, whether language learning and acquisition is explicit or implicit, it is clear that

scholars agree to some extent that implicit learning is non-declarative (implicit) knowledge and differs in nature from declarative (explicit) knowledge which is largely conscious or active.

However, critics of the language learning–acquisition distinction argue that the two concepts are far from being separable. A personal anecdote of Kevin R. Gregg's experience in learning a second language offers counter-evidence to the distinction between learning and acquiring. His experience of learning Japanese verb conjugation consciously via rote memorization led to unconscious acquisition (Gregg, 1984). In other words, learning turned out to be acquisition. This experience therefore highlights the challenge of overtly distinguishing between learning and acquisition.

In discussing the dichotomy between implicit and explicit, and between learning and acquisition, other scholars argue that proponents of the learning acquisition concept do not make it clear where the distinction lies (McLaughlin, 1987; Zafar, 2009). Responding to Krashen (1982, pp.83-87), McLaughlin posits that Krashen's concept fails on the basis of setting. According to Krashen, an adult in a natural setting can acquire declarative instruction by inquiring about grammar and getting feedback from colleagues whereas in a classroom setup language can be acquired with a focus on interaction, through role-play or dialogues. This view of language acquisition by Krashen renders setting insignificant according to McLaughlin (1987). As asserted by Gee (2014), humans are language creatures who are readily born and capable of acquiring diverse human languages. This claim is consistent with Noam Chomsky's hypothesis that humans have a genetically innate capability for language acquisition (Chomsky, 1965, 1986).

However, questions that require attention are whether the two demarcated extremes ever meet or if they have an effect on each other in the course of language learning and acquisition; if so, when and what sort of effect might they have on each other; and what is the common ground on which they interface?

The following section focuses on these questions.

4.3.4 Implicit and Explicit Learning and Acquisition: An Interplay

However different learning and acquisition appear to be, it can be argued that there is an interplay between declarative or non-declarative, implicit or explicit or conscious and non-conscious language learning.

The synergy between implicit and explicit language learning is greater than the sum of their individual effects put together. The emphasis scholars choose with regard to language acquisition and learning during the course of child development is paramount (Piaget, 1962; Vygotsky, 1934, 1964). In discussing this interplay between explicit and implicit learning and acquisition, I argue for a dual and integrated approach which takes into account the seemingly fixed demarcations between explicit and implicit approaches. With few exceptions, this postulation of an intricate and multifaceted interaction between explicit and implicit methods has not been recognised universally (Matthew, et al., 1989).

The connection between explicit and implicit learning and knowledge cannot fully be appreciated if no effort is made to understand its theoretical background. Ellis (2005) suggests two views regarding the nature of linguistic knowledge. In her suggestion, she points to Chomsky's universal language principles as being applicable to all languages, as well as some specific language parameters that give rise to a specific language as a result of inadequate input. This view suggests that upbeat input activates parameters and principles which in turn, drive one's linguistic knowledge.

The other view, which is linked to the works of connectionist language learning theories, shows that linguistic knowledge is a gradual generalization of conventions manifested by the rate of recurrence and likeness occurring in function mappings. This arguably natural approach to language learning is widely accepted and encouraged. Language acquisition is thus induced by, or it occurs through planned deliberately structured social intervention or teaching.

Researchers have not reached consensus on how language acquisition could be accounted for, and little is known regarding the beginning of language as a system in the human brain, despite the work undertaken in such efforts. What is known are observable facts about the sequence of acquisition. Still, factors affecting language acquisition as well as teaching and learning techniques and strategies – of varying degrees of success have left little known about

the nature of language acquisition processes. Owing to this, to some extent questions remain unanswered as to whether language develops in distinct stages or gradually, whether it is inborn or learned (Chomsky, 1986), whether it is an element of cognitive development or a separate skill, an individual competency or a universal resource.

Yet while various theories about language acquisition exist, my thesis focuses on one only: the Input Hypothesis Theory by Stephen Krashen, which in my view provides a distinctive viewpoint on the concept of language acquisition.

The Input Hypothesis Theory was the most dominant of its time and remains a reference to contour innovative philosophies and beliefs today. However, in the light of language acquisition in an information age, for a broader understanding of language acquisition I have included other approaches such as the affordance and socio-constructivist theories. Hence, while not disregarding of other theories, I argue that the input hypothesis theory plays an exceedingly important role in understanding how language acquisition and learning can better be practised given the affordances provided by among others, language, artefacts and technology.

In the next section, I first focus on how the Affordance Theory is intertwined with facilitating and enhancing interaction for the language acquisition process.

4.4 The Affordance Theory

In pursuing the role and use of emerging technologies for language learning I consider the concept of affordance, and investigate how this concept relates to the comprehensive input hypothesis underpinning this study. I argue that together with the Input Hypothesis, the Affordance Theory enhances interaction for language acquisition via technology. I discuss the concept of affordance as seen through various lenses, then explore it in the light of language acquisition and why emerging technologies are highly promising input affordance tools. I argue further that together with other theories such as the Input hypothesis, the Actor-network and the Interactionists' theories, the Affordance theory makes a major contribution to our understanding of emerging technologies in the employ of language acquisition.

To begin with, affordances, as a concept originates from studies in psychology. Its original meaning denotes how humans and animals perceive their environment. The term was later developed by Gibson (1979) in the field of ecological psychology. Gibson utilised it to

describe the properties of a particular environment that potentially enables the actor within that environment to take action. Gibson (1979) suggested that essential features of any surroundings such as the medium, substance, surfaces and their arrangement, objects, persons as well as animals, including places and hiding spaces – all have affordances.

In illustrating the nature of the concept of affordances, James Gibson demonstrated that unobstructed movement relative to the ground, and visual perception and air all afford breathing. On the other hand, water affords drinking and 'pouring from one container to another, bathing, or washing' (Gibson, 1979). He goes on to demonstrate that a surface such as the ground also affords support such as for running, walking, and standing; however, the mere presence of affordances does not inevitably lead to a specific behaviour or action. But what they do do is to contribute at least to the probability for such actions to take place (Greeno, 1994).

Similarly, when a person approaches a staircase, for example, this does not mean they will use the stairs. It presents them with the option to do so potentially. For instance, the staircase could also be used for sitting if the need existed. This demonstrates that the same structure can enable diverse affordances depending on the need.

While scholars do not agree on the definition of affordance, James J. Gibson originally coined the term to refer to what the environment can offer an individual (Gibson, 1966). From Gibson's postulation, one would argue that affordances are our perceived and implicit knowledge of how to interact with an object. According to the Cambridge Advanced Learner's Dictionary available online, affordance is defined in terms of the 'use or purpose that a thing can have, that people notice as part of the way they see or experience it'.

Affordances are two-way associations involving humans and the environment. They afford possibilities for doing things, provided the affordances are recognized. In this manner, people generate their own personal affordances. Affordances therefore re-establish human agency. In some ways this clarifies why in learning, learners' developmental patterns will vary. During the data collection process, it became evident that ZEdPads provided learners with opportunities to interact with literacy materials in a multimodal and comprehensive manner.

Through this study therefore, I elaborate on affordances and explore the ramifications of affordances via emerging technologies (iPads) for English Language Learning (ELL) and teaching.

In the words of Gibson, (1979, p.127), the term affordance is associated with what the environment presents the animal, including what it offers or provides for good or ill. Singleton and Aronin (2007) argue that true affordances are perceived and recognized capabilities. In other words, affordances are 'verb-ables'. They help to initiate action and contribute to furnishing adequate and comprehensive input. For example, an iPad switch-button affords switch (-ability), the educational apps button affords content view (-ability) and so on. Kono (2009) agrees that affordances are the possibilities in the environment. He observes that affordances can be said to be the circular functional process among animals and the immediate environment. The following figure visually explains the concept of affordances in relation to their environment.
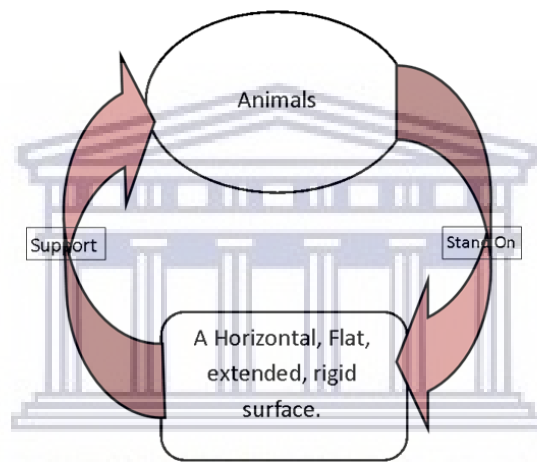
Figure 5 Concept of Affordance

One of the criticisms of Gibson's affordances and perception idea is that is constitutes a bottom-up approach. Gibson's (1966) direct bottom-up notion of perception advances the idea that the actionable (affordances) involve data-driven processing, as perception is triggered by a stimulus. Here the processing is arguably one-directional from the retina to the visual cortex, followed by each consecutive phase in the visual path performing more intricate analysis of the input from a 'bottom-up' approach.

The psychologist Richard Gregory (1970) by contrast, proposes a top-down constructivist indirect theory of perception. This extreme conceptualisation of perception by psychologists shows that learners need more than just input from the environment through various instructional artefacts. For example, Gregory argued that perception is a productive or constructive process which banks on top-down processing. In other words, the environmental

information stimulus is more often ambiguous and in order to make sense of it, higher cognitive information from our experiences regarding what we perceive is required a concept Helmholtz calls the 'likelihood principle'.

This distinction by psychologists between the two forms of perception processes – bottom-up processing and top-down processing – starts with Gibson's affordance theory (1977, 1979).

According to James Gibson's approach, the pattern of light that reaches the eye, called the optic array, encompasses all the optical information needed for perception. Perception, it is argued, includes picking up the rich information (adequate input) made available by the optic array through direct means, involving less or no processing. Due to the movement and the diversity of light intensity – an ever-shifting source of sensory information – the organisation of the optic array modifies to accommodate for any or each movement. James Gibson argues that we have an internal mechanism that helps us make sense of the unstable sensory input. Thus, any change in the way the optic ray flows contains significant information regarding what form of movement occurs. The implication of this is that any material should be carefully administered in ways that do not load learners' cognition thereby inhibiting the processing by which that input would otherwise turn into intake.

However, from a psychological perspective, this seemingly complicated approach can be understood by seeing that James Gibson's arguments are consistent with an interactionist view of perception and action based on the information supplied by the environment. The interactionist position is an alternative to language acquisition whose focus is premised on the processes of agent-situation interactions. It is derived from ecological psychology, and in recent inquiries into conversational communication, from studies into complex, socially organized activity and philosophical situation theory.

In the interactionist account, the notion of affordance and action or verb-able are key ideas. Affordances for an agent should be understood as factors in the environment (limitations) to which the agent is attuned. This broader perception of affordances consists of affordances that are recognized and affordances that are viewed directly by interaction between the actor or agent and the environment. As described by Pea (1993) in the context of Museum studies, affordances are perceived in terms of "[a]ctual functional properties of an object that govern how an object could possibly be used."

Relating this concept to learning and language acquisition in particular, affordances are part of the spectrum of broader theories that enhance interaction between the actor and the agent by reinforcing dispersed learning. Affordances encourage learners to deal with the atmospheric essential attributes, which include designed objects such as the iPad and its inscriptional notations, in a manner that allows learners to participate in contributing to dispersed learning capabilities (Pea, 1993, pp.51-52). Although Pea quotes Gibson's contribution, he is more inclined towards Norman's (1999), whose interest concerns how to design the learning tools whose use could be as transparent as possible to the user, in this case, the learners. As opposed to emphasis on the perceptual 'picking up' of an affordance, Pea, like Norman, is concerned with the role of context and culture.

In relation to the possibilities the environment offers (affordances) and the ability to trigger interaction between the actor and objects, Van Lier views affordances as properties of the environment, which entail that it has some connection with the environmental activity and the body's perception (Van Lier, 2000, p.246). From an ecological standpoint, Van Lier avers that a language learner is engrossed in spaces full of probable meanings. The potential meanings are accessible progressively when the language learner acts within and with the environment (p.253).

Different affordances are summarised by Van Lier concerning affordances of technologies for language learning (Van Lier, 2010). And two definitions of affordances are proffered. These are that: (1) "Affordances consist of the opportunities for interaction that things in the environment possess relative to sensorimotor capacities of the animal" and that (2) "Demands and requirements, opportunities and limitations, rejections and invitations, enablements and constraints." However, by the same token, the affordance theory does not go without criticism.

Critics of the affordance theory argue against the theory as they say it is based on a seemingly speculative, analytic and incoherent position. For example, it is argued that the concept is exceedingly problematic in that its origin and its application are based on the test carried out on its logical and analytical shortcomings (Oliver, 2005). As noted earlier, the concept was first used in Gibson's work on perception (Gibson, 1977, 1979). The key element of the concept is that affordances are environmentally latent, measurably objective as well as independent of the capacity of individuals to recognise them albeit relative to the performer. However, it is argued that this kind of association has not been fully clarified by Gibson.

Moreover, the concept of comprehending every potential affordance has resulted in a logical impasse to the extent that measuring affordances tends to be speculative as opposed to being analytical (Oliver, 2005, 401).

In addition, it is argued that the concept of affordance becomes even more complicated by Norman's attempts to appropriate it. Away from Gibson's perception of affordances which stresses objective 'real affordances' the term 'affordance' is made more complex by its subsequent appropriation by Norman, who began shifting the emphasis from Gibson's supposedly objective 'real affordances' to 'perceived affordances' (Norman 1988). Norman's proposed shift integrates subjective interpretation and cognitive activity, which were overtly vetoed by Gibson.

Norman (1988, p.10) further asserts that "affordances reflect the possible relationships among actors and objects" with the possibility of arriving at a similar unsolved impasse as the position taken by Gibson. In addition, echoing Gibson's perspective, Norman (1988) further stresses that his affordances "are properties of the world". With this, Oliver (2005, p.406) concludes that affordances are analytically redundant.

However, despite the seemingly positivistic origin, logical inconsistencies and, unclear usage, the term affordances has been used widely to express links between the learner and technology for the purposes of learning. This also shows the value of the concept in positioning emerging technologies as technologies for teaching and learning. Furthermore, because of its association with teaching and learning, the term presents itself as a tool that not only helps enhance interaction among linguistic agents or actants (a term that will be discussed further), but also facilitates the nature of input for language acquisition. As a persistent term, it has been used widely in literature (Cochrane, 2010); Koole, 2006; Orr, 2010) and it has been the most cited in papers (Liang et al. 2005; Cochrane and Bateman 2010). In fact, this is an enhanced view from Shotter and Newson's definitions (Shotter and , 1982).

The concept 'affordances' offers relative to the environment does not present itself in isolation. The connections 'affordances' creates through its meaning and implications for learning render it but an entanglement of assorted human (agents) and nonhuman material cultures.

Therefore, emerging technologies such as iPads have the capacity to present texts in pluralistic forms thereby enhancing CI for language acquisition. What is important is that teachers have adequate digital literacy skills (Chabinga, 2015b) so they are able to enhance teaching and learning in meaningful ways. As Chabinga (2015) notes in his study about the use of ICT in English Home Language, multiple language dialogue activities are significant because they provide a rich natural way of 'picking up' a language (S. Krashen, 1982). Teachers must therefore be exposed to and supported in their effective use of technology while observing conditions and appropriate strategies to use for successful literacy development.

Additionally, in investigating what strategies seem appropriate for language acquisition, Krashen (1982) draws our attention to another one of his five hypotheses, namely the affective filter hypothesis. Central to this hypothesis is an explicit instruction to the learners during language teaching. The key elements of the affective filter hypothesis include incentive, confidence and anxiety (Krashen, 1982).

Studies show that *incentive* or motivation plays a major role in activating interest in working or learning. In ESL, motivation activates learners' acquisition of language. Incentives open a platform for *self-confidence* to come to the fore. Learners who have confidence in what they are doing learn better and hence perform well (Krashen, 1982). And these factors reduce *anxiety,* one of the most serious hindrances to acquiring a language (Krashen, 1982, 1994). This confirms that learners should not feel as if school or class is a place where all their weaknesses are revealed. It explains why teachers must ensure that before a class begins, learners are motivated by good words (Bower, Monteiro & Gilligan, 1978). Anything inconsistent with the three factors as suggested by Krashen, tends to block their access to the Language Acquisition Device (LAD) (Chomsky, 1986).

Krashen's claim and suggestion is that we acquire a language only through comprehensible input, in an enabling low-anxiety environment. With this nativist approach, Krashen (1981) argues that an innate natural device activates the comprehensive input leading to competence in the acquisition of language. The emphasis in these strategies is placed on the role of interaction in second language acquisition (SLA).

Long (1990) who is among the interactionists, posits that input and interaction are critical ingredients in language acquisition, especially in relation to vocabulary. Long's interactionist

hypothesis emphasises the role and importance of adequate input as a crucial factor, but stresses that this input must be interactive. While comprehensible input is crucial for language acquisition, it is questionable whether interactive comprehensible input is adequate in itself.

Swain (1995) contends that input alone is not enough. She suggests that in addition to input, output practice shapes the manner in which language acquisition is acquired and retained. Swain's argument is that in addition to input, output allows language learners to see their own inadequacies as they receive feedback from others and in the process, refine their own forms and structures.

However, it is still quite unclear whether the proposed negotiated interactive practices known as input and output can achieve anything more than practice itself. Both Krashen and Long including many language instructors, acknowledge and support the view that adequate input is the birthplace of language acquisition. The acquisition of a language is premised on whether language learners (agents) are given enough opportunity to negotiate meaning through meaningful and modified interactions.

4.4.1 Affordance and Learner Agency

My study stresses the importance of the manner in which language learners are socialised in the process of language acquisition (Vygotsky, 1978). This emphasis is informed by the input hypothesis and the affordance theory. My investigation also draws on concepts from the socio-interactionist and actor network theories which are embedded in the broader spectrum of sociocultural theory.

I argue that through emerging technologies language learners strive to construct their own identities through their own agency. As argued in the foregoing section, the learner's full participation in the process of language acquisition is important. One of the most important aspects of the input hypothesis and affordance theories is the role interaction plays in acquiring a language. This is consistent with sociocultural theory which regards language learners as agents of their own learning and co-constructors of meaning, as opposed to being passive recipients (Lantolf, and Pavlenko, 1995). In this study, the use of ZEdPads seemed to foster the learners' active engagement with the literacy materials, and they were able to participate meaningfully in the teaching-learning process.

Adherents to the Sociocultural Theory (SCT) argue that social interaction plays a fundamental role in the development of cognition. Current conceptualizations of the sociocultural theory draw heavily on the work of Vygotsky (1986), and later theorists such as Wertsch (1998, 1991). Vygotsky seems to suggest that care givers, parents, peers, teachers as well as the material culture that is, technology, have a role in shaping the individuals' beliefs and perceptions as they develop. Thus, the ZEdPad technology could be regarded as the mediators of authentic and self-directed learning.

According to Tharp and Gallimore, (1988) the sociocultural perspective has profound implications for teaching, schooling and education, especially in language teaching and learning. Its strength, like that of the Input Hypothesis (HI) or Comprehensible Input (CI) lies in the fact that it recognises the role of social interactions and dialogue as individuals construct knowledge and negotiate meaning in real world situations while acquiring language skills (Lantolf, 2000; Lantolf and Thorne, 2002). In acquiring a language therefore, primacy is given to language learner agency and affordances (Van Lier, 2000) rather than the input intended for the language learner. What is important to note however, is that the learner's use of affordances of any tool such as language, or cultural tools like technological devices, is subject to contextual mediation (Peng, 2011, p.314).

Vygotsky (1987) describes learning as inseparable from social events where children interact with objects, people and their immediate environment (p.287). Thus, social interaction and dialogic platforms are key factors in accelerating language acquisition that could be mediated through cultural tools such as iPad technology, which is the focus of this study. That is why in the 21st century, with the influx of digital devices old and new alike it is tacitly acknowledged that emerging technologies have affordances that might sustain the much-needed source of multimodal information.

The interaction between users of such technologies and the information that they provide contributes towards these affordances. Thus, I argue that emerging technologies have the potential to facilitate affordances that sustain negotiated interaction in a multimodal manner for language acquisition. In this regard, I view digital technologies such as the ZeduPad – under investigation in this study – as viable tools for language acquisition. As argued by iPads and scholars, *A Comprehensive Output Hypothesis* by Swain complements Krashen's *Input Hypothesis* because comprehensible input is not everything to language acquisition and mastery; the production of linguistic speech also plays a role in it.

4.4.2 Digital Affordances

In exploring the digital affordance of emerging technologies, affordances of these ETs come to the fore. In this vein, a discussion about digital affordance has to include its user interface.

A user interface is the means by which individuals interact with technologies that is, ETs such as tablets. This also entails how people exchange information, and how they interact with ETs. The user interface could be described as a cultural relic that assists in delineating a generation of mobile, global, social, and hyper-local digital users. In other words, the user interface is an assortment of strategies, procedures and tools that act as a socket of interaction between the user and the ET. ET's user interface especially for language learning and acquisition, with its digitized images, graphics and texts enable the teacher or the learners to appreciate the explanation of concepts through interaction (Faghih, Reza and Katebi, 2013).

The user interfaces are critical in making appropriate representations in the user's mind for the effective acquisition of information (Khan, 2012). It then follows that learning effectively is closely linked to how the e-learning interface such the ZEduPads (under investigation here) are designed, as this affects learner motivation, interactivity and cognitive development. The user interface is therefore a communication instrument or tool because it is an interactive display. The ET's interface communicates its interactivity through cues. I call these cues digital affordances.

As indicated earlier, psychologist James J. Gibson coined the word "affordance" to describe the "actionable possibilities" in an environment. But it was Don Norman who later popularized the term in his book, *The Design of Everyday Things*.

It has already been stated that an affordance is a readily perceivable interactive possibility. It occurs when an object, whether physical or digital, has sensory characteristics that intuitively imply its functionality and use. For example, a handle on a coffee cup affords picking it up, just as Amazon's "add to cart" button provides a cue for initiating a buying experience. Unlike physical products, digital affordances can manifest themselves in any way imaginable for literacy acquisition. However, what is of particular interest is whether the acquisition of literacy is a one-directional process with one method.

4.5   Theory or Theories?: An interdisciplinary Approach

In this section I discuss relevant theories from a social action perspective, in keeping with the objectives of this study. As stated before, these involve the role and use of iPads as potential multimodal artefacts for literacy development teaching. In general, theories can be perceived as helpful sets of concepts that are useful in enabling us to make sense of phenomenon. Theories may be empirically verifiable or something akin to the conceptualisation of a formal precept.

In the field of education, theories play a major role in enabling researchers and teachers alike to contemplate why and how changes in learning occur (Smith, 1999). Theories may also encapsulate a body of knowledge originating from and linked to analyses of localized conditions. Furthermore, an ongoing trend has evolved to include both human agency and material/societal structures in an analysis of the world in general, and of education in particular. This trend is already evident in Vygotsky's work in the early 20th century, where he highlighted the mediating role of language in learning.

Since then, Activity Theory has been developed over three 'generations' and is now used widely in the interpretation of Information and Communication Technologies' (ICTs') function in education and other domains. Added to this, the inclusion of cultural artifacts is an asset in an analysis of the development and use of technology, because this signals the view that human activity is mediated by artifacts over time.

Humans engage in this mediated activity in networks, which can themselves be reconfigured through expansive transformation. While certain theories' primary focus remains on human activity, the Actor Network Theory (ANT) includes human and non-human material objects in its symmetrical analysis. This is also reflected in Connectivism as it shows that learning resides in non-human appliances. Michel Foucault (1926-1984) comments that: "Different philosophical theories provide us with tools in a tool box".

A belief in the necessity of a literate society for a transformed economy, for poverty reduction, equality and equity, has broadened the perspective on how this noble objective has been achieved in the past decades.

In general, development is achieved through multi-disciplinary approaches. This perspective has permeated and influenced education, notably in how literacy developed. Several

educators around the globe currently subscribe to the school of thought that holds there is no single theory that fully explains the entire phenomenon that is literacy education. The acquisition of elemental skills to improve writing, reading, listening and speaking relies on an array of theories. These encompass linguistic, cognitive, sociolinguistic, psycholinguistic and critical theories about literacy. Such perspectives are similar to the earliest concepts regarding memory and learning as active and constructive processes in sharp contrast to the 20th century notions about learning as automatic and passive. This critical perspective is consistent with Foucault's statement quoted earlier.

Based on the understanding of an interdisciplinary approach – briefly discussed in Episode 3 – the teacher and the learners benefit from a variety of tools with which to face social and economic challenges. According to the Merriam-Webster Online Dictionary (2019), the term interdisciplinary is defined as 'an approach using two or more academic, scientific or artistic disciplines.' An interdisciplinary approach entails meaning-making through texts, wherein the reader orchestrates various functions that include affordances and social interactions. The educational effectiveness of these interactions demands comprehensible input to enhance literacy development among learners. The input activates Actor Network Practices which illustrates how the diverse theories or concepts are implicated in the process of literacy development as shown below.
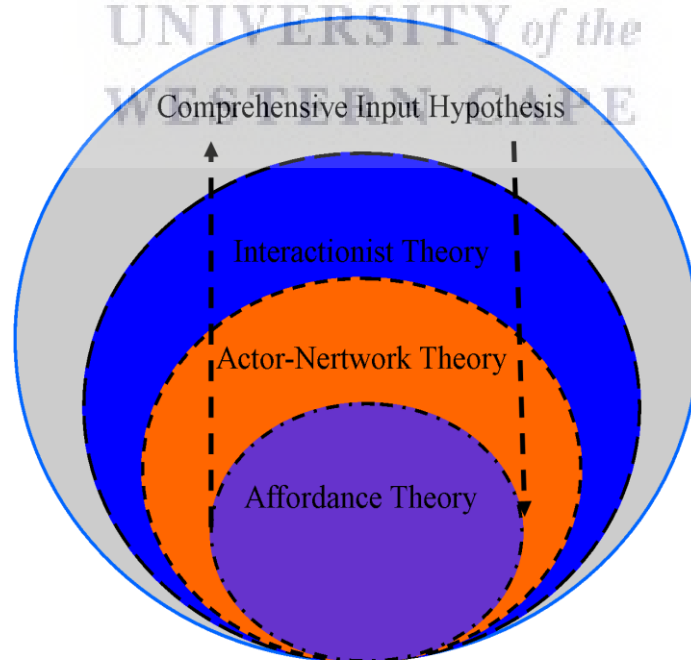
How each Theory is Implicated in Providing Comprehensive In-Put
Chabinga k. © 2019

Figure 6: Theories implicated in Conprensible Input

From the above figure, what emerges is that various concepts help us better comprehend and explain social and economic challenges. Similarly, various theories have been expounded on how language acquisition (whether first or second language), and learning is processed. With this insight, in the following segment I further explore the concepts of acquisition and learning from a sociocultural perspective.

4.5.1 Sociocultural Theory

As stated earlier, the Sociocultural Theory (SCT) argues that social interaction plays a fundamental role in the development of cognition. Current conceptualizations of the sociocultural theory draw heavily on the work of Vygotsky (1986), as well as that of later theorists such as Wertsch (1998, 1991). Vygotsky seems to suggest that care-givers, parents, peers, teachers as well as culture, have a role in shaping the individuals' beliefs and perceptions as they develop. According to Tharp and Gallimore, (1988) the sociocultural perspective has profound implications for teaching, schooling and education, especially in language teaching and learning. Its strength, like Input Hypothesis (HI) or Comprehensible Input (CI) and Comprehensible Output (CO), lies in the fact that it recognises the role of social interactions and dialogue as individuals construct knowledge and negotiate meaning in real world situations, while acquiring language skills (Lantolf, 2000; Lantolf & Thorne, 2002).

Vygotsky (1987) described learning as one that cannot be divorced from the social events as they occur when children interact with objects, people and their immediate environment around them (p. 287). Thus, social interaction and dialogic platforms are key factors that accelerate language acquisition which could be mediated through cultural tools such as iPad technology, which is the focus of this study.

4.5.2 The Role of Technology in Second Language Learning

The role of technology in Second Language Acquisition (SLA) cannot be overlooked; and this extends to the teaching and learning of English as a Foreign Language. As the subject of this study the potential of this "tool" is probed, in the case of three rural and disadvantaged schools.

Emerging technologies offer learners a variety of new options for language acquisition and learning through interactive interfaces – especially the ZEduPad tablets whose haptics are

referred to in Episode 3 (Van Patten, and Williams, 2007). In the current study, certain learning theories are discussed to explain how in SLA literacy and language development are enabled by exposure to adequate linguistic experiences through learners' manipulation of technology. All theories explored here are concerned with the role of linguistic input or the environment (Van Patten and Williams, 2007), and therefore I investigate whether technology should be considered integral to such educational efforts.

As stated earlier, Krashen recognises that Comprehensive Input can be facilitated in several ways for instance, through reading and teaching aids. Effectiveness depends on the tools teachers use to facilitate adequate input for language acquisition. Depending on how competent teachers are technologically, it may be argued that technologies are a potential instructional tool that can facilitate language acquisition.

In pursuing the role and use of emerging technologies for literacy development in Grade 6 learners, another factor to consider is the affordances that technologies, especially iPads, potentially contribute to the facilitation of adequate input. In short, I seek to assess the link between comprehensive input and affordances for language acquisition.

Technology as a cultural tool-kit could probably transform instruction as well as learning at all levels of education. It can assist learners with learning difficulties of any sort, to learn to improve their own approach effectively and successfully. Technological novelties in the classroom appear to have already revolutionised traditional pedagogy, practically aligning it with the connected world where teachers benefit from its diverse opportunities.

In the context of this current study, language acquisition can effectively occur if learners are given adequate input, and produce output through interactional and dialogical activities which may be facilitated with the use of technology. This view is supported by the works of Krashen (1982, 1989) and Swain (1985, 1995, 2000), also Vygotsky's sociocultural theory (Lantolf and Pavlenko, 1995; Lantolf and Poehner, 2008), as discussed earlier. By mediating learning through technology such as iPad technology, teachers are able to provide learners with comprehensible input and output which are necessary for literacy enrichment (Turgut, 2012).

Learning with technology such as the iPad reconstructs or reconfigures the process as learners usually work at their own pace while recreating situations and manipulating their own learning (Prensky, 2010). This suggests that technology-rich environments motivate

learners. Krashen's (1985) and Swain's (2000) hypotheses suggest that comprehensible input and output in language learning largely depend on a form of visual-auditory materials provided by the teacher and an interactive teaching and learning environment. In this way, the iPad technology can be an ideal resource for literacy development. Research shows that audio-visual materials play an important role in teaching and learning (Gibson, 1971; Gilakjani, 2011; Yusup, 2014).

The iPad technology has the capacity to display learning materials in any form, graphic, visual or audio. This may complement the teacher's effort to provide comprehensible input activities. It is from this perspective that I argue that the role of CI and AT are relevant to this study as both emphasize the importance of understanding language in any interaction. Thus, negotiation through interactions in the process of language learning comes to the fore as understanding the meaning of the senders' message is as important as the production of clear, unified and meaningful linguistic material (Mackey, 2006). These theories help us understand instructional modification using cultural and symbolic tools like iPads to mediate language acquisition. Technologically, pedagogical instruction transforms the way children learn and perceive things (Prensky, 2010).

In the next section, I focus on the methodology used to realise the aims of this study.

4.6 Episode Summary

In this Episode, I have highlighted and discussed tools for teaching and learning, and the theoretical framework of this study. The discussion focussed on input and its implications for literacy in wake of new technologies. Furthermore, the Episode also explored the theoretical characteristics of comprehensive input as a prerequisite for language learning (Krashen, 1985). More generally, theoretical perspectives on the role of input in language learning, literacy and acquisition were investigated.

EPISODE 5: DATA HARVESTING: PREPARATION OF INSTRUMENTATION

5.1 Introduction

In the previous episode I reviewed specific instruments with which I intended to survey the field and thereby to ensure reliable research outcomes. This also involved confronting potential challenges the investigation might present. In this episode, I describe the site, the conditions and the process by which data was obtained. The necessary element of uncertainty in analytical studies, projected by the research questions, prompted me to select the most appropriate instruments. These instruments were also influenced by the theories informing this study, namely the Input Hypothesis and Affordance Theories. I hoped the latter might best bring forth interesting results on the familiar ground of the classroom.

Data collection requires that instruments are carefully selected and tested to guarantee uninterrupted data gathering and processing. Thorough planning about instrumentation[8] enables the researcher to choose the most appropriate instruments. However, decisions surrounding the selection of instruments still pose a big challenge to most researchers as once chosen, instruments less suited to the enquiry may distort the authenticity of the data (Creswell, 2009).

From the beginning, the study adopted a phenomenological approach situated in qualitative data collection. However, the statistical nature of the data during the piloting stage triggered the need to complement the qualitative approach with another. This meant that both the qualitative and the quantitative approaches would be employed. The need to employ both approaches posed a challenge as to what the best philosophical stance would be to justify the mixed method approach through a particular paradigm (Parvaiz, Mufti, and Wahab, 2016). In this case I selected the Pragmatist Design.

5.2 Towards Instrumentation: The Pragmatist Design

Philosophical stances can be described as accepted patterns or models (Kuhn, 1962, p.23) which serve as an organizing structure for social phenomenon. All researchers have their own philosophical stances with which they approach the investigation of the site they have chosen.

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[8] Chabinga (2019). Instrumentation. A word coined to refer to research design, methodology, methods, interviews etc. as tools for data collection. Originally, Creswell John uses the term instrumentation to mean data collection tools (Creswell, 2014).

This influences their perception of the world and therefore how they decide to conduct their investigation. More and more, their philosophical position persuades the researcher to consider mixed methods as the tool set with which to investigate the research phenomenon. The distinguishing element of mixed methods is that the integration of both qualitative and quantitative approaches rests on the synergetic exploitation of data. This differentiates it from research reliant on separate methods.

Thus, an investigation into the role and use of emerging technologies (ZEduPads) in Grade 6 English Second language in Northern Zambia is afforded an ideal practice situation of how Comprehensible Input and Affordances can facilitate meaningful input for literacy development. However, this would require an approach that facilitates the evaluation of the practical application of mixed methods. A pragmatist stance holds the philosophical lens for such an approach.

While it is difficult to find an appropriate philosophical stance for mixed methods, the pragmatist approach resonates with the current study. What makes the pragmatists' paradigm a convenient framework for most educational research approaches is the fact that it is flexible. This implies that the process of method selection matches the intent or purpose of an investigation including the research site where an inquiry is to take place. As a methodology a mixed methods approach encompasses a world-view of assumptions that informs and gives traction to data collection as well as analysis. Thus, knowledge about relevant philosophical stances or paradigms is not solely about the flexibility of the mixed method, in this case, but also about looking for an appropriate philosophical foundation and discourse that insulates the credibility of the approach (Creamer, 2018). Hence, pragmatism could be described as a world view or philosophical stance that underpins mixed research methods. Indeed, according to Creamer (2018) pragmatics may be seen as an umbrella term for other paradigms such as pluralism and critical realism because it is associated mainly with mixed methods (Creamer, 2018, p.96).

The synthetic quantitative as opposed to the qualitative apparent within the 'paradigm wars', involves post-positivist and post-modernist methods. I have opted for the pragmatic philosophical stance which supports most mixed methods approach (MMA) models. This stance is singular in that it concentrates on the significance of, and enrichment in employing evidence from the two approaches. It enables the researcher to handle a wider choice of study

questions and to convey better quality results than either method could do in isolation (Creswell, 2009).

In selecting my research design or methodology, thereby to contribute meaningfully to the body of knowledge in my domain (Applied Language and Literacy), I reminded myself of my own assumptions about knowledge. My first assumption is based on the value I perceive in multi-theories, as I view each methodology as having its own strengths and limitations. I understand that one's academic stance depends on one's world view. By extension, the latter exerts an influence on the study. It determines which research methodology is selected for the research.

The diagram that follows represents how our research design is informed by and interwoven with our perception of the world, how we select the strategies for inquiry and hence how we collect the data to access the perceived truth.
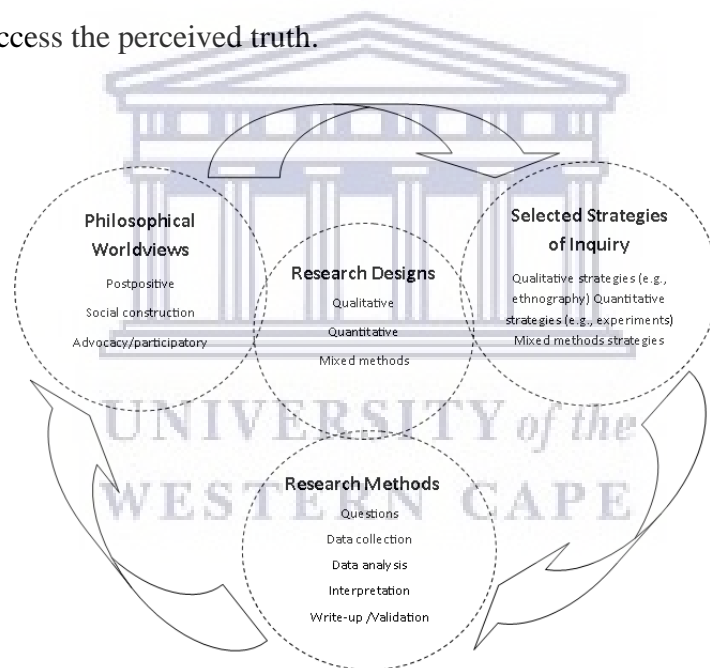
Chabinga (2019) A [F]ramework for Research Design—The Interconnection of Worldviews. Adapted from Creswell (2008).

Figure 7 Mixed Method Mesh

As researchers, in order to complement and offset each other's limitations (Creswell, 2014), we acknowledge our assumptions. My first assumption led me to argue that my choice of the mixed method was also based on the worthwhile results it has afforded either professionals or policy makers or both (Teddle and Sammons, 2010).

In addition, my position is that while numbers might seem lifeless and bloodless to some (Paulos, 1999, 2008), I believe the opposite is true. I am convinced that though numbers might not really tap into the social feelings of the social phenomenon, they may still be used 'to get the feel of' the social phenomenon. Actually, numbers have strong links with narratives and if used optimally can produce fascinating stories (Paulos, 1999, 2008; Thomas, 2007). In their interesting books, '*Once Upon a Number*', and '*The Comparison of Mathematics with Narratives*' Paulos and Thomas make a case for why numbers have connections with storytelling. A critical examination of their assertion helps us argue that the scholars appear to support and enlighten us about the idea of mixed method research.

The mixed method appears to be more popular than before because of its strengths in relation to the comprehensible Input Hypothesis, the Affordance Theory and other auxiliary theories such as the interactionist and Actor-network Theories. These frame my inquiry. Thus, I view MMA design to be crucially important and complementary to my study as it promises access to valuable and meaningful data true to the lived experiences of both teachers and learners. For example, questionnaires were used to reinforce and confirm the verbal talks that I had with the learners and teachers about the affordances ZEdPads brought during literacy teaching and learning. They also brought to light how these affordances acted as input and encouraged interactions among learners to enhance literacy learning.

As observed by Hakim (2000, p.1), a research design emphasises the need for the goals, purpose, intentions and plans to be delineated within the practical limitations of setting, period, funds as well as the researcher's availability. However, it is important to stress that the research design is partly a reflection of the investigator's ideas and assumptions. In fact, the investigator should remain aware that the research project is a process of co-knowledge formulation between the researcher and the researched (Chabinga, 2015).

Hence, in order to make the research attainable and fruitful, as the researcher conducts the investigation (Creswell, 2003) they must consider three important questions. These questions should include knowledge to be generated and its theoretical assumptions, as well as the strategies that would inform their methodology. In other words, a starting point is considering what knowledge claims and theoretical viewpoints the investigator brings with them to the ongoing debate. In sketching these, researchers must think about which strategies would best inform their methods of collecting and analysing the data (Creswell, 2014). As Vogt et al. (2012) observe, the process enables the researcher to be conscious of any biases that might

influence the course of their research inquiry, the choice of approach and the instruments for data collection. Developments in modern technology offer plenty of resources by which to collect and analyse data, depending on the design elected.

An equally significant aspect of MMA is the recommendation that the investigation be designed to ensure that at distinctive stages of QUAL and QUAN, data gathering and eventual analysis intersplice effectively (Creswell, 2009). This can promote both approaches and incorporate results and interpretations that allow for meta-inferences, which expand the QUAN and QUAL outcomes otherwise read in isolation (Sammons, Davis, Day, and Gu, 2014; Sammons, 2010). Consequently, scholars Gray, and Densten (1998), deduce that quantitative and qualitative research methods are thought to produce a 'variety' as opposed to a 'dichotomy'.

Frazer's (1995) critique is that both Quantitative as well as Qualitative data obtain in what he terms "false dualism". Frazer (1995) further claims that the false duality of the two methods is something we are most likely to be "better off without".

In the context of this research, I refer to false dualism to mean an idea that views truth as containing two irreducible features or modalities. The back and forth practice for the MMA investigation or study, in which both deductive and inductive thinking are employed for theory generation and analysis, signifies a cyclical rather than a straight and undeviating method of inquiry. By the same token, it demonstrates that MMA investigators are attempting to develop greater insights into any subject matter as opposed to only seeking to produce a fixed, continual, undeviating rendition of realities or "laws" regarding a phenomenon. This is certainly considered appropriate for research into educational facilities and procedures that are continually susceptible to change inwardly and outwardly and are generally fundamentally dynamic in nature.

The fundamentally dynamic nature of educational (and certain other) research largely depends on the researcher's philosophical assumptions, as indicated earlier. In relation to such factors, the mixed methods approach cannot be complete without an appreciation of historical developments.

In this investigation, I thus choose to employ the term instrumentation loosely to refer to the design, methodology and methods of data set collection. In this case instrumentation encompasses specific data collection methods.

5.3 Towards a Mixed Instrumentation Approach: A Historical Appraisal

As stated earlier, managing the research inquiry involves selecting appropriate instruments, seeking clarity on developments in current practice, and surveying a range of theoretical discussions on the general subject of investigation. Thus, appreciating the origins of the mixed method approach can shed more light on how the tools can be used effectively.

Origins of the mixed method approach can be traced to the social sciences. The expansion of the mixed method as an approach is locatable in health and medical sciences, nursing, social work, pharmacy, family medicine and allied health practices, amongst other fields. A predominant view regarding the origins and methodological development of the mixed methods approach is attested to by Campbell and Fiske (1959). In their research, they advocate multi-trait methods to triangulate data. Such initiatives saw the blossoming of tangible mixed method research in the 1980s.

Alluding to the evolution of a mixed methods approach, Creswell and Plano Clark (2011) state that the developmental period of mixed methods started in the 1950s and was sustained until the 1980s. According to them, the period brought with it a preliminary interest in using a multi-method approach in a single research inquiry (p.25). In addition, in the course of the late 1980s and early 1990s in several disciplines more than a single quantitative and qualitative approach was used as separate and divergent elements of one study (p. 20).

Even though substantial numbers of studies were conducted between 1900 and 1950, these suggest nothing important about multimethods (Tashakkori and Teddlie, 2003). Tashakkori and Teddlie argue that the first attempt at an explicit multimethod or mixed research project occurred only in (1950, p.6). Other literature dates its use to the same period between 1980 and 1989. In 1989, a published book entitled *Multimethod Research: A Synthesis of Styles,* written by Albert Hunter and John Brewer on sage publication came onto the market for researchers.

From the 1990s to date, scholars use the term mixed methods research. It has become more popular recently in the research worlds of. business, social, behavioural and health sciences, where it has been referred to as mixed methods research.

5.3.1 Defining Mixed Method Instrumentation

The mixed methods approach is described in several ways by various scholars, which makes it quite a difficult concept to define (Niglas, 2009). Some describe a mixed methods approach as an empirical inquiry which subsists on both the collection and analysis of qualitative as well as quantitative data (Denscombe, 2008). Others explain mixed methods research as: "[t]he class of inquiry where the inquirer fuses or combines qualitative as well as quantitative inquiry techniques, approaches, methods, conceptions or language in an individual study or set of related studies" (Johnson, Onwuegbuzie, & Turner, 2007).

Another interesting definition, pertinent to my area of inquiry is by Udo Kelle who defines mixed method research as:

> the combination of different qualitative and quantitative methods of data collection and data analysis in one empirical research project. This combination can serve for two different purposes: it can help to discover and to handle threats for validity arising from the use of qualitative or quantitative research by applying methods from the alternative methodological tradition and can thus ensure good scientific practice by enhancing the validity of methods and research findings. Or it can be used to gain a fuller picture and deeper understanding of the investigated phenomenon by relating complementary findings to each other which result from the use of methods from the different methodological traditions of qualitative and quantitative research. (Kelle, 2006)

This part of the definition relates directly to the intention behind my research project, in my endeavour to gain a better understanding of the role of emerging technologies and their potential value to comprehensive input for literacy development. However, further noteworthy exhaustive or representative definitions on the subject advanced by Creswell, Clark, Gutmann, and Hanson, (2003, p. 212) read as follows:

> Mixed methods study involves the collection or analysis of both quantitative and qualitative data in a single study in which the data collected concurrently or sequentially, are given a priority, and involve the integration of the data at one or more stages in the process of research.

In other words, both quantitative and qualitative methods may be utilised, as is the case in my current study (see diagram). Whereas the definition of mixed methods applies only to single inquiries, the Mixed Methods Approach (MMA) may be described more broadly as an integration of two approaches in a cluster of individually coordinated inquiries (Creswell and Clark, 2011; Polit and Beck, 2004).

The integration or synthesising of qualitative and quantitative approaches is done to use inferences from both methods for an improved understanding and a corroboration of findings. Greene (2007, p. xiii) believes that a mixed methods approach affords investigators an opportunity to mitigate the weaknesses or limitations or strengths inherent in each of the methods as well as to offset the inevitable biases of the methods. Creswell and Plano Clark (2011) remark that the mixed methods approach provides a more extensive understanding of the problem under investigation than if one approach were to be applied to a particular study.

A mixed methods approach as Creswell and Plano Clark (2008) observe, is situated as both a method and a methodology. In other words, as a distinct research methodology, the mixed method instrumentation is relatively new to the academic faculties of human and social sciences, hence it requires that more light be shed on what it is and what it is not. As jnoted, while scholars may have different definitions, these converge on the principle and intent of the approach.

For example, Creswell's (2014) definition of the mixed method as "an approach to inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data and using the distinct designs that may involve philosophical assumptions and theoretical frameworks" agrees with Johnson's. For Johnson et al., mixed methods could be described as:

> …the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g. use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration (Johnson, Onwuegbuzie, and Turner 2007, p.123)

The mixed methods approach can therefore be summarised by its core characteristics inherent in the approach. One characteristic is the ability for investigators of a phenomenon to collect and analyse data sequentially or simultaneously by integrating both forms of data. The manner in which mixed method data is integrated rests on the philosophical assumption of the inquirer and the nature of the inquiry. There are several reasons why the researcher might want to mix the methods for a particular study. Greene et al. (1989) advance some of them. The first though not the greatest, is triangulation.

Firstly, triangulation creates avenues for corroboration and convergence of the results from each approach. Secondly, Greene et al. (1989, p.259) advocate complementarity, which seeks amplification, augmentation, illustration and interpretation of results between the two methods. Thirdly, initiating an inquiry using a synthesis of methods leads to the discovery of inconsistencies as well as contradictions in the data sets. The advantage of discovering inconsistencies and contradictions is that one can get back to the drawing board to reformulate questions.

Such features appeal to me as an inquirer because de-emphasising singular methods in favour of a broader picture of what the mix of methods would achieve, is vital to my research. Moreover, choosing the mixed methods is founded on an assumption that every phenomenon possesses both quantities as well as qualities. In other words, the investigation of a phenomenon conveys information relative to both numbers and words, which are a representation of phenomena.

Initially a qualitative phenomenological approach was adopted for the research. However, this changed during the piloting phase owing to certain cultural and linguistic factors of which I became aware. This realisation resulted in my resorting to an emergent design (Creswell and Plano, 2011). When a planned design appears to be inadequate in the course of the inquiry, the emergent design is activated (Morse and Niehaus, 2009). It involves the addition of an element of the other type thereby remedying inadequacies in the initial approach which have revealed themselves.

Criticism of the practice of adding an element from the other approach raises questions about whether investigators must try to factor in all such challenges in advance, or whether this can be done in the process of the study. Two responses to this query shed light on the researcher's predicament. The first is that it is important for the researcher to plan for eventualities because doing so can enable them to handle challenges and still collect a meaningful data set. The second response takes into account that circumstances beyond what is prepared for inevitably arise and therefore prompt the researcher to make the decision to include an additional research approach. Generally, it is advisable to brace oneself for unexpected developments.

A mixed methods approach (QUAL and QUAN), using a concurrent triangulation strategy was therefore adopted for this study, in order to obtain a wide-ranging rounded data set that

would provide a broad picture of *"Vamakhalilo"*- the lived experiences of teachers and learners with regard to iPad use. *Vamakhalilo* is a word I coined from my mother tongue Tumbuka, a language that is shared between Zambia, Malawi and part of Mozambique. It is a generic and equivalent word that means lived experiences. However, I will refer to this word at greater length in Episode 6 dubbed *Vamakhalilo* –presentation of lived experiences.

Suffice to say, two kinds of data were collected, that is, statistical (numerical; numbers) and textual (electronic; graphics), read as multimodal. This was in addition to themes and descriptions determined by personal generalizations.

5.3.2 Towards an Integrated Approach: Mixed Methods

A concurrent triangulation strategy QUAN and QUAL, or a mixed methods design was employed (see figure 8, p.147) below. As explained earlier, the Mixed Methods Approach (MMA) initially labelled, Multi-methodology or multimethod study (Tashakkori, & Teddlie, 2003), incorporates multiple approaches to data collection within a scientific study or group or set of connected scientific studies. It combines qualitative and the quantitative methodologies (Carey, 1993; Creswell, 2009). Unlike the multi-methodology, the MMA study is much more precise because it contains the mixing up of qualitative and quantitative data, approaches, methods and/or paradigms within a scientific study or set of connected scientific studies. One could claim that the mixed approach studies constitute a unique scenario of multimethod study. An additional useful, but more infrequently employed tag for multiple or mixed study is 'methodological pluralism'.

Many advocates of these methods for professional and academic investigation stress that mono-method investigation could be enhanced by using numerous data sources, approaches, methods, viewpoints, standpoints, and paradigms.

The combining of these approaches is mostly employed in investigations requiring a better understanding of the research problem. The argument about whether or not it is appropriate to use a combination is solely dependent on the researcher's preference and their objectives as they seek answers to their research question. Among several benefits, the approach gave me as researcher leverage to understand the problem of the study better, and allowed me to have a complementary data set. However, critics of this approach point out that the complexity of the data set poses interpretational and analytical difficulties.

Those who opt to use the mono-method approach argue that each method is adequate and has the features required for the cross-validation and triangulation of data. They base this on the belief that the two approaches are each accompanied by distinct assumptions and are set up to investigate differing phenomena.

However, it is beyond the scope of my study to dispute the potential in, or the differences between qualitative and quantitative paradigms. I concur with Carey (1993) who describes these approaches as mere tools which when mixed, render an opportunity to find answers to questions of importance. Thus, the blend does not imply that mono-approaches are inadequate. In seeking data complementarity, the researcher is availed of an opportunity to see the phenomenon under investigation within a bigger picture.

In the next section my focus is on the philosophical assumptions of the mixed methods approach.

5.3.3 Philosophical Assumptions in the Mixed Methods Approach

As already indicated, initially this study was designed as purely qualitative. However, circumstances arising from the pilot study necessitated the adoption of an additional approach. For example, it was discovered in the course of the research that the learners were not able to respond with adequate explanations, due to their linguistic inadequacy. Thus, in order to gain more rounded answers, mixing the data harvesting tools became necessary. Consequently, the study adopted a concurrent triangulation of QUAN and QUAL alongside data collection and analysis, and methods guiding interpretation. Arising from this was the necessity to create an outline of the philosophical assumptions which undergird this combination in my study.

For research-based practice aimed at enhancing both teaching and learning, a Mixed Methods Approach (MMA) presented the dilemma of how best to shape this research design to explore the lived *(Vamakhalilo)* realities. The context required that I set aside the tug of war between the ontological, epistemological and axiological perspectives confronting qualitative and quantitative investigations.

Hence, I refer to some historical background in order to clarify how my own philosophical assumptions and decisions evolved in this study.

During the 1960s and 1970s, writers were adamant that the existence of combined or mixed methods arose as a result of the paradigmatic battles amongst advocates of quantitative and qualitative methods. However, these debates led to the restructuring of studies in sometimes inappropriate or misaligned ways. The 1980s saw the reconciliation of different paradigms by authors opposed to this methodological dualism. Such reconciliation was based on the insight that the choice of methodological paradigm does not exist outside of a philosophical stance. For example, Brannen (2007, p.7) suggests that the selection of methods is influenced by one's philosophy of knowledge and perception of truth. This is the first thing every investigator must do: position themselves within world views about knowledge and its assumptions.
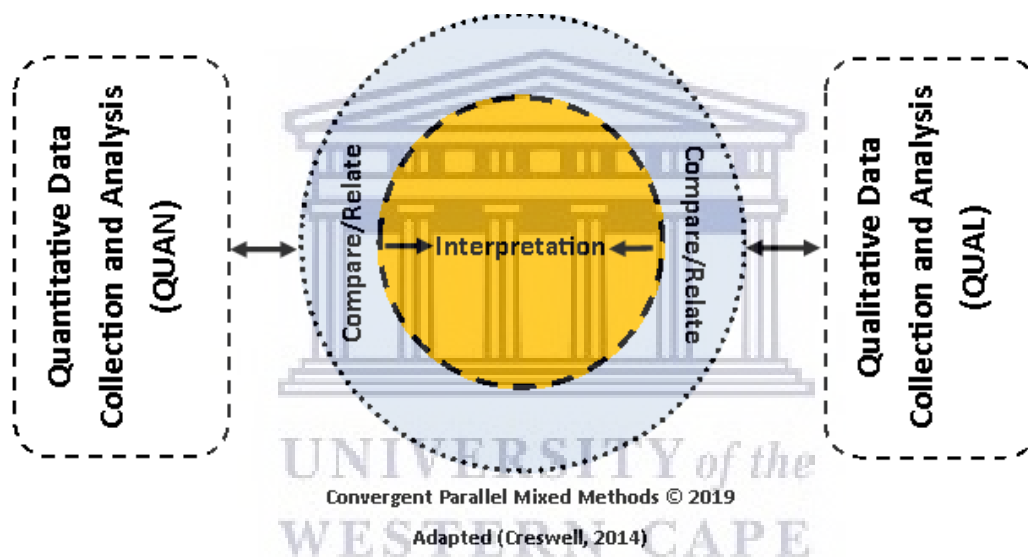
Figure 8: Mixed Mthod Model

5.4 Implementation of Pragmatic Research Design

In order to pursue the objectives of the inquiry, it was necessary to locate it within the relevant international debates on the subject. In the words of Sapsford (2006, p.175) a methodology transmits a philosophical position that undergirds and informs the research style. Any researcher ought thus to consider what research paradigm they would like to use. Doing so would allow them think about what their paradigmatic position is on the nature of reality. Consistent with this view, Appleton and King, (2002) advise that a research paradigm should be consistent with its assumption about the nature of 'truth'.

In other words, the first thing a researcher must do is to locate his or her research paradigm within the framework of whichever reality forms his/her assumptions, or worldview. Arguably, ontological theory advances that truth is highly subjective and is compounded by the viewpoints of the study's participants. Hence, the researcher will use quotes and themes in the words of the participants to provide evidence of different perspectives. This is done by articulating, appreciating and making the research participants' voices, concerns and practice visible. In keeping with the constructivist position, that researcher is obliged to give a true picture of reality (Schwandt, 2001).

In this section, I focus on how the instruments were implemented to collect, analyse and present data from responses to the questions stated in Episode 1 of this study.

Because my pragmatic research design set out to probe the role of emerging technologies (iPad) for literacy development, it necessitated going beyond the use of a single method, which would have confined the inquiry to a mere taxonomic arrangement. Hence, employing the pragmatic research design privileged both subjective and objective data collection in the investigation. This in turn produced further opportunities for meaningful sense-making embedded in the *Vamakhalilo* (lived experiences) of the role of iPads in literacy development (LD) in socially disadvantaged schools.

As stated, the objective was to gain insight into the role of emerging technologies (iPad) for literacy development. According to Chabinga (2015), there is potential for improving learners' proficiency as an earlier study shows that in affluent schools whose language learners' proficiency is above grade level, a slight improvement in literacy was observed with similar instruments. Hence, to gain a broader picture, it became necessary to obtain data from rural schools too. This would provide an authentic assessment of the role of emerging technologies for language learning in rural schools.

However, appreciating the role of the iPad in socially disadvantaged rural schools requires that the reader be briefed of the context in which the pilot study was conducted.

5.4.2 Pilot Study

Gorman and Clayton (2005, p.98) describe a pilot study as a draft research plan applied in a neutral location that will not be used in the actual fieldwork. It is not to be used in the collection of preliminary data within the actual location(s) from which research study data is

to be collected. Thus, a pilot study allows one to test several variables and to iron out any initial inadequacies in the study.

In order to test and increase the reliability of the instruments for data collection, I conducted a pilot study from August to October 2018 from schools that did not use ZEduPads for teaching and learning. Research instruments included the human instrument (researcher), questionnaires, and schedules for interviews, focus group discussions and observations. Small focus groups of eight learners were used in the pilot study, thereby mimicking the number of learners who would participate in the actual study. The pilot study provided me with an insight of how the participants would respond to the data collection instruments I used in my study. Discussions were recorded, transcribed and analysed.

Results emanating from the pilot study revealed a need to improve the questionnaire and the interview schedules. For example, the initial questionnaire using 'yes/no' questions did not adequately elicit emotions or feelings from the 'participant'. Hence, a likert scale type was used. Apart from revealing the necessity for changing some questions, the results revealed the potential of ZEduPad to enhance literacy skills amongst primary school learners.

Thus, conducting a pilot study after having checked for reliability and validity of the research instruments is of paramount importance. As noted, a pilot study can be described as a mini version (a feasibility study) relative to a full-scale study (Van Teijlingen and Hundley, 2002). However, while its aim is to pre-test the research instruments such as the interview protocol and the questionnaire, there is no guarantee that conducting a pilot study will ensure success in the main study. What it offers is limited to increasing the chances of achieving objectives of the main study. It serves an opportunity to facilitate best progress once the main study is underway.

It is clear to me that pilot studies serve a wide range of essential purposes which can be of value to other investigators. However, researchers require more deliberations that would provide guidelines for the process of conducting the pilot studies as well as the outcome of the same.

In this current study, the pilot investigation was a mini inquiry representative of the main study which targeted a sizeable number of participants from schools in Northern Province of Zambia. Even though the participants were few – up to 30 pupils purposefully selected from the three schools, and three teachers – they mirrored the traits of the total sample for the main

study. The development of the questionnaire as well as the interview protocol was done with help from my supervisor as well as peers, some of whom are PhD students in the Department of Statistics at the University of the Western Cape.

The aim in conducting a pilot study was to determine how feasible the study would be as well as to test for the validity and reliability of my instruments. As indicated, it was also because I wanted to gauge how understandable, appropriate and practical the instruments were. This pre-testing helped a great deal in addressing most of the challenges and some biased questions. In addition, pre-testing enabled me to gauge and adjust the period for carrying out the study and helped me to eradicate confusing and complex wording. The pre-test revealed that the study instruments were not adequately prepared; and eventually, after they had been refined, they were easy to understand. In particular, questionnaires could be adjusted to be comfortably completed in 5 to 10 minutes.

In the process of data analysis, explained in Section 5.5, help with a Statistical Package for Social Sciences (SPSS) was sought from PhD peers for data input, cleaning and analysis. This process helped me re-formulate the research questions and objectives, adjust the total number of participants, revise confusing questions as well as plan for the main study. This was done in order to come and get back to the research as a way of member checking.

5.4.3 Description of the Study Site

Walford's (2001) warning remarks regarding research site selection inspired me to pay careful attention to this aspect of my study. Among the factors considered for site selection was the need to stay true to the theoretical objective of the investigation, namely, the role of emerging technology in literacy development to inform the practice of teaching. Other factors concerned obtaining access to sites that would provide me with specific information. Furthermore, much attention was paid to the time, and the financial and personal costs that come with fieldwork, especially in outlying locations such as two of the three schools involved in this research – as shown on the map in Figure 9.

The current study investigated the role and use of emerging technologies (iPads) in three economically and socially disadvantaged schools in the Mungwi District, Kasama, Northern Zambia. Of the three sites – shown by pin points on the map of Northern Zambia – two are situated on the banks of Chambeshi River, approximately 70 kilometres from the Provincial Capital (PC) and 925 kilometres from the National Capital (NP).
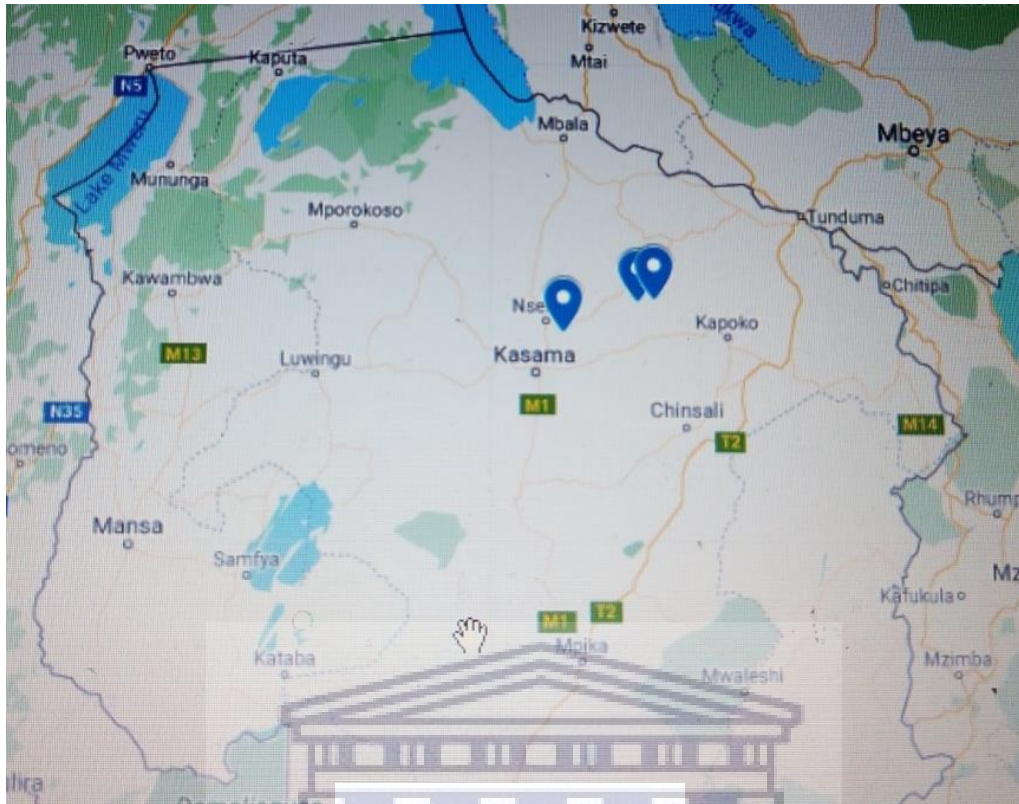
Figure 9 Research Site Map

The two schools, M and the P, are 15 kilometres apart on the Chambeshi River banks while the K is 25 kilometres from the PC, east of the Mbala Mpulungu Road. Except for M, K and P run from Grade 1 to Grade 9 respectively. The schools are all rural and disadvantaged; the criteria which my study purposefully chose to investigate. In partnership with World Vision (working with rural schools) through the Stavros Niarchos Foundation, the three schools were provided with fun2learn ZEDuPads. Table 2 shows the number of ZEDuPads and the teachers trained at the time.

Table 1

SCHOOL	NUMBER OF TABLETS	TEACHERS TRAINED
M	90	1
K	80	5
P	77	5

However, by the beginning of 2018 during the data collection period, most of the teachers were transferred from these schools and this affected the use of these tablets. For example, K

had 2 teachers officially trained who also trained a few other new teachers in the school; and P had one officially trained teacher who also trained 3 more teachers to use the devices.

The next section focuses on the sampling process.

5.4.4 Sampling of informants

One of the most difficult tasks to undertake during mixed methods research is the sample selection process. The selection of samples in quantitative and qualitative inquiries can be seen as two distinct albeit interconnected judgements. According to Collins (2015), the researcher must decide on the *plan* for selecting their informants for example, the scheme of sampling; and must also decide how many informants will be involved, in this case, the *size* of the sample. This process therefore requires a sampling design (Collins, 2015) which becomes complex in concurrent or sequential mixed methods research within a single inquiry. The choice of a sampling design is thus crucial because it affects the meta-inferences and the extent to which the results can transfer to, or be generalised for other contexts, individuals and groups.

In carrying out the qualitative study for example, the researcher chooses participants and the research site that seem to offer sufficient information. In my view therefore, intentional or purposeful sampling lies in leveraging the immunity the inquirer enjoys in conveniently hand-picking informants who have insight into the key concepts under investigation.

Of several sampling schemes for mixed methods research I opted to deploy the "convenience" and the "multi-stage" purposeful schemes proposed by scholars like Collins (2015); Creswell (2009); Johnson, Onwuegbuzie and Turner (2007); and Onwuegbuzie and Collins (2007). The convenience sampling scheme involves selecting sites, groups or characters that are suitably accessible and disposed to take part in the investigation. Similarly, the multi-stage sampling scheme involves choosing sites, groups or characters that represent a sample in more than two stages, reflecting purposeful participant sampling. These schemes suited the objective, which was to gain insight into how iPad with its affordances serves as a multimodal comprehensive input for literacy development and how this in turn might facilitate a network of interlinking interactions.

From a numerical perspective, the researcher in a qualitative study deals with smaller numbers of participants or sites in order not to strain the quality of the study because the

larger these numbers the smaller the amount of information obtainable from each participant. Thus, the key reason for selecting smaller numbers is to ensure quality of information from participants. This is not only convenient but also enables the researcher to gather information more easily, with the prospect of probing in cases where clarity is needed. Four to ten participants are recommended for focus group interviews, although in classroom observations the number tends to be dependent on the class size (Creswell, and Plano Clark, 2011; Creswell, 1998). In this study, the class size ranged from 40 to 100.

In the main, the intention behind sampling in quantitative study is to have the results generalized, by selecting participants who are representative of a study population. However, the purpose of this study was not to generalise the results per se, but to gain insight into the phenomenon of literacy development with the aid of iPads.

Although two questions – one from learners and teachers respectively – were meant to measure the impact of ZEduPads on literacy development, most questions were intended to render insight into the use and role of iPads in language and literacy development. In short, the sampling design was non-probabilistic, and thus involved choosing participants at random (Collins, 2015) to give them a fair chance of being selected.

The key element in quantitative sampling is to have a sample large enough to enable the researcher to draw inferences. The inferences must reflect some level of confidence in the representivity of what is being studied in the target population (Preissle, Glover-Kudon, Rohan, Boehm and DeGroff, 2016). To define the sample size, scholars do sample size calculations using information in research methods books or software. In the case of this study, G*Power software, which calculates statistical power and effect size (Lipsey, 1990; Onwuegbuzie, and Leech, 2004) was used to determine the sample size for the pupils in order to blur the sample size error between the estimated and the true population. Using the G*Power calculations sample priori, the effect size $|\rho|$ 0.024 with Power (1-β err prob.) 0.95 produced a total population of 225 out of which 225 pupils were surveyed.

In research the importance of this particular transaction – sample size effect –is it allows the researcher to differentiate their research results statistically, and hence to indicate significant differences. In order to achieve this level of significance, the investigator must have an increased sample size (Lenth, 2001; Lipsey, 1990). Cognizant of this, I purposefully use the

G*Power software to give me an estimation of the total sample size needed to achieve this statistically significant difference.

5.4.5 The Teachers

Initially, since three schools where involved, I planned to work with three teachers. However, due to a lack of adequate staff in the researched schools, and the fact that they were not fixed to particular classes, I realized there was a need to work with all the teachers provided they taught the classes under investigation that is, Grade 6. As noted earlier in this episode, the benefit of using the mixed method lies in its flexibility to adjust to the needs of the investigator.

Keeping a journal of the teachers' profile allowed me to draw from them valuable information on the role of emerging technologies (ETs) for literacy development. Their qualification guaranteed high quality responses about their experiences in the use of ZEduPads for teaching and learning across subjects but more importantly for language teaching. In addition, I was assured of acquiring a true reflection of the teachers' perception of their classroom dynamics while using the tablets. This was crucial to my study as I needed this information for making unbiased judgement during data collection, and when sifting through it for interpretation.

My 14 years of teaching experience stood me in good stead for evaluating the quality of teacher responses, and for gauging whether or not these provided insight into their knowledge of their role. What was also useful to my data collection was the process of documenting the teachers' biodata, which included but was not limited to age and number of years in the profession.

As indicated earlier, although I did not have fixed Grade six teachers, all seven teacher participants were responsible for teaching all subjects – as is expected of primary school teachers. In Zambia, primary school teachers are trained to teach all the subjects.

However, things have changed since the data was harvested. The Ministry of General Education (MoGE) has determined that primary school teachers should operate in the same way secondary school teachers operate, according to subject specialisation. However, this has not been established unproblematically. It has come with several challenges, which I would like to share on another platform. Table 3 reflects a summary of the teachers' profiles.

Table 2

Teachers Profile and Experience in Years

	Age	Sex	Qualification	Experience
Teacher A	26	Male	Primary Degree	2 Years 6 months
Teacher B	23	Male	Primary Certificate	3 Years
Teacher C	24	Male	Primary Certificate	2 Years
Teacher D	32	Male	Primary Certificate	10 Years
Teacher E	24	Male	Primary Certificate	2 Years
Teacher F	28	Male	Primary Diploma	7 Years
Teacher G	28	Male	Primary Certificate	3 Years
Total No	7			[9]

Table 3

Qualifications Summary

	Frequency	Percent	Valid Percent	Cumulative Percent
Certificate	5	71.4	71.4	71.4
Diploma	2	28.6	28.6	100.0
Primary Degree	0	0	0	00
Total	7	100.0	100.0	

5.4.6 The learners

Of the total sample of 215, 225 pupils were recruited through the three primary schools who participated in the investigation. The pupils were aged between 10 and 15 years. Their home language is predominantly iCibemba with very little knowledge of English, which they hear only when they are in the classroom with the teacher. Because the schools under investigation are rural schools, it was expected that there would be few pupils aged 15 at this level. In Zambia, the prescribed age for Grade one (1) entry is 7 (MoGE, 2015). The children's Socio-Economic Status (SES) is very low. Living on the banks of the great Chambeshi River, the children's economic welfare revolves around the river, mainly through fishing. This local economic activity contributes to absenteeism and lack of interest in school among these children.

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[9] Qualification differences: The Primary Certificate indicates that one acquires a basic level of knowledge in a particular field while the Primary Diploma is a more focused course that aims to enable teachers to specialize in their field. Meanwhile, a Primary Degree enables graduates to illustrate knowledge and competencies required for access into the job market that is, primary school teaching.

5.4.7 Classroom Observations

In order to achieve the objectives, I approached this study as an interdisciplinary investigation. For example, in order to gain access to meaningful practices involving the use of ZEduPad for literacy development in the classroom, I relied on the theoretical framing of this inquiry. It assisted me in exploring how the Comprehensive Input Hypothesis, Affordance, Interactionist, and Actor-Network theories interface to provide meaningful comprehensive input into literacy development via the use of the multimodal ZEduPads. Similarly, to gain meaningful data from the field – the natural setting of the classroom – (Creswell, 2009; Denzin, and Lincoln, 2000, 2008) I had to borrow from concepts of ethnography for data collection through observation.

Intergrating the photo-ethnography, ethno-recording, interviews, field notes as well as phot-numeric[10] data revealed high quality insights into the experiences of ZEduPad use for literacy development in Grade 6 classes. Direct observation was also one of the strategies I used to gather information and to explain the use of tablets for teaching literacy.

Owing to this perspective, it is clear that observation is one useful data collection tool for mixed methods research. Certain scholars think of observation as a systematic process of recording the behavioural patterns of participants, objects, including occurrences, without necessarily questioning the participants (Marree, 2007; Marshal and Rossman, 2006). It generally captures behaviour as it occurs in a natural setting (Cargan, 2007, p.142) where hearing and smell are a part of the process. While there may be arguments against this type of procedure about affecting the behaviour of participants as they are being observed, observation is a useful tool that allows the researcher to discern what people claim to be doing, as well as to understand their behaviour (Bell, 1999).

There are two types of observations, namely participant and non-participant observations. In participant observation the researcher is involved in the activities, while in non-participant observation, the researcher does not 'interfere' with participants in the research (Swarts, de la Rey, Duncan and Townsend, 2008).

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[10] Photo-numeric is a term originally used in clinical work to signify the arrangement of photos for clinical tests. In my study, photo-numeric is used as a generic word to mean getting an understanding /making sense of and capturing the numeric data to tell a story from a series of pictures taken and arranged numerically.

This research used the non-participant method which means the researcher did not directly interact with the participants (Swarts, de la Rey, Duncan, and Townsend, 2008). Both teachers' and learners' activities with ZEduPad tablet technology were observed as the teachers delivered their lessons in English Language. Thus, not only was I able to record videos, I was also able to take still photos during the observation process. Where I appeared to have missed valuable pictorial moments, I was able to take live photos directly from the videos using Atlas Ti.8. This extended application of the ethnographic data collection tools has become highly useful, in addition to other tools such as document analysis.

5.4.8 Semi-Structured Interviews

Interviews come in the form of conversations which are tailored to allow the researcher to see the world through the eyes of the participants. The latter can be variable sources of information, as long as the strategy is used correctly (Marree, 2007). Strause and Corbin (1998) postulate that interviews are social interactions between the participants and the researcher. They are usually used with the aim of ascertaining what the participants think, feel and know about certain things.

Although there are other types of interviews such as standardized open-ended and closed interviews, this research used the semi-structured interview because it could accommodate probing responses for clarity while participants answered predetermined questions (Marree, 2007). With closed-questions, there is a limited number of choices when answering, but with open-ended questions the respondents can respond in their own words, allowing for a wide variety of answers. Nunan, (1992) maintains that semi-structured interviews involve questions which elicit the deeper subjective experiences of the participants. In this research study, I used the semi-structured interview because it gave me a chance to prepare questions in advance. Additionally it allowed me to let participants express their own views (Marree, 2007).

Allowing the participants to express their views freely on the use and role of ZEduPads for literacy skills development yielded meaningful authentic data. Getting honest and meaningful data through interviews was achieved due to successful interview question development that adhered to the Interview Protocol Refinement (IPR) framework (Castillo-Montoya, 2016).

The key concept of the IPR framework is to strengthen the quality of data collection and to some extent to enhance the reliability of the interview process and eventually, the

corresponding data. In order to achieve this, Milagros Castillo-Montoya argues that the preparation of interviews must go through four procedures under the IPR framework. These procedures include, but are not limited to firstly, "ensuring interview questions align with research questions; secondly, constructing an inquiry-based conversation; thirdly, receiving feedback on the interview protocols; and fourthly, piloting the interview protocol" (Castillo Montoya, 2016). Although the IPR is appropriate for structured and semi-structured interviews, Castillo-Montoya (2016) suggests that the framework can also be applied to non-structured interviews. But first, the interview protocol must go through the phases of development.

In ensuring that interview questions aligned with the research questions during the development of the interview protocol, what emerged was an awareness of how complex lived experiences are. Acknowledging participants' intricately complex experiences enabled me to think seriously about formulating reliable questions that would yield quality responses. I was alert to the fact that it takes time and patience to elicit responses that entail experiences which do not simply unravel themselves neatly before the investigator. Thus, this required careful listening and intentional follow ups on my part each time I engaged the participants. As Seidman, (2013) puts it:

> [T]he goal of in-depth interviews is not to merely have answers to questions… rather, the essence of in-depth interviews is the investigators' interest in understanding the lived experiences of the researched and the meaning they attach to such experiences…and at the heart of interviewing research is an interest in other individuals' stories because they are of worth. (p. 9)

This quote helped me to avoid a mechanical approach to interviewing. It triggered in me some sense that people's lives have value and so they should be treated with the utmost care. During the interview sessions, such sensitivity enabled me to be careful as I inquired about their experience in the use of ZEdPads. This was possible because I invested time in formulating the interview questions that were closely informed by the research questions. Furthermore, the participant's context and their daily practice were explained in the second stage thereby constructing an inquiry-based conversation.

The second stage or step in the IPR framework – constructing an inquiry-based conversation – was to ensure that the interview questions were framed to foster and sustain a good conversation. This was done in order to elicit meaningful responses from the participants' points of view (Patton, 2015).

Since interview questions are different from the research questions, the interview questions were tools that enabled me to tap into the participants' lived experiences, thereby reinforcing my understanding of the research questions (Maxwell, 2013). To make my conversational interview questions stimulating and easy to understand I relied on my knowledge of the cultural norms manifested in everyday language practices. This kind of thinking is consistent with Brinkmann and Kvale (2015) who suggest that the research questions are framed within the theoretical language, while the interview questions are communicated in the daily language of the participants (p.158). Thus, in order to keep good conversations I asked one question at a time, avoided jargon while keeping in mind the commonly used terms (Merriam, 2009; Patton, 2015).

With this in mind, I was attuned to the idea that interview questions were meant for me to gain further information relative to the aim of this inquiry. Thus, in order to sustain a conversation as Creswell (2007) suggests, all my questions included four types namely, introductory questions, transitionary questions, key questions, and closing questions. However, it is not my intention to dwell in detail on these question types. Suffice to say, each question was asked to lead me closer to obtaining detailed quality information. For example, the first type of question sought to understand how teachers have been using iPads or any form of technology for teaching. This type of question is one that does not appear intrusive. Other questions offered links between pieces of information and so on.

Because this study adopted a mixed methods approach, this was how important the interview protocol was in complementing the statistical data collection explained in another section of this Episode. Moreover, such questions, in my view, may be perceived as follow up questions as I gained further information to key research questions thereby eliciting valuable data – relative to how the questions are structured, of course.

Receiving feedback on the interview protocol is the third stage of the IPR framework in the development of an interview protocol. Unlike the first and the second stages where the inquirer's focus was to formulate conversational and probable questions to elicit key information, the third stage is concerned with getting feedback on the interview protocol. Feedback ensures that the instrument is trustworthy and reliable. It is an important aspect because through feedback, the inquirer can potentially gain insight into how to understand interview questions from a participant's point of view, and to gauge whether their understanding is closer to (or further from) what the study expects to find out about (Patton,

2015). Through this lens, several interventions were made such as vetting interview questions as well as reading them aloud.

Also, I involved my peers in giving me feedback on the interview protocol. My supervisor was particularly helpful in making sure my interview protocol – including the questionnaire – conformed to a good writing style, length, structure as well as comprehensibility. Nonetheless, in order to avoid collecting incomplete data, my interview protocol was tested.

Piloting the interview Protocol is the last phase in the IPR framework. At this stage, my interview protocol was not only aligned to the goal of this study, but the questioning path was conversational while remaining inquiry-based. At this stage, my interview protocol was fully developed; I had received feedback on its answerability, simplicity and clarity. I was ready to test the interview protocol in a pilot study which I carried out with participants who mirrored the traits of the sample population I interviewed (Maxwell, 2013).

The pilot study, which replicated the real situation as far as possible, offered me a chance to simulate the interviews in a real manner and to practise how I would conduct the actual interviews. The pilot study, conducted on April 2018, was thus aimed at testing the instruments to ascertain their viability.

Lessons drawn from the pilot study indicated both a massive amount of available data, and that collecting the data for the study meant more than just dishing out questionnaires or merely asking interview questions to gather information. In the final stage, I jotted down notes which helped improve how I conducted the actual interviews in schools PPS, KPS and MMPS.

To sum up, the IPR framework helped me to create an interview protocol that would hopefully elicit honest and meaningful data during the actual research. It prompted me to approach this study using semi-structured interviews with the seven primary school teachers who taught English Second Language (ESL), and Grade six learners who were purposefully selected with the help of the teacher.

As noted in Section 5.4.2, purposeful sampling is vitally necessary as in this case, the selected participants were knowledgeable enough to give me the information that addressed the study (Coyne, 1997; Palinkas, Horwitz, Green, Wisdom, Duan and Hoagwood, 2013).

Open-ended questions were used to collect data in this regard through focus groups with the learners, while individual interviews with teachers provided similarly relevant data.

5.4.9 Focus Group Interviews

Focus group technique is one of the most widely used research tools for data collection in the social sciences. As a data collection tool, it dates back to World War II (Stewart and Shamdasani, 2015; Stewart, Shamdasani and Rook, 2007).The group interview technique specifically, can be traced from the behavioural and clinical sciences, and psychology in marketing research as a source of primary data (p.3). This is because focus groups are particularly useful in qualitative research. They have the embedded potential of opening up new insights and generating an understanding of key issues relative to the study underway. In this study, focus group interviews were used with the participation of purposefully selected learners.

Various definitions of the focus group point to how the technique contributes to research in social sciences. On one hand, Lichtman's (2013) definition of the focus group points to a 'group interview' (p.207). On the other hand, Kitzinger (1994) describes it as an 'organised group discussion' aimed at exploring and eliciting individual personal views on their lived experiences (p.103).

Crucial to what constitutes a group interview is the fact that it encourages interaction among participants as a collective activity. This is why to generate data in this study I used the focus group interviews with selected learners. Each focus group consisted of 8 pupils. The selection of learners involved the class teachers who picked learners based on their performance.

Focus group interviews can accommodate only a limited number of between 6 and 12 participants (Krueger and Casey, 2002; Stewart and Shamdasani, 2015). Due to this limited number of participants, focus groups may not be representative enough. However, the purposefully selected participants – believed to be knowledgeable in a particular field – provided me with rich in-depth data for the study. That is why it is highly recommended that participants are selected on the basis of their perceived knowledge of the particular topic being researched (Rabiee, 2004). Also, the small numbers of participants in focus group interviews are easier to manage and control. It is argued that not only can a small group be managed more efficiently and effectively, but it is also conducive to having a large amount of data elicited from it (Rabiee, 2004; Stewart and Shamdasani, 2015). Using this technique for

data collection helped me keep the discussion under control while focusing on the areas of interest as described in the research questions. The nature of the group discussion brought to light new ideas that became useful to my study because focus groups are dynamic and not static. Generally, 70% of the learners admitted that the ZEDuPads were useful in enhancing their literacy levels.

However, critics of focus group discussions contend that sometimes it is difficult to control the group. Not all participants may get a chance to be heard. To forestall such potential challenges therefore, the interviews were done through turn-taking and note-taking; the latter was later used as a component of the documents informing my study.

5.4.10 Policy Documents and web-documents iSchool

A set of documents formed one of my data sources. It included web-based documents compiled by iSchool Zambia, the proprietors of ZEduPad. These documents provided me with valuable insight into the efficacy of ZEduPad for teaching and learning, particularly for literacy skills development.

As I have sourced, and thus refer to various documents for my research, it is important to describe what constitutes a document and to clarify its importance in the investigation.

In broad terms, a document could be any written text. However, today the definition of a document has been broadened and contested, making it difficult to define precisely. This is partly because documents must be perceived as socially situated and embedded (Scott, 1990). The Merriam Webster Dictionary defines a document as "an original or official paper relied on as the basis, proof, or support of something… (such as a photograph or a recording) that serves as evidence or proof" (Merriam-Webster, 2019). An extended form of the definition has a daring twist to it. The extended meaning relates to "a material substance (such as a coin or stone), [bearing] a representation of thoughts by means of some conventional mark or symbol".

Currently this definition also refers to the act of constructing or even producing something such as a film or novel providing authentic events and situations. Moreover, other definitions include 'document' as any piece of information, either in black-and-white, published, photographs, electronic or any artefact, including video-recorded files that could provide information about anything (Marree, 2007). However, regardless of the sound

definitions describing what it is, it is important to be clear about its importance and what type of document one would like to incorporate in one's own research.

As described by Guba and Lincoln (1981, p.228) and Silverman (1993), a document is "any written material other than a record that was not prepared specifically in response to some requests from the investigator". To this effect, Silverman (1993) has categorized documents as files, statistical records, records, records of official proceedings, as well as images. However, Guba and Lincoln (1981) argue that there is dissimilarity between records and documents. According to them, "[a]ny written account organized by an individual or agency attesting to an occasion thereby providing (an) account (of) such events" (Guba and Lincoln, 1981, p.228). In looking for documents it is important to be cognisant of the fact that these go beyond the recording of facts; the process involves a reflexive confrontation with the ethical bedrock of social inquiry (Coles, 1997, p.6).

Atkinson and Coffey (1997, p.55) further argue that documents are not stand-alone pieces of material but one unit which should be reflective of the theoretical frame of reference to make its content understandable. Thus, documents form part of an important source of information in this study. Most which were used are premised on the fact that they were i) authentic, ii) meaningful, iii) credible, and iv) representative. Here documents include the lesson plans, learners' digital work on the tablets, and the policy document entitled 'Educating our future'.

5.5.1 Authenticity

Authenticity relates to whether or not the source or originality of documents is true or questionable. This includes whether the creation or production is authentic, reliable and un-altered. Checking for evidence such as authors' details, publication dates and place etcetera are fundamental criteria for authenticating documents. Therefore, it is the inquirer's obligation to check the authenticity of any document selected for use in a research investigation. Just as we must be sure about the sites and the participants we are going to involve in the study, it is important that investigators are sure that the information gathering is not staged in anyway. That is to say, the document should not have textual editing on it, or marginalia or indeed any other form of document transformation.

To achieve document authenticity for the iSchool Zambia document, I made sure I was given the correct website from which I was able to download the portable display format (PDF). However, I remained alert to the possibility that certain elements might have been present (or

absent) rendering the document questionable or not what it appeared to be. For instance, legal court documents, wills, or even marriage certificates can be forged or falsified, and even literary works might be attributed to wrong authors (Platt, 1981).

I was alert to the fact that the documents I analysed were indeed the original documents and authentically so. I did not take this for granted simply because the documents were from authentic sources. So, I further evaluated the documents to confirm their credibility for my study. I visited the World Vision officers who are in partnership with the three schools to find out about their program of iPads in the schools and to establish whether indeed they had submitted reports on the success or the challenges of their program in these schools. The World Vision confirmed authorship of the documents. Bowen and Platt (Bowen, 2009; Platt, 1981) inspired such action with their warning that even though documents appear to be authentic and original (and therefore truthful), other conditions usually arise necessitating further evaluation. The latter is justified when the objective is to check for credibility.

5.5.2 Credibility

While I ensured that the documents I used were authentic and original, holding some level of truth, I opted to validate their credibility by making sure that the content of the documents was not in any way distorted or altered. Credibility is another criterion for appraising and ensuring that the information contained in these documents was accurate and honest. I reasoned that such interpretation was important if I were to recognise constructed truth through my participants. So, because the documents from iSchool were written by the monitors from the same organisation, I was particularly careful to ensure that the classroom narratives and descriptions were evident enough to suggest only the authors' true submissions with no intention to alter the original experiences of the participants. This I did with full knowledge that it is possible that incorrect entries or descriptions could be recorded in almost any document.

While iSchool has digitized the Zambian primary curriculum, they are a business firm whose core goal is to realise dividends. With this in mind, it occurred to me that their documentation regarding the role and use of the ZEduPad might be flawed.

At a much deeper level, credibility helps to evaluate all documents on two planes: the plane of trustworthiness and that of expertise. Both encompass subjective and objective elements. Trustworthiness is premised on subjective factors; however, it also makes use of objective

measurements such as established consistency and reliability. Scott (1990) advises that in dealing with credibility, the researcher should be worried about the degree to which the inquirer is careful about the perception as they endeavour to accurately record from their perceived point of view. This means that the investigator must be sure that the documents consulted were not distorted or independently prepared beforehand or even transformed to mislead the investigator. Establishing document credibility is not perceived as less important in other fields. It is crucially important to achieve credibility by ensuring respondents' quality truthful and honest expression. Thus, I chose to check for credibility of the documents to ensure that the content was honest and representative of the views of those researched.

Credibility was therefore ensured because the documents were purposeful (Bowen, 2009) in that World Vision was reporting on how the ZEdupads were helping rural schools to enhance teaching and learning. Thus, their report was not mere opinion as they also carried simple surveys to acquire reliable information.

5.5.3 Representativeness

Representativeness is the third criteria used to ascertain typicality of a particular document or account. It seeks to determine reliability: whether the document is representative of a set of produced materials and is not just an idiosyncratic representation. In a mixed methods approach – opted for here – both the survey reports and the thematic information from the interviews could show typical representation of data. For example, articles carefully written by skilled researchers about whether or not technology enhances literacy skills development, use standard methodologies to guarantee representativeness. The methodology section of such reports clearly shows what sampling methods were used to attain representativeness.

What is difficult to tell is whether the documents consulted constitute a complete representation of the information contained in a document set on a particular subject. It is important to be sure about when the documents were written because documents acquire distortions with time as newer information arrives (Scott, 2006). However, because of the powerful nature of information contained in some documents, they become extinct with time because they are used so often that they become worn out and discarded. Less important documents seem to remain available for longer.

In the case of my research, the web-documents from iSchool were checked for recency as well as representativeness in order for me to incorporate information relevant to my study.

The recency of the web documents was within the period of one year from the time they had been published. Achieving representativeness from a general perspective where the investigator thinks all documents can demonstrate credibility and authenticity is important as representative on their own is an expression of methodological mistrust. Like meaning-making, this exercise requires that the investigator applies themselves to make sure representativeness is achieved.

5.5.4 Meaning

The last yet important criterion relates to the actual text analysis of the document. In this process, the researcher assesses whether the unit of information contains evidence that is clear as well as comprehensible. The goal of evaluating a document is to understand what it means. Accessing the meaning involves semiotic and inter-textual analysis to ascertain whether the content of the document is suitably located within its historical setting. One can gauge this partly by examining the approaches used in constructing meaning, and partly by finding out what meaning was perceived by the audience for whom text was intended.

Any document the inquirer comes across is two-faceted in relation to meaning: the literal and the interpretive meanings respectively. When assessing a document it is therefore necessary to decide which interpretations one would form, based on one's enquiry as well as on the truth of its realistic assertions (Platt, 1981).

To this end, I used interviews to supplement documentary data by selecting key informants – both teachers and pupils – whom I considered knowledgeable concerning their experiences with ZEduPad as a phenomenon under investigation. Apart from the four criteria McCulloch (2004) stresses are fundamental, he proposes a fifth approach to analysing documents – through theorization. By this he means if one wants to interpret any document, one can do so by applying the theoretical hermeneutical framework. Reference to this framework for interpreting the material must therefore follow.

These approaches to interpretation are mostly used in curriculum studies. It was thus important to pay attention to what documentary study emphasises about theorisation and the construction of meaning as textual meaning which moves from author to the audience. One common belief is that meaning does not reside in the word but in the recipient's (the reader's or perceiver's) mind. As I looked at these documents, it became apparent to me that utilising the insights from documentary studies provided me with valuable assistance in my

interpretation of the content of documents I had picked for my study. It enriched the data analysis of my study.

In (indirect) support of this, Bailey (2008) argues that documents may be understood as any primary eyewitness experiences of a particular occurrence or behaviour in textual form, written by those who were present at the scene. Document analysis thus focuses on all types of written communication that may throw light on the phenomena under investigation (Marree, 2007). In fact, according to Chris Wharton quoted in the *Dictionary of Social Research Methods*, Jupp (2006, p.79) says of document analysis that it is: "[t]he detailed critical and thorough evaluation of documents created via a diverse range of social practices, (and that it) take(s) a wide range of form(s) from visual images to word(s)."

The importance of document analysis lies in how it enables a researcher to trace and evaluate the circumstances of their historical production. As an indicator of their social function, documents enhance the scholar's interpretation of their research material. In this regard, a portion of my document analysis is the Language Literacy Curriculum and Policy as well as the e-policy document for Zambia. Apart from the iSchool report documents noted earlier, the completed learners' work and the teachers' lesson plans form part of the document analysis process.

Documents such as jotted notes, video-recorded files, learners' artefacts amongst others, were referred to in order to investigate how learners use ZEduPad tablets to develop reading and writing skills. Studying them and looking for anything that linked them to how literacy practices were conducted was one way to find useful information with which to validate my argument.

5.6.1 Analysing Data

Data analysis involves evaluating information using analytical and logical reasoning in the process of scrutinizing every part of the information gathered. Patton (1987) maintains that data analysis is the process of bringing order to the data collected. Similarly, Creswell (2003, p.217) points out that analysing data involves making sense of both textual and visual data. Data representation then entails interpreting the data in broad terms (Creswell, 2003, p.217). It involves choosing appropriate methods of data analysis, which are largely dependent on the research methodology, whether it is a qualitative, quantitative or mixed method approach.

Analysing quantitative data raises issues of validity and reliability as these are crucially important. These ensure that the measurement of the research results is consistent and stable with no errors or biases from either the inquirer or the participants. By contrast, qualitative inquirers sometimes acknowledge both the respondents' and the inquirer's influence as they participate in the research process bringing their own pre-understanding and experiences to the study project.

In the foregoing section, this research was framed as mixing the qualitative and the quantitative approaches in a single study. This decision allowed for a careful complementary triangulation of the data set. Mixing the methods enabled the purposefully selected participants to express their perspectives on the role and use of ZEduPads in language and literacy development (Maykut and Morehouse, 1994). Emerging from the transcribed observations, the individual and focus group interviews, together with the numerical data analysis, data was identified through both inductive and deductive reasoning (Braun & Clarke, 2006). These strategies highlighted the many ways in which the ZEduPad was useful in promoting language and literacy development.

Thus, the qualitative data analysis was highly thematic and reflexively intuitive. It took place throughout the data collection process, while the quantitative aspect was characterised by mechanical code and count and was left until the end. In my use of the mixed methods, I employed a combination of reflexivity and counting for data analysis.

5.6.2 Qualitative Data Analysis

Qualitative data analysis is highly crucial in the process of any research project. This is so despite the fact that every phenomenon has qualities of both quantity and quality. In view of this, my decision to mix the methods was taken to ensure my study would have the desirable properties accessible through qualitative data sourcing. As explained, qualitative data seeks quality not quantity (of information). Qualitative findings were therefore ensured, though not by statistics or numbers (Strause, and Corbin, 1998), but through an in-depth understanding of underlying motives, thoughts, motivation, and in particular human experience (Stake, 2010).

In analysing data, researchers are generally encouraged to transcribe every part of the data collected rather than only some parts of it (Swarts, de la Rey, Duncan, and Townsend, 2008). Contrastingly, Creswell (2003) sees the analysis of data as strongly linked to ethnographic

research analysis. This implies analysing data with close reference to texts and images (Creswell, 2003). Overtly it brings to the fore a deeper understanding and interpretation of the lived experiences of the researched. This perspective on data analysis suggests deployment of an iterative method.

Creswell's (2003: 217) argument is that the analysis of data is ongoing, involving perpetual data reflection, analytical questioning, as well as memo-writing. These activities are necessary throughout the entire inquiry process. In other words, Creswell's position is that the research process is not divorced from anything that makes it a research process. His perspective is reinforced by O'Reilly's (2005, p.3) views on ethnographic inquiry which also draws attention the point that data reflects the frame of analysis.

I argue that ethnography is a meaningless practice on its own, and that it becomes meaningful when deployed via certain other interdisciplinary or disciplinary schemes while it is being used in relation to divergent ideas and practices in the process of an inquiry.

Scholars define ethnography in various ways. However, in my study my focus is on one of its tools for data collection, which is observation. Observation refers to observation of phenomena in a natural setting (Denzin and Lincoln, 2008) with the help of digital devices, herein Digital Ethnography (DE). Following O'Reilly's (2005) open and descriptive definition of DE, I posit that:

> [e]thnography is ... inductive –iterative research (that draws on a family of methods…that acknowledge the role of theory and the researcher's own role and that (of) humans as part object/part subject'…involving 'direct and sustained contact with human agents, within the context of their daily lives (and cultures), watching what happens, listening to what is said, asking questions…in producing a richly written account that respects the irreducibility of human experience'). (O'Reilly, 2005)

This mediated contact during digital video observation with participants enabled me to focus on other things such as note-taking to supplement and enhance immediate thoughts. At the same time, this approach included aspects of a phenomenological position, where the quest is to 'understand lived experiences from the informant's perspective' Leedy and Ormrod (2001, p.157). This focus on probing the participant's experiences helped me to appreciate their understanding of the role of the tablets in the teaching and learning of language. Indeed, this approach helped me search for underlying central themes and meaning related in their

experiences and intentionality of consciousness containing inward consciousness and outward appearance premised on image, memory and meaning (Creswell, 1998, p.52).

Consciousness and intentionality refer to the exploration and identification of subjective and subjacent features of consciousness that go beyond the intention of comprehension of truth from a solitary vantage point. The only critique of this approach from where I stand is that the inquirer may have some stake in the situation. As I was conscious of this, I bracketed all my prejudices. I applied the procedural format of writing the study questions that explored their (pupils) meaning of experience, carrying out interviews and data analysis that enabled me to find meaning in clusters of pupils interviewed (Creswell, 1998).

In view of this, an iterative method during data collection was an inevitable choice for me. The idea of going back and forth as I observed, collected, analysed and questioned added value to the inquiry process. Hence analysing data was an embedded procedure at every stage of the inquiry. The themes that emerged as I collected data were attended to only when I had completed the data collection process for both qualitative and quantitative investigation.

5.6.3 Quantitative Data Analysis

As intimated in the foregoing section, the other method I used which characterizes my study as a mixed methods approach, was the quantitative method of data collection. In addition to the thematic qualitative data, I also assessed numerical information through the process of gathering and analysing quantitative data. This meant that as the researcher I had to convert the basic statistics into evocative data by applying critical as well as rational thinking to the numbers to make sense of them (Creswell, 1994).

Analysing quantitative data involves calculating variable frequencies as well as differences between them. The quantitative approach to data collection and analysis is typically associated with the discovery of evidence which supports or rejects the formulated hypotheses at the beginning of the research process. There are different ways of interpreting numerical data. However, it is always good practice to be fair and careful in one's numerical judgement.

One of the questions in this study sought to ascertain whether iPad enhances literacy acquisition. Responses showed that ZEduPads have helped enhance literacy levels in most pupils at participating schools. This particular initial data-finding helped me critically analyse

and interpret this for another's benefit within the parameters of the study. So using quantitative data analysis enabled me to generate results that indicated whether ZEduPads were indeed helpful to learners in their reading and writing.

Clearly, this is the beauty of the quantitative approach. The method is effective at giving answers to 'what' or 'how' questions relating to a particular situation. Because the approach is concerned with collecting and analysing data sets that are organised and numerically represented (Creswell, 2014), the approach is designed to be objective in demonstrating to what degree ZEduPads enhance literacy development among the Grade six (6) learners.

In the case of this study, the quantitative method was used precisely to complement thematic evidence regarding the role and use of ZEduPads for literacy development. It helped me back up assertions about the use and the impact of ZEdupads for primary schools in Zambia and beyond. This approach also helped me as a researcher to have measurable evidence about what could be done in order to maximise the use of tablets in schools in Zambia. In view of this, I opted for a concurrent parallel approach for data analysis as indicated earlier.

What follows is a discussion about issues of reliability and validity pertaining to the study.

5.7.1 Reliability

In every research project it is a requirement that the study conforms to set standards when reporting results from the field. One such standard is reliability when presenting data and findings.

Reliability involves consistency, replicability and dependability of the findings (Nunan, 1999, p.14). In other words, the term reliability, like validity, is used to refer to how the worthiness and quality of a study is to be judged. It measures the objectives the inquiry intends to achieve. Getting results from a quantitative inquiry is straightforwardly accessible due to the numerical form of its representation. In a qualitative approach, by contrast, the process is more demanding and difficult because of the narrative nature of its data.

It is important therefore, to understand how reliability is achieved, and to ascertain whether internal consistency is commensurate with the standards laid out for the research study. This is emphasised by Lincoln and Guba (1985) who advocate less focus on getting similar results and more on the dependability and consistency of the data (p.288). In this approach they

argue, the goal is to have consensus that the inquiry was dependable and that consistency was maintained.

It is argued that human research instrumentation can be reliable when dedicated to training and practice (Merriam, 1998, p.206). In general, scholars propose that reliability and dependability of findings can be maximised through three techniques namely triangulation, the inquirer's position and the audit trial (Lincoln and Guba, 1985; Merriam, 1998). The inquirer must be explicit about all the stages which make up the research process. The researcher will thus elaborate on all aspects of the research, including the rationale of the study, the methodology, the design and the target subjects.

In this research the investigator employed triangulation to establish reliability. To this end a set of tools such as classroom observation, interview protocols, as well as the questionnaires were relied on in order to acquire data from the field. The researcher also engaged other diverse sources such as students, pupils as well as language teachers.

To ensure reliability, the research instruments were strategically used. Collecting different kinds of data from a variety of data sources not only added value to my tools and the data gained, but also enhanced the reliability and validity of the findings.

5.7.2 Validity

Principles fundamental to any research project are premised on the quality of the work, in other words, on whether or not the findings are valid, trustworthy and dependable.

Discussions about validity in quantitative inquiry have become increasingly common in the literature. For example, Wilson (2010) and Onwuegbuzie (2003) have argued that the validity of an investigation is crucial in every inquiry and have suggested 50 various threats to the validity of any inquiry. These threats can occur at any stage of the research process for instance, in the design or data collection stages, or in the analysis or the interpretation of data. A very important point on validity in quantitative inquiry builds on Campbell's work on validity, and can be found in the work of Shadish, Cook and Campbell (2001). The authors advance four major forms of validity namely internal validity, statistical conclusion validity, external validity and construct validity.

Other literature that shows the historical advancement of validity in quantitative inquiry can be seen in the American Educational Research Association (AERA), American Psychological Association (APA), and the National Council on Measurement in Education (NCME, 1999); Bracht and Glass, (1968) and Campbell (1957).

By contrast, in qualitative research, lived experiences are multi-directional, multi-dimensional as well as ever-evolving. (Merriam, 1998, p.202). Thus, the validity of the findings depends entirely on the respondents' openness to share their lived experiences honestly. For example, to ensure the validity of my data, I had to use questioning techniques that complemented the set questions accurately. The participants were treated with the utmost respect and the interaction was guided by what they presented as their real experiences. This illustrates how validity is attained by evaluating what it is intended to evaluate, whether or not the inquiry is true or believable.

Against this backdrop, validity is clearly an important criterion for quality and acceptability in the evaluation of a study (Burns, 1999, p. 160). Researchers use various methods to access and process the data. This is why the instruments used for collecting data are required to be of high quality: the credibility of the data depends on the quality of the instruments (Fraenkel and Wallen, 2003, p.158).

One of the ways by which I validated my instruments was to undertake a pilot study in order to test the usability of the instruments. As stated earlier, the latter were modified according to what I determined through my observations.

I also used content validity (CV) to validate my instruments. CV is a procedure by which to validate data by measuring various elements and behaviours effectively and adequately. To this end, the instruments as well as the data were reviewed by my supervisor who is an expert in my field. Obscure questions were revised and complex words reformulated. Questions which were deemed non-functional and ineffective were dismissed completely.

Furthermore, I was also concerned about the internal validity of my data. Internal validity ensures that internal congruency with the reality is achieved. It is also concerned with the extent to which the investigator adheres to the objectives of the inquiry. According to Merriam (1998), internal validity can be achieved through triangulation, participatory modes, and by checking long-term observations at the site, checking peer examination and checking the inquirer's bias.

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A reliance on only one method of data collection is professionally questionable, weak and biased. Information from various sources strengthens the findings. In this case, triangulation meant collecting data by using a variety of methods and sources such as the questionnaires, the interviews as well as classroom observation. Clearly, triangulation of data collection through mixed methods and the use of various sources through mutual respect with participants enabled me to corroborate findings. In fact, the successful use of the instruments for this study is largely attributable to the feedback I received from my peers, my supervisor as well as the pre-testing of the instruments in a pilot study.

5.8 Member Checking

Member checking is a process whereby "the final report or specific description or themes" are taken back to the participants (Creswell, 2009, p.191) to offer them "an opportunity to provide context and an alternative interpretation" (Patton, 2002, p.561). Since they are the ones involved in the actual experience under investigation, they would have detailed information about the context in which the experience occurred, their personal rationale for the occurrence and their responses to it.

Member checking is important for establishing academic trustworthiness (see 5.5.1) and reliability because the views from those in the field, the participants, other teachers and researchers, allow for a fuller and rounder understanding of what is happening in the literacy field. It thus helps to keep my biases in check when I interpret the data.

There has been a critique of member checking over the years, for instance, by Fielding and Fielding (1986), Bloor (2001), and Silverman (2006). Their critique centres on the fact that there are "many reasons and interests which can lead members to misreport to the researcher, and it must be borne in mind at all times that they have different purposes from the researcher's" (Fielding and Fielding, 1986, p.43).

I acknowledge that each participant's purpose may be different from mine. They may have an agenda, or indeed, they may want to project a more positive self-image when they refute or disagree with my interpretations. Thus, member checking, and therefore not member validation, is used as a form of follow-up procedure in data collection; it seeks to create "an occasion for extending and elaborating on the researcher's analysis" (Bloor, 2001, p.393). The information garnered from the participants' feedback is thus included in the analysis and interpretation of the experiences. This was what Fielding and Fielding (1986) advocated

http://etd.uwc.ac.za/

when they suggested that member checking be "another valuable source of data and insight" (p.43). This idea is in part also alluded to by Lincoln and Guba (1985).

Clearly the investigator is not bound to honour all the criticisms that are mounted (in member checking), but he or she is bound to hear them and weigh their meaningfulness (p. 315). It is ethical to allow the participants to examine their data and the interpretations thereof, and to offer their views at this point. With this in mind, I added to member checking the two sub-categories of peer and audience validation, to establish the trustworthiness of the interpretation.

It is likely that my interpretation of the data may "go beyond the subjects' self-understanding – what they themselves feel and think about a topic" (Kvale and Brinkman, 2009, p.253). Since the participants saw the experience from a "common sense understanding" (Kvale, 2007, p.125), it is therefore useful to seek validation from "scholars familiar with the interview themes and with the theories applied to the interview texts" (p.125). After all, peers in a similar field, or working within a similar branch of research, would have some familiarity with the relevant research literature and the research methods, and would have engaged in similar research work.

They would thus be able to provide some sort of corroboration with regard to the interpretation of the data (p.125). In an earlier study I conducted on beginner teachers, this was done with two peers who are familiar with teacher education and teacher research in Singapore. The interpretation in both narrative analysis and the thematic analysis of narratives (Polkinghorne, 1995) was sent to them as a form of checking, and in return, they provided their views on what they agreed with and what they thought I might want to re-examine and re-analyse.

In addition to peer validation, I consider the use of "audience validation" (Kvale, 2007) as relevant. It is validation from the "primary intended users and readers" of the study (Patton, 2002, p. 561), and from those whom the study is about – the literacy learners. As stated earlier, member checking is important for establishing trustworthiness.

As both narrative and quantitative researcher, I seek to learn not only of facts, but also of the interpretation of the facts. Thus, I would agree with Riessman (2008) that "a narrative is not simply a factual report of events, but instead one articulation told from a point of view that seeks to persuade others to see the events in a single way" (p.187). It is the personal meaning

of the experiences for the learners and teachers this study sought to investigate (Atkinson, (2002); Mishler, (1990); Polkinghorne, (2007); Riessman, (2008)). As Atkinson (2002) succinctly captures the point, "(h)istorical reconstruction may not be the primary concern in life stories; rather, it may be how the individuals see themselves at given points in their lives, and how they want others to see them" (p.127). To learn of their realities, to learn of their emotional and mental responses to those realities, to engage with the meaning and interpretation participants ascribe to these realities is "the best evidence available to researchers about the realm of people's experience" (Polkinghorne, 2007, p.479).

5.9 Ethical Statement

Several publications have been made and documented regarding ethics in social sciences inquiry. However, as argued in this Episode, the mixed methods research (MMR) approach is a recent academic progeny, and therefore what has been said about ethics in a mixed method approach is limited. However, the paucity of research on ethics in social science inquiry and appraisal drill demonstrates how multi-methods or mixed methods escalate the intricacies of the processes required for moral and ethical decision-making.

Surprisingly, the MMR offers a greater set of increased flexible apparatuses for handling ethical dilemmas within the intricate array of real-social settings than would the single method/methods (Preissle, Glover-Kudon, Rohan, Boehm, and DeGroff, 2016). This episode reflects the insights which advocated reflexivity as well as transparency with the researched throughout data collection. This was done bearing in mind that every research project includes ethics that adheres to guidelines for compliance and integrity. However, compliance and integrity have to go beyond following common standards, to include the awareness that the application of a code of ethics requires ongoing thought and decision-making at every stage of the particular project.

Lichtman (2013) describes ethical considerations as a 'set of moral principles, rules, or standards governing a person or profession' (p.51). In research, ethical considerations are universally driven by honesty and justice, including respect for the participants both during, and after the research has been conducted (Miller, Mauthner and Jessop, 2012). Regarding ethical considerations, Clough and Nutbrown (2002:84) remark that:

> (I)n order to understand, researchers must be more than technically competent. They must enter into chattered intimacies; open themselves to their subjects' 'feeling worlds, whether these worlds are congenial to them or repulsive'. They must confront the duality of

> represented and experienced selves simultaneously, both conflicted, both real (Clough and Nutbrown, 2002, p.84)

In particular, I sought consent and maintained confidentiality at all stages. In ensuring that the ethics code for this research was commensurate with the canons of research, the inquiry was scrutinized by the Ethics Committee of the Faculty of Education and cleared by the Senate Ethics Committee of the University of the Western Cape in 2017. Consent and assent forms including information cards were scrutinized by these committees, after which clearance was granted (Boeiji, 2010). These forms enabled me to adhere to ethical guidelines and therefore no manipulation or coercion was recorded in relation to the 225 pupils and 7 teachers for the duration of this inquiry.

All participants were given copies of the consent and assent forms and asked to read them with the objective of understanding the nature of the research study in which they were being requested to participate. Upon reading the outline, participants were quite willing to take part in the study. Equally, the parents from the three schools were asked if their children could participate in the study. Because the schools are in rural districts where literacy levels are minimal among parents, the information card for the learners was deliberately made easy and translated into the local Bemba language. Also, the permission of the Provincial Education Office (PEO) of the Northern Province of Zambia, and that of the Head Teachers was sought through letters of permission respectively.

The participants were informed and assured that this researcher would endeavour to keep the information collected with the confidentiality it deserves as they would remain anonymous and their participation, voluntary. Hence, regarding storage of the data, as stipulated in the Data Protection Act (DPA) of 1998, participants were all assured that the information collected would be kept in the strictest confidential manner and would be used only within the classroom-learning environment and for my PhD research study. Participants were also informed that they had the right to disengage their participation at any time and/or skip any questions they felt uncomfortable answering. The success of the study was achieved largely because the instruments had been tested in the pilot study.

The section that follows highlights aspects of the data collection and analysis methods used in this current study.

5.10 Data Collection and Analysis Methods

In this study, I employed the concurrent data collection design. The concurrent data mixed methods scheme is employed mainly to validate data collected from both the quantitative and the qualitative approaches. This is done in order either to transform the data set for contrasts or to address varying questions (Creswell and Plano Cark, 2007, p.118).

In several instances the same sample population, as was the case for my study, provide both quantitative and qualitative data for comparisons. This is consistent with the argument that data collection involves the procedure of gathering and measuring information collected on variables (Marree, 2007). This design was employed in my study to investigate the role, use and the degree to which ZEduPads enhanced literacy skills in primary schools.

The questionnaires included the levels of agreement and familiarity with multiple uses of apps on the tablets. Because of the time-consuming nature of research for qualitative data collection, I used interviews consisting of eight (8) pupils and whole-class video recording observations. With the quantitative approach, I engaged all the pupils who were under observation in answering the questionnaire, which had been translated into their local language. This part of the data collection was straightforward and quick due to the ease of use accompanying survey questionnaires.

The main strategies by which data collection occurred in this procedure included questionnaires, sometimes coupled with interviews, including the document analysis and semi-structured interviews (Preissle, Glover-Kudon, Rohan, Boehm, and DeGroff, (2016); Yin, (2003)).

The study process involved three stages, namely data collection, data processing, and data analysis. The collected data was processed before it was analysed, through sorting, clarifying and doing open coding in the case of qualitative data. Open coding entails making sense of the data, while axial coding refers to the scrutinization or examination of the open coding process (Denzin and Lincoln, 2008). Qualitative data analysis was done through Atlas.Ti.8 software renowned for its ability to organise data in a systematic way.

Since it is technological software, Atlas.ti does not analyse data for the researcher. In this case, the researcher uses the software actively to make sense of the data while it helps in keeping the coded data in an organised form for easy sorting when needed. The Atlas.Ti

software helps the researcher to code-relate themes in what is known as a 'network view'. The network view can also show up contradictions within statements from a respondent if used appropriately (Friese, 2014). The software thus allowed me to explore my qualitative data heuristically because it supported my analysis and extended my mental ability to organise, remember and arrange it systematically (Friese, 2014).

Analytical thinking in education remains critical. And if teaching is an art and a science, then statistics plays an important role in the science of teaching and learning. Thus, in an alternative approach, quantitative data analysis was analysed using the SPSS software. Unlike Atlas.Ti, SPSS works with numerical data. SPSS is good for providing statistics as well as graphic representations useful for generating frequencies and describing several forms of variables. The best place to start in SPSS is in generating frequencies.

Another feature which was helpful in my data analysis was descriptive cross-tabulation. The cross tabulation or 'crosstabs method' creates a two-way or multiway table which offers a range of tests as well as specific measures of relationship. The organisation of the table and the arrangement of classifications define what measures or tests to use. In this study, one of the objectives was to determine whether the use of iPads (known as ZEduPads) has an impact on literacy development. The results of this inquiry are discussed in Episode 8. This data manipulation capability allowed me to experiment with several options during the analysis of data with SPSS.

In the final stage of data analysis I conducted what is known as selective coding, which involves classifying themes, variables or concepts including statistical charts that help in addressing the research objectives. The point of selective coding is to detect relationships in the findings. At this stage, I also compared what the respondents had said (teachers and pupils during focus group interviews), what was recorded, in order to gain a detailed understanding of the phenomena. Lastly, I interpreted the results and produced the findings of the research study.

Mixed method triangulation is the type of data collection that enabled me to integrate two approaches – qualitative and quantitative – to check and establish validity and reliability in this study (Creswell, 1994). From the triangulated data, I was able to process more nuanced informative data and results that adequately addressed the objective of this study.

5.11 Episode Summary

In this episode I have argued for pragmatics as an overarching paradigm for the mixed methods approach in my current study. Principally, I have discussed and expounded upon the characteristics of pragmatics asserting that it is a methodology/paradigm or world view that most mixed methods studies use. At the core of pragmatism, I argued, is a stance of non-commitment to any antagonistic wars of reality and truth as promulgated by the post-positivist and constructivist world views (Feilzer, 2010, p.8).

As a world view, it is concerned with solving practical problems in the material world. I concluded by stating that because of its non-alignment with any other world views, it frees the investigator from feeling intellectually and practically constrained by a dichotomy between constructivism and post-positivism (Creswell and Plano Clark, 2007, p.27). Thus, I asserted that the pragmatic choice for this mixed methods approach was appropriate as I sought to study the Grade six pupils using the ZeDuPad to gain insight into their everyday experiences as they used the tablets.

Additionally, using this research design meant tapping into insights from both the ethnographical and phenomenological domains. This involved an extended period of interacting and observing the phenomena as they unfolded, to gain an understanding of participants' experiences from an insider's perspective. Apart from this, the episode has demonstrated that using the pragmatic world view for this concurrent mixed methods approach enables the investigator to collect information from two sources: numerical and thematic.

Conducting the study in a pragmatic mixed methods paradigm, affords the investigator the opportunity to document real practical experiences that can be used to inform policy makers about the relevant challenges. In this case the latter included a lack of modern teaching and learning methods and materials such as tablets, as an intervention in the low literacy performance, especially in rural schools. This means that the pragmatic mixed research method can account for the flows and challenges of multimodal semiotic resources, artefacts as well as the social-actors in real time and space.

Regarding the instruments for data collection, I used a canon camera to capture the lessons. During this period, pictures as well as additional notes were taken of my lesson observations.

Recorded interviews and the survey questionnaires formed part of the data collection initiative. Two software programmes were employed for data analysis. These facilitated an understanding of the role and use of ZEduPads in literacy teaching namely, Atlas.Ti as well as the SPSS package.

This episode concluded with an explanation of how I adhered to the Ethics Act Guidelines meant to protect the interests of the participants.

The Episode explained how data analysis, reliability and validity were handled in order to produce authentic data for results that may inform policy making in Zambia. It also demonstrated how a pragmatic world view in mixed methods research is consistent with the epistemological position of comprehensive input and affordance. In Episode 6, the discussion focuses on these two major theoretical positions which underpin this study and provide structure for interpreting observations. Intrinsically linked to comprehensive input and affordance was the subjectivity at work in the pupils' construction of meaning as they used ZEduPads to develop their literacy skills.

Episode 6 hones in on data presentation and analysis.
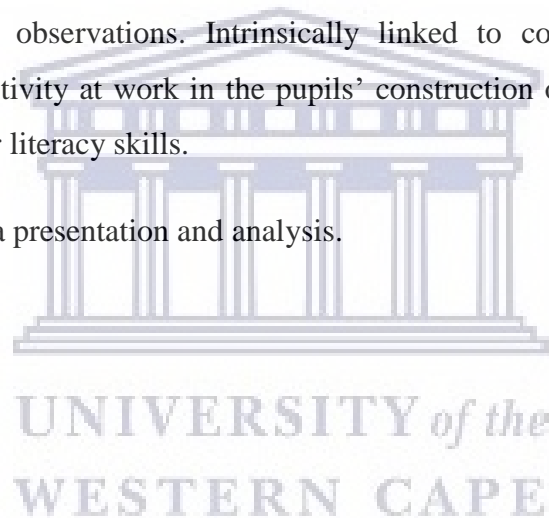
EPISODE 6: COLLAGE OF LIVED EXPERIENCES: *VAMAKHALILO* (QUANT-QUAL DATA)

6.1 Introduction

In the previous episode, my focus was on instrumentation. Various instruments for accessing and interpreting data were discussed and justified. In presenting the instrumentation, a mixed methods research design approach, process, rationale and purpose were explained. In justifying the mixed methods instrumentation, Creswell and Plano Clark (2011) argue that a mix could provide a more comprehensive understanding of the phenomenon under investigation than either approach could offer on its own.

The mixed methods research design was employed in the current research to gain an experiential (ukhalilo) impression (experience (makhalilo)) of the extent to which ZEduPads are literacy-viable tools in the context of Grade 6 learners in Northern Zambia. As mentioned in episode 6, the term "*vamakhalilo*" is my own coinage to signify lived experiences. Embedded in the conceptualisation of a mixed research model, is a process using mixed instrumentation. The research design and methods in this model are epitomized by decisions and protocols concerning data collection and the data itself. In this episode therefore, the collected data from the qualitative and quantitative approaches is presented, described, analysed and interpreted methodically. The next step of the process is to distil creative and meaningful insights. According to Marshall and Rossman (1990):

> Data analysis is the procedure that aims at ordering, structuring and making meaning of the deluge of data collected. It is a muddled, vague, time consuming, creative, and interesting process. It does not proceed in a linear fashion and therefore is not neat. Accordingly, data analysis is a search for answers about relationships amongst categories of data. (p.111)

Hitchcock and Hughes (1995, p.295) move a step further by suggesting that data presentation and analysis is "[t]he manner in which the investigator traverses from a description of what is the case to an explanation of why what is the case is the case." This process was made possible through documentation and analysis designed to present data intelligibly and in a visualizable (coined) manner, to classify trends and relations relative to the goals of the current study. Consequently, the classified tendencies and relationships in tune with the goals of the study, would allow me as the inquirer to develop an e-pedagogical model that would

assist teachers and learners to integrate the ZEduPads into literacy teaching and learning processes fully.

Thus, here the data of the research findings is presented simultaneously as QUANT and QUAL analysis. It derives from the questionnaire, from the group learner interviews and from the individual interviews with the teachers. First, data regarding the responses learners gave and what was observed in the classrooms is presented. This is followed by the responses teachers gave through a questionnaire. The study spawned an abundant amount of information in support of the fundamental goals of the investigation. However, not all that had been obtained is captured in this data presentation because of space and time.

According to Taylor and Bogdan (1998), there are no hard and fast rules regarding the number of instances that ought to be captured to support an interpretation or even a conclusion. This usually amounts to 'a judgment call' (p.156). By extension, I am aware that not a huge number of captured instances can validate the research findings and conclusion, but that even a single incident from a small data set may be adequate and sufficiently insightful to be significant for the study. Consequently, a minimal number of excerpts from both the learners and the teachers have been used to support the investigation. As stated earlier, the mixed data is interlinked because each data set contributed to a holistic picture of the lived experiences of the learners and the teachers in the three schools, here named K, M and P. The findings of the study feed into two main objectives: to investigate the role and use of ZEduPad technology in English Second Language in three primary schools in Northern Zambia and to observe the teaching methods and strategies used to enhance literacy development in ESL through ZEduPad technology.

The two major objectives or themes are premised on the e-pedagogically sound methodologies (Beschorner and Hutchison, 2013; Prieto, Migueláñez and García-Peñalvo, 2014), which are essentially intended to provide adequate input for literacy enhancement. With their work as a reference point, the episode is segmented into four themes: 'use of iPad', 'knowledge of iPad', 'experience with iPad' and 'role of iPad in literacy development'.

In relation to presentation, analysis and interpretation, I am convinced my findings are adequate to propose a learner-centred conceptualisation of the use and role of iPads in my investigation.

6.2 Data relating to the demographics

In this section, I present and analyse the data established on the elementary statistical descriptions made through the statistical package for social sciences (SPSS) as well as the Atlas.Ti software to support the emerging technologies for teaching and learning.

Essentially, the presentation and analysis of the data are done simultaneously. The data feeds into two major enquiries in the investigation, namely: the use and role of ZEduPad technology in English Second Language, and the teaching methods and strategies for literacy development through ZEduPad technology.

In pursuing the goal of this study, this episode is thus divided into two main sections focusing on the use and the role of iPad technology for literacy development and the methods and strategies employed in enhancing literacy development. Framed by Krashen's Input Hypothesis and Gibson's Affordance Theory, this episode answers the five main questions stated in Episode 1 of this thesis.

In order to present a more nuanced appreciation of the data obtained, I begin with a description of the learners' demographics.

6.1.1 Demographic Enrolment Profile

Demographic data enables the researcher to appreciate and understand the background characteristics of the target audience, such as the age and gender of the learners from disadvantaged rural schools, in this case study. The current study involved three schools: K, P and M. One of the questions required the learners to identify the schools at which they were enrolled. This question was answered in descriptive statistics as an independent variable. Appreciating which school the learners belonged to, provided me with an insight into any differences or similarities in terms of the level of knowledge to which the learners were exposed. The total number of Grade 6 learners involved in the study was 225.

Table 4

Distribution of Enrolment

School		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	K	54	24.0	24.0	24.0
	M	101	44.9	44.9	68.9
	P	70	31.1	31.1	100.0
	Total	225	100.0	100.0	

It is evident from Table 5 that School M had the highest learner enrolment in the class, thus representing 44.9% [101] of the 225 learners in the study population. It was followed by School P with 31.1% [70]. School K had the least number of pupils enrolled in Grade 6, at 24% [54].

Interesting features observable in this data are that Schools M and P are located in excess of 70 kilometres from the provincial capital and hence are more disadvantaged. This fact explains why there is a slight over-enrolment in these classes. In rural areas the distance between schools is more than the recommended 5 kilometres apart. The pie-chart that follows represents the distribution of the learner respondents in the three schools involved in the current study.
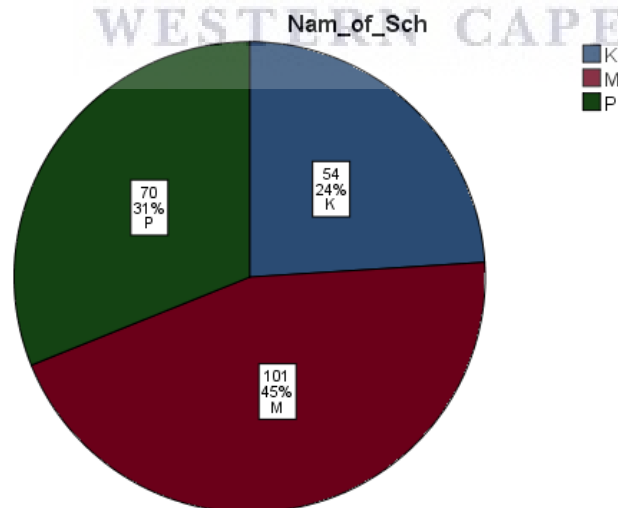
Figure 10: Pie Chat Showing Schools

6.1.2 Demographic Age Profile of Learners

Age is one of the most important aspects of research in the social science disciplines. Depending on what the sample or population of the study is, capturing the demographics of the respondents should include age as this is a crucial factor in their response to a particular issue. It varies depending on their level maturity. From this perspective, age is important in evaluating the responses submitted by individual respondents. Thus, the ages of the 225 learners who participated in the study ranged from 11 to 15 years. Table 6 shows how age was distributed among the 225 learners in the study at the time of data collection.

Table 5

Distribution of Respondents by Age

Age		Frequency	Percent	Valid Percent	Cumulative Percent
	11	25	11.1	11.1	11.1
	12	17	7.6	7.6	18.7
	13	59	26.2	26.2	44.9
	14	98	43.6	43.6	88.4
	15	26	11.6	11.6	100.0
Valid	Total	225	100.0	100.0	

From Table 6, it can clearly be seen that of the 225 learners the average age was 13. In terms of the quartile value, more than 18% of the learners were below the age of 13 whereas, more than 81% were above the age of 12. Thus, a large number of learners were 14 years of age, given that the minimum age of enrolment in Zambia into Grade one (1) is 7. Accordingly, across the three schools 26.2% [59] were in the appropriate Grade. It should therefore follow that by the time the learners are in Grade 6, they would be 12 years old. However, of the participants in the study, the majority 55.2% [134], either had repeated a grade or had not started school at the stipulated time.

This trend is common in most rural schools in Zambia because most families do not take their children to start school early in rural areas. During the group interviews, most of the selected learners who participated in the interview with the help of their teachers averaged 13 years of age or older. The bar graph in Table 7 illustrates the average distribution of the respondents' by age.

Table 6
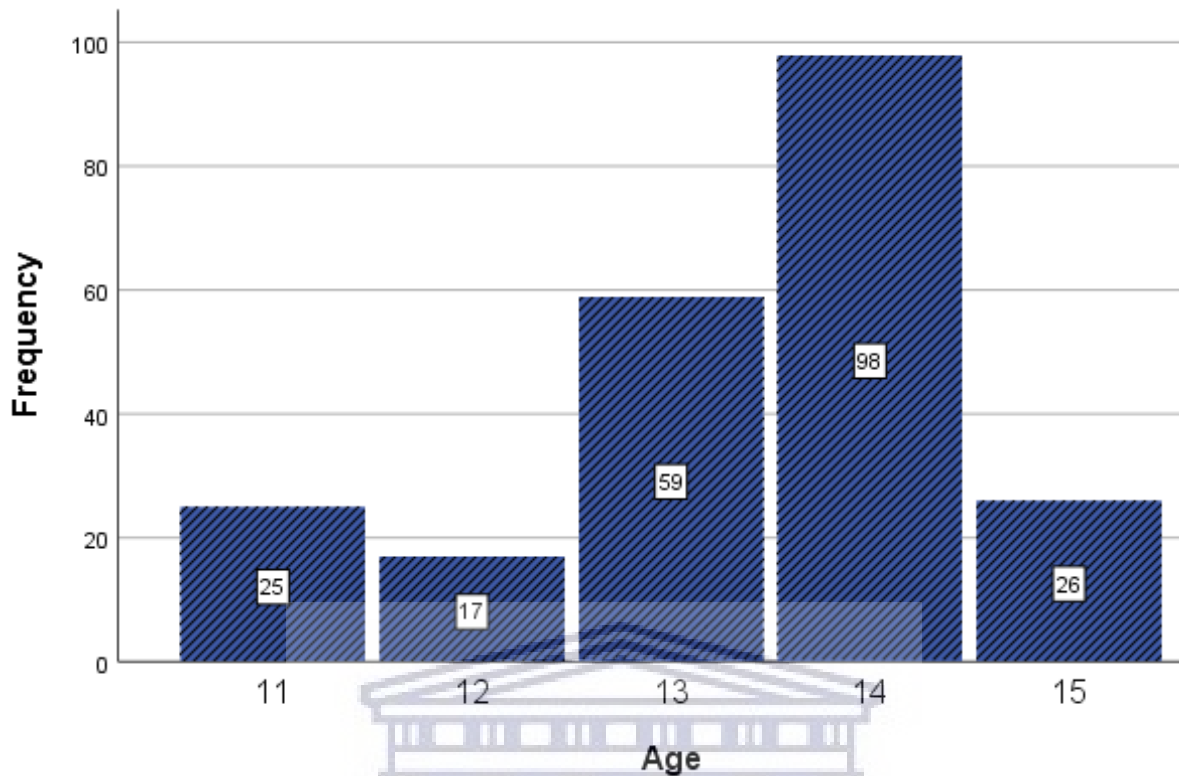
6.1.3 Demographic Profile by Gender

Gender is another important aspect of research in the social sciences. Gender rather than sex, which is the biologically assigned identity at birth, is the category that invokes culturally programmed social roles. Because gender affects learner participation in literacy classes, its effects on behaviour could be expected to extend to the use of ZEduPads for literacy learning. Thus, in this study, gender was of deliberate interest in understanding the role and use of ZEduPads in learning or acquiring literacy skills. Consequently, the data related to the respondents' gender is presented in Table 8 which follows.

Table 7

Distribution of Gender

Gender		Frequency	Percent	Valid Percent	Cumulative Percent
	Girls	94	41.8	41.8	41.8
	Boys	131	58.2	58.2	100.0
Valid	Total	225	100.0	100.0	

In relation to the links between cultural programming and enrolment, the table shows how gender parity is largely an issue in rural and disadvantaged schools. Owing to cultural

influences, the table clearly reveals that there were more boys – 58.2% representing 131, while there were fewer girls – 41.8% representing 94 girls. In the most rural Zambian socio-cultural environments, almost 50% of the girls usually drop out of school before Grade 7, and an additional 20% before Grade 12. Drop-out cases relate to early pregnancies and early marriages. However, those who proceed arguably prove to be smarter and more capable of answering the questions that are asked of them.

In this case, most of the girls who were selected with the help from the teachers were those who were able to express themselves for the purpose of the study. The pie chart that follows shows the gender distribution of boys and girls who participated in the study.
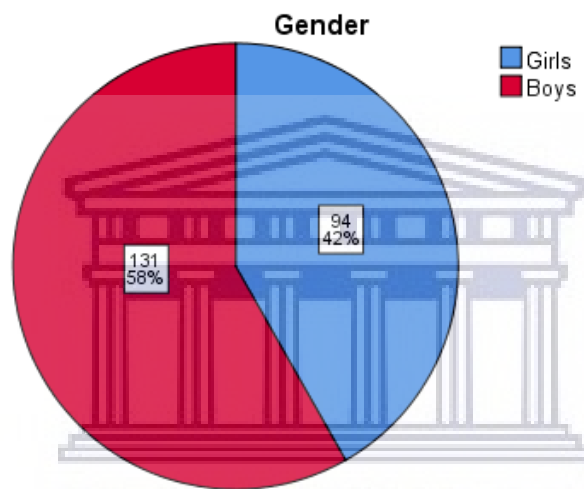
Figure 11: Pie Chat Representing Gender

6.1.4 Distribution of ZEduPads

iPads were distributed through World Vision Zambia to three schools in rural Northern Zambia. These schools are located in the World Vision (WV) catchment area, two of which are on the Chambeshi River banks. K is approximately 20 kilometres closer to Kasama, the provincial capital for Northern Zambia on the Mbala Mpulungu Road, though it falls under the Mungwi District as do the other two schools, M and P. All three schools were visited for data collection. School materials and the shortage of teachers are frequent conversation topics in these far-flung areas.

K could be described as a peri-urban school which lacks teaching and learning materials as well as teaching staff. At K World Vision in partnership with Starvros Niarchos Foundation (SNF) are promoting Fun2learn blended learning. The school was given 80 ZEDuPad

technological devices which benefit 463 pupils in the school. Of the seven (7) teachers who were initially trained for a week, only one teacher was found using the tablets effectively. The teacher has since trained four (4) fellow teachers in the use of ZEDuPads.

The next school for data collection was P. School P is located on the banks of Chambeshi River and is about 70 kilometers from the provincial capital. The school was given 77 ZEDuPads to benefit 235 pupils. Five teachers from this school were trained, but at the time of data collection, only two teachers were using the technology for teaching and learning.

At School M which has the highest enrolment of 623 pupils, only one teacher had been trained and was integrating the use of Fun2Learn teaching and learning in the school. The following table is a summary of the tablets supplied to the three schools that participated in the study.

Table 8

Tablets Supplied to Schools, and Teachers Trained

School	Tablets	Beneficiaries	Teachers Trained	Teachers Found at Time of study
K	80	463	7	4
M	90	623	1	1
P	77	235	5	2
Total	247	1321	13	7

6.2 Data relating to the role and use of iPads in Literacy Development (ZEDuPads)

In this part of the study both statistical and qualitative data are presented showing the distribution of ZEduPads in literacy development, and supported by thematic validation. This data accounts for the three primary schools in the Northern Province that were given ZEDuPads through World Vision Zambia. Over a period of three months in 2018 I collected data from these rural disadvantaged schools here named, P, K and M.

This study ran on the assumption that researching is an interlinked data collection process integral to continuously informing and enhancing teaching practices amongst teachers in the current deluge of technological information. Based on these assumptions, I set out to investigate the variables related to the role and use of ZEduPads in enhancing the development of literacy skills among the Grade six classes, all in the Mungwi District.

The inquiry involved a mixed methods data-collecting approach with the use of thematically scheduled collection tools such as interview protocols, document analysis, and digital ethnography in recording phenomenological experiences of the participants. The study used questionnaires in conjunction with numerical data to obtain information from a total sample of 225 pupils and seven teachers. Thus, in the following section, I focus on the use of ZEduPad as responded to by all three schools.

6.2.1 The use of iPads (ZEDuPads)

This section addresses the question about how the use of iPads (ZEduPads) affects literacy development. K was the first school visited for data. In order to establish whether learners were able to use the iPads, they were given two statements on the questionnaire. One related to whether the learners were able to operate the iPads, and the other to instructions from teachers in this process. What follows is a replication of what appeared in the questionnaire (participants were able to rate their responses where 1 indicates the lowest capacity rating and 5 the highest):

1. Your knowledge to operate and use the iPad for learning is .... .and
2. Your teacher's instructions to use the iPad during literacy lessons are understandable and easy to follow.

The responses were interestingly varied. In response to the first statement, 16.9% [38] of the learners appeared to be unfamiliar with the use of the ZEduPads in the classroom; and 3.1% [7] did not seem sure whether they knew how to use the iPad for literacy development. In other words, 20% [45] were under the quartile range amongst those who did not know how to use the iPads for literacy lessons.

Otherwise, the majority, 37.3% and 42.7% representing 84 and 96 learners respectively affirmed that they knew how to use the iPad during lessons for literacy development. These learners knew how to operate it to access links that led them to specific lessons and exercises during the lessons. In other words, on a scale of 1 to 5, 80% [180] of the learners ticked 4 and 5 as an indication of their knowledge of the operation of the iPad. The following table represents the distribution of the learners' responses on the scale.

Table 9

Your knowledge to operate and use the iPad for learning is high

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	14	6.2	6.2	6.2
	Disagree	24	10.7	10.7	16.9
	Not Sure	7	3.1	3.1	20.0
	Agree	84	37.3	37.3	57.3
	Strongly Agree	96	42.7	42.7	100.0
	Total	225	100.0	100.0	

As shown in Table 10, 80% which is a cumulative of those who agreed and strongly agreed indicates the number of learners who had confidence in using the iPad for learning. This was encouraging. If learners from disadvantaged rural schools who rarely access, or even possess such technology can learn to use such devices as quickly as they did, this has several implications for literacy development using emerging technologies. This is arguably an indication that emerging technologies if used appropriately, can spur on literacy development. By all indications, this information was necessary because appreciating the learner's knowledge level of the use of the ZEduPad determined subsequent questions in the study. Since a tabular format may be hard to read, the bar chart which follows in Table 11 illustrates how learners responded to the first question on the knowledge of how to use the iPad. The question was whether their knowledge to operate and us the iPad for learning was high.

Table 10

Your knowledge to operate and use the iPad for learning is.
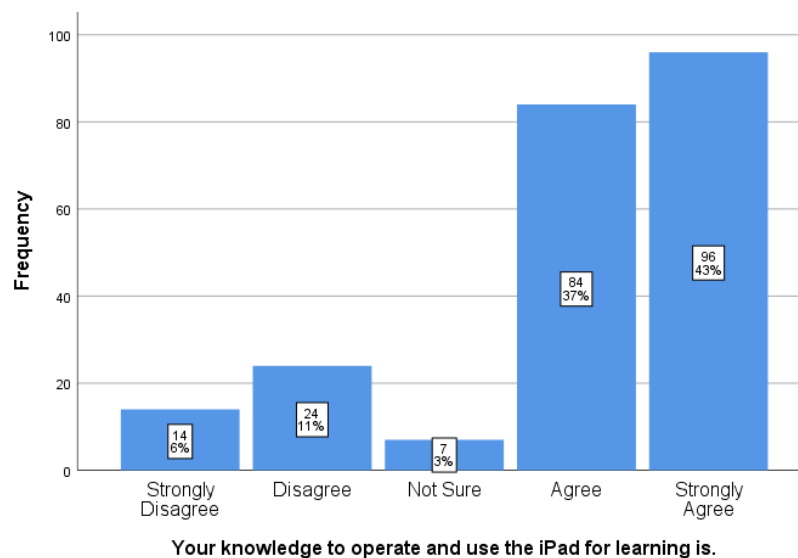
Consistent with the quantitative data, the qualitative data revealed similar views across learner groups during group interviews. In the focus group interviews, most learners of those who had been selected with the help of their teachers affirmed that since they had been taught how to use the newly deployed ZEduPad, they knew how to use the iPad more confidently. Their confidence improved as they continued to use the iPads in every English lesson or indeed also in other subjects. Their iPad skills use, honed by continued use, also activated their interest in learning any lesson on an iPad every day. At the time of data collection, the learners reported that their skills went beyond switching the iPads on and off to assisting the teachers in charging them through the solar panels that were delivered together with the iPads.

Furthermore, the learners revealed that even though some links did not at first match the lesson content, nonetheless, they were able to navigate through the apps that gave them access to the lessons. In addition, the learners explained that apart from using the iPad, they were also taught how to use peripheral accessories that accompanied the ZEduPads, such as microphones, shared in pairs. Adjusting the volume on the headset, fixing it securely to improve the sound, were skills most learners admitted were important for using the iPads effectively. The excerpt, from transcribed audio tapes reflects this. In this extract, R represents the researcher and P, the pupil:

R: Tell me, how well do you know how to operate the iPad? How do you operate it?
P(s):   [*All*]We know how to switch the iPads on and off…yeah, for me, [*another pupil interjects*] I was very scared at first…[*laughter*]…but now I can switch on and then go to the link where we learn many many thing in English and subject others [sic]… [*third pupil*] Sir, me I the [sic] one help teacher to connect wires to the iPads, also headphones too…it easy to follow link for lesson after finish you go to exercise and there is man or girl who say well done if you get answer right….[*another laughs*]… sir, sir me me, [*pupil raising hand to talk*], we also help friend who did not know to follow link for lesson sir.
R: You mean you also help friends who do not know how to use the iPad?
P: Yes. Even to show them how follow links and find answers

[**Pupils: School P**]

In School K, most learners were assertive about the use of the iPad. Like School P learners, those at School K revealed that after they had been taught how to operate the iPads, they have been using and operating iPads for learning on their own, notably when the teachers were not in the classroom. For example, in the following excerpt, the learners had this to say:

P: …me I am very happy because I now know how to use the iPad. Previously, I had no idea even how to use my dad's phone at home, but because the teacher helped us to know how to op..erate the iPads, I now also operate a phone…Hmm, me Sir, me Sir, I want to talk…
R: Yes what do you have to say about how well you can operate the iPads for learning?

P: Me Sir, I can say that the iPads are nice. I know how to switch them on and go to the link for the lesson on that day. When the teacher puts us in pairs, I am always put with someone who doesn't know how to operate them. I am the one who looks for the links when the teacher writes the instruction on the board for the lesson.

R: Oh! So you mean the teacher writes a link on the board to follow?

P: [*All*] Yes Sir. Aah but if he is not there sir, we do what we want and follow any link….[*laughter*]…yeah but if the teacher is not there we even go into lesson that are for seven or grade one…you just find you are lost…[*laughter again*].

[**Pupils: School K**].

Similar views were held by School M. However, on the question as to whether or not instructions from the teacher were easy to follow during lessons, most learners – up to 76% [171] – revealed that they were easily able to follow instructions to access lessons on the tablet.

4.9% [11] were *not sure* whether they were able to follow instructions. 19.1% [43] revealed that they were *not able* to follow the instructions. This detail could mean several things with regard to factors that constrain learners' ability to take in content. In other words, it can mean that the learners were not operating at their grade level or that their levels of reading were not adequate. This in itself is an indication of how multileveled the classes are in most schools. It is consistent with the theoretical basis of this study as it accords with Stephen Krashen's arguments in his hypothesis regarding factors that can inhibit intake of content. As Episode 4 demonstrates, comprehensive input along with other factors plays a significant role in ensuring the necessary groundwork is laid for a successful intake of content (Ying, 1995).

Multileveled classes can be difficult to deal with. However, technology has the potential to dislodge such challenges if properly used (Lankshear and Knobel, 2011; Wrigley, and Guth, 1992). Hence, the study sought to investigate the role of the relatively newly introduced iPads vis-a-vis ZEduPads technology in teaching and learning in Zambian schools, especially for literacy development. In the table that follows, the results reveal the distribution of responses regarding whether instructions for using the iPads were easy to follow in literacy lessons.

Similarly, a question addressing whether the teachers instructions in the use of ZEdPads were clear was asked and returned varied answers as shown in table 12 below.

Table 11

Your teacher's instructions to use the iPad during literacy lessons are understandable and easy to follow.

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	15	6.7	6.7	6.7
Disagree	28	12.4	12.4	19.1
Not Sure	11	4.9	4.9	24.0
Agree	105	46.7	46.7	70.7
Strongly Agree	66	29.3	29.3	100.0
Total	225	100.0	100.0	

Table 12 indicates that 76% of the 225 participants which is a cumulative of those who agreed and those who strongly agreed in this study revealed that they enjoy the use of the iPad when they have an opportunity to access these for learning. This shows unprecedented enthusiasm for the use of iPads in rural schools, which are often short of teaching and learning materials, and subject to a staff deficit.

In my view, interest in something plays an important role in its success or failure. In the case of this study, the participants' interest in using iPads for learning could significantly enhance their intake of content and thereby enhance their literacy skills. The bar graph that follows clearly shows the distribution on this particular question regarding how easily the learners picked directive instructions to access the appropriate content on the iPad.

Table 12

Your teacher's instructions to use the iPad during literacy lessons are understandable and easy to follow.
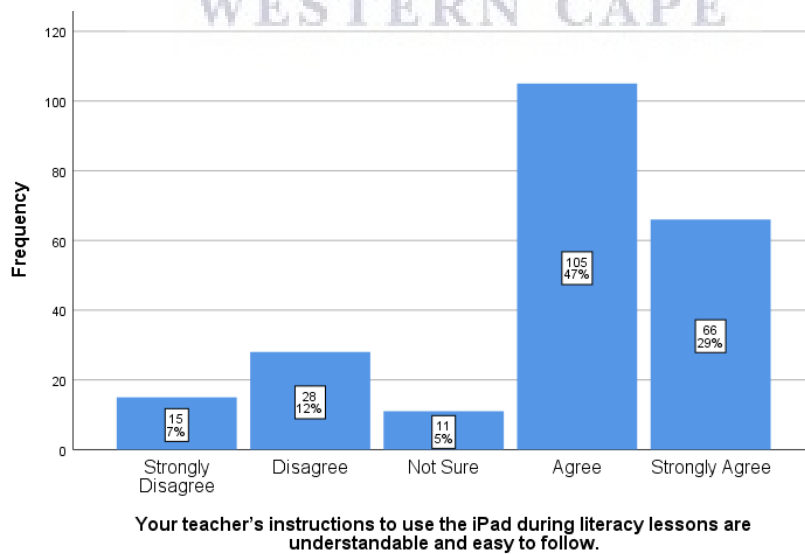
Teachers thought that I was a technical personnel assistant from World Vision who had come to orientate the teaching staff; that I had been brought specifically to the schools not using iPads. However, I calmly explained to them that I was not one of the personnel from World Vision and iSchool Zambia. I clarified that I was there to do my study regarding the use and role of ZEduPads for teaching and learning, and that my findings would be forwarded to iSchool and World Vision concerning challenges they were facing in using the devices.

In all three schools, the majority of learners I spoke to thought I was there to monitor the work, and to replace some of the teachers who had been transferred. (This made access to the iPads a little bit difficult in view of the shortage of teachers.) One of the learners had this to say:

> [*after greetings and some talk around general stay in their communities*]… so Sir, we thought you are one of the big people in the education and you came to help us talk to our teachers to be giving us iPads even to take home. Me I have learnt even reading through the iPads. I don't go for break time because, these gadgets are so nice. There is someone inside who is telling you every work. [*laughter*] [Field notes: 13.06.2017]

Some teachers were also eager to learn more about the use of iPads for teaching. They were curious about how I had come to know so much about the use of iPad, and asked if my role entailed updating their use of the technology: "*When I saw you Sir, believe me, I thought you came to check on us and see whether we are using the iPads the right way and show us more.*" [Field notes: 12.07.2017].

The teacher continued to talk about how learners were not absconding from classes as they had in the past, and how teaching had become easier because learners were more eager to learn with iPads than without them.

In the next section, I focus on access to knowledge content.

6.2.2 iPad Use and Epistemological Access to Knowledge

This aspect of the questionnaire concerned learners' knowledge during and after the use of iPads. In particular, my focus was to establish whether the iPads were simply a distraction to the learners or whether they were able to follow the instruction process and retain content. I also sought to discover whether they were able to assist others, if they themselves were able to remember what they learnt. In addition, a special focus entailed establishing whether the

learners' literacy performance had improved once they started using the ZEduPads for learning.

As with other results on the use of iPads, these results varied. For example, a follow up question on whether the teacher's instructions were easy to follow, was whether the learners were able to inquire from the teacher if after the lesson they had any questions. Asking questions after lesson delivery helps to clarify and refine the learner's doubts on any of the content. In my view, asking questions is also an opportunity for the teacher to establish knowledge gaps. Furthermore, asking questions helps the teacher to gauge the learners' level of understanding.

As Chin and Osborne, (2008) and Vale (2013) put it, asking critical questions is a great resource for the teacher and helps to enhance critical thinking skills as the teacher and the learners engage and interact with one another. Moreover, asking questions is equally important for both teachers and learners, and as a strategy for teaching and learning has a venerable Socratic history (Cotton, 1988). Questions challenge assumptions, lead to new knowledge and expose assumptions and mis/conceptions.

Thus, strong evidence of whether learners answered teachers' questions after learning shows that 39.6% [89] of learners admitted to asking questions to clarify their doubts on the use of the ZEduPad for literacy learning. A further 39.1% [88] of learners strongly agreed that they asked questions, while 6.2% [14] strongly disagreed that they asked questions and only a small number of the respondents 0.9% [2] indicated that they were not sure. The greater percentage of those who agreed to asking questions reveals how technology interests and enhances higher participation for learners when it is used for teaching and learning (Schindler, Burkholder, Morad, and Marsh, 2017).

The statistics thus show how technology is a potential tool for learner engagement. This is consistent with classroom observation as outlined in the table that follows, and as a recurring theme, more generally. The concept of engagement in the classroom has arguably become an enigma. As can be seen from Table 14, there is significantly more agreement to asking questions than disagreement.

Table 13

You ask question(s) during or after the lesson on the use of the iPad to access knowledge or information.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	14	6.2	6.2	6.2
	Disagree	32	14.2	14.2	20.4
	Not Sure	2	0.9	0.9	21.3
	Agree	89	39.6	39.6	60.9
	Strongly Agree	88	39.1	39.1	100.0
	Total	225	100.0	100.0	

It is apparent from this table that very few learners, a cumulative number of 20% [46], failed to ask questions for clarification during lessons. This can be attributed to several factors such as fear of being laughed at, failure to construct formidable questions, low self-esteem and many other factors that inhibit a learner's participation in class. However, this did not necessarily mean that learners were ignorant of how to use the ZEduPad for learning. What it could have meant is that their level of confidence to ask questions was still low, or indeed their literacy levels were still not up to their grade level yet. The bar graph which follows in Table 15 is a representation of the question they were given.
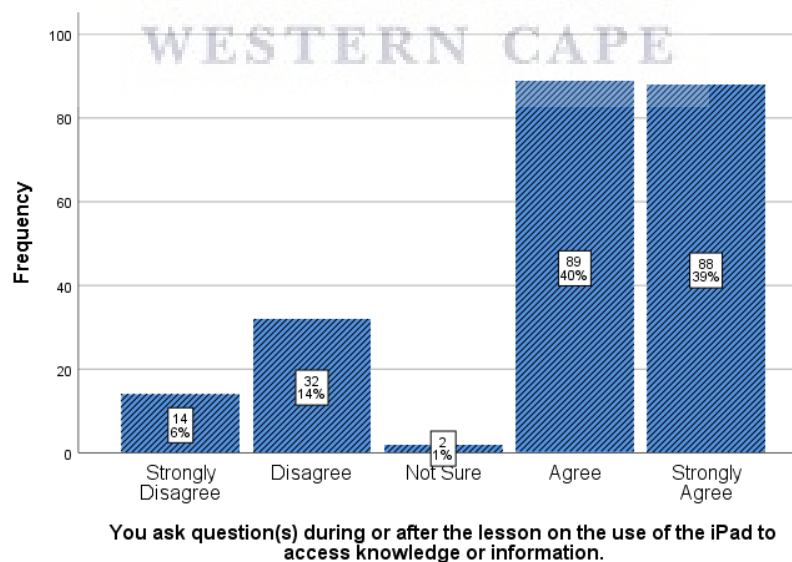
Table 14

You ask question(s) during or after the lesson on the use of the iPad to access knowledge or information.

Similarly, results from the qualitative interviews were consistent with results returned on the questionnaire. A common view amongst the interviewees concerning the asking of questions during and after lessons was that many questions involved cases where a pair could not find the link even if it was written clearly on the board. Because they were still honing their skills in the use of the tablets, most learners were occasionally ignorant of how to follow the links provided by the teacher.

Learners argued that technology was always difficult when one was just beginning to learn how to use it: "*So for us to make sure we are on the right link for the lesson of the day,*" one learner stated, "*we have to ask questions always*". Another learner commented, "*If you don't ask questions, you can find that your friends are on something else and you, you are also somewhere else*". Yet another learner felt that:

> ...asking questions Sir, you can find that even for some words you are saying this word but it is another word you should say....
> **R:** So why would you say a different word instead of another?. [*Follow up question*].
> **P:** ...Sir it's because for example, when you are listening to the mic for certain explanations the person inside the mic speaks like a white man so you can't hear the words properly. For example, when we were learning about accidents and safety, I did not understand the word fender, so I was saying feather...[*laughter*]...so when the teacher listened to the word he told me it's fender not feather and he explained that fender is that one in front of the car.　　[**Group Interview: School M**]

In the foregoing extract, the learner refers to speech errors which entail "the act of using an incorrect word instead of one which is similar in pronunciation." The learner was invoking potentially confusing words, like homonyms and homophones, in this case, a malapropism.

Interestingly, this finding related directly to the literacy development skills using the ZEduPad, as will be explained under Section 6.2.4. In other words, the learner's statement directly responded to the goal of this current study, the role and use of iPad technology in developing literacy skills. By the same token, my focus was to establish any traits that pointed to evidence of developing literacy skills. It is one thing to know how to use iPads for learning and another to develop reading and writing skills with their aid.

Other questions – on the questionnaire and in the interview – related to how easy it was for learners to locate apps on the iPad for literacy learning.

Knowing how to locate links easily and being able to help others similarly in literacy learning activities, enhances collaboration amongst learners while reinforcing and internalising own skills. In responding to related questions, the majority (those who agreed) fell in the upper quartile 39.1% [88]; and 39.6% [89], those who strongly agreed, also indicated that during

literacy classes they helped others to locate as well as to answer questions. Only a small number of respondents 6.7% [15] strongly disagreed; and 10.7% [24] who disagreed indicated that they did not help others during literacy lessons. This could mean these respondents were not yet digitally fluent or they were still shy of taking the lead during lessons.

The table that follows – Table 16 – shows the breakdown of how the responses were distributed concerning whether learners helped others with the iPad during literacy lessons.

Table 15

For literacy development, you help fellow pupils during the lessons on the use of the iPad

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	15	6.7	6.7	6.7
	Disagree	24	10.7	10.7	17.3
	Not Sure	9	4.0	4.0	21.3
	Agree	88	39.1	39.1	60.4
	Strongly Agree	89	39.6	39.6	100.0
	Total	225	100.0	100.0	

It is apparent from this table that the majority of learners, 78.7% [177] confirmed that during literacy learning sessions they helped others navigate the iPad. From this data it can be concluded that learners welcomed the ZEduPad technology for learning. It was observed that learners used these tablets easily. They liked the use of iPads as opposed to lessons without the devices. In other words, the devices inspired learners to be focused during lessons while indirectly learning a fair amount of content. The bar graph in Table 17 depicts the distribution of the figures as described.

Table 16

For literacy development, you help fellow pupils during the lessons on the use of the iPad
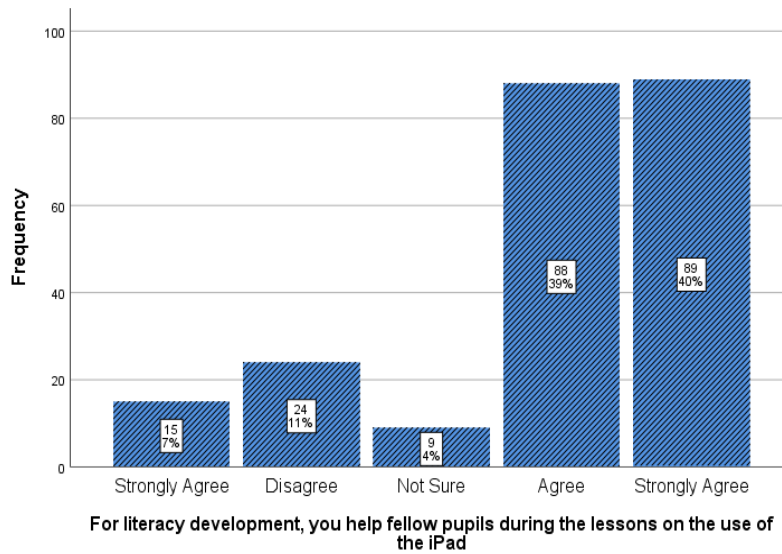
This revelation was consistent with responses gathered from the interviews and in general, as with the questionnaire, the responses were very positive. Over half of those interviewed in a focus group reported that assisting others on the use of iPads during the literacy lesson was interesting as in the process, they too were learning new things.

According to the learners, helping each other in pairs – as required in the iPad model – helped them remember the content. From a socio-cultural perspective on language and learning, the learners' discovery that when assisting each other the interaction assisted both parties has long been linked to developing communication skills in the target language. Additionally, learners felt that helping others also made them self-directed in their learning, with little input from the master (teacher).

This was another theme emerging from the study: the shift and mutation of the master-servant relationship in the classroom. In the interviews, for example, one learner stated that:

> I feel good when am assisting my friend who doesn't know how to use the iPad to find the links for the lesson [*and another learner also commented*] …if you are helping a friend hmmm what can I say...[*laughter; pause*] '*nishi elyo uleishibilako*,' [literally translated, 'if you are helping a friend it means you are becoming even more knowledgeable'… 'bakafundisha batwafwafyafye nganatuluba' (Teachers usually comes in when we are not correct). [**Group Interview: School P**]

Clearly, it can be deduced from the foregoing extract that learners in the schools were at different levels of knowledge about using the ZEduPads. However, the addictive nature of

technology attracted learners to working together collaboratively. The effects of collaborative work enhance opportunities for language use, which also leads to literacy skills development. For example, in one of the classroom observations, a teacher at School K often playfully reviewed vocabulary with two other groups who would be assigned group work while others were using the iPad to attend to their own task.

The presentation model is such that, one group is given a task to work on as a group, while the other group of learners focuses on a power point presentation given by the teacher and a third group is given iPads to work on the same task. The groups rotate or takes turns sequentially thereafter. The following picture shows the vocabulary list each day that the teacher reviewed.
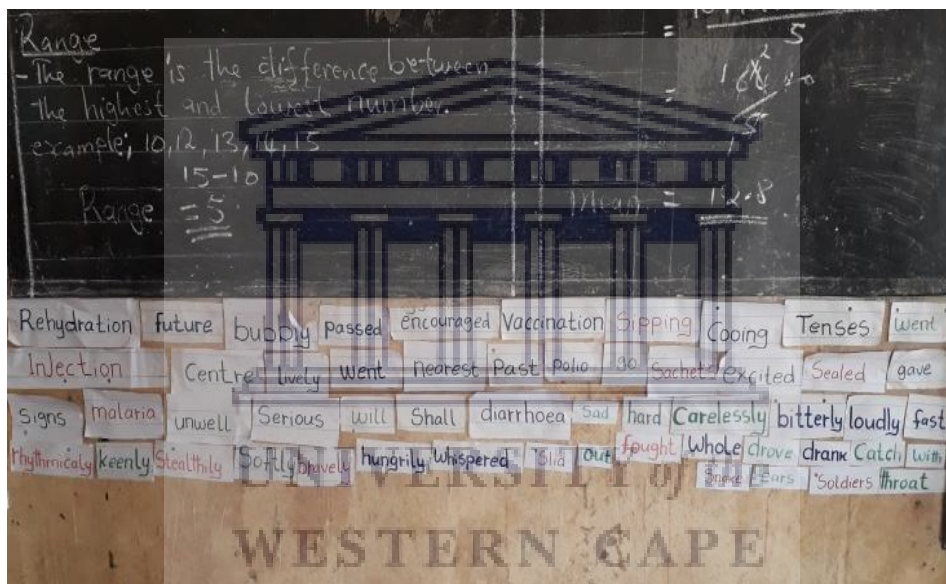
Figure 12: Vocabulary List

Concerning the statement questioning whether assessment tasks were easy following the teachers' presentation of the lesson, the data revealed a somewhat consistent trend from the responses to earlier questions. Of the 225 learners who completed the questionnaire, over half (67%) agreed that the assessment tasks were fairly easy to do; 10% strongly disagreed; 17% disagreed while 5% remained neutral or undecided about their response.

The statistics were quite encouraging considering that rural and disadvantaged schools usually do not have adequate teaching and learning materials. Thus, bringing the learners to a level of enhanced performance and enthusiasm about learning, especially in literacy skills, is considerable hard work and a challenge for teachers in these schools. In this respect,

technology is potentially the best ally, though arguably not in that it should supplant teachers. In the table that follows, I present the distribution of responses learners gave on this particular question.

Table 17

You find assessment tasks after the teacher has taught the lesson easy.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	23	10.2	10.2	10.2
	Disagree	39	17.3	17.3	27.6
	Not Sure	12	5.3	5.3	32.9
	Agree	68	30.2	30.2	63.1
	Strongly Agree	83	36.9	36.9	100.0
	Total	225	100.0	100.0	

Generally, Table 18 shows that most learners admitted the ZEduPads were helping them answer assessments easily after a lesson presentation. Thirty percent (30%) and 37% indicate how responses were distributed, tilted towards the upper quartile. If all conditions had been equal and the learners had been more exposed to this type of device, rural and disadvantaged learners might be as good as their urban-based counterparts in affluent or economically socially advantaged schools. The insight from this would be that more exposure to these devices would also mean bridging the digital gap that continues to exist between the learners whose socio-economic status (SES) does not allow them to access the same teaching materials as their counterparts.

The high numbers of learners skewing towards satisfaction with iPads as shown on the bar-graph in Table 19 is an indication of the potential of ZEduPad technology to influence quality education in the rural schools of Zambia. Generally, this positive attitude from the learners towards the use of iPads for literacy skills and assessment may be attributed to the manner in which lessons have been digitised on the iPad. All the lessons are self-explanatory with easy-to-follow steps once learners have navigated the correct link and section of the lesson. The teachers' work has been simplified because when paired learners listen to the audio-visual explanations, they have the liberty to replay the lesson and listen to it repeatedly before they attend to the task.

Moreover, the app makes provision for giving feedback when they click on it for answers. When the learner gets the answer wrong, it will give them positive encouragement such as, '*not quite*', '*you can do better try again*', or simply, '*try again*'. Learners may attempt to give answers several times before clicking on the right answer. When they eventually click on the right answer, again, the feedback is encouraging. The app responds in the affirmative, '*well done*', or '*bravo*', '*you are genius*' etcetera.

According to the learners, it is this feedback that motivates them to do more and want to keep on trying. As one learner commented, '*The iPad helps me to listen more and more to the girl or man who one talking inside to explain to me what to do*' [Group Inter: School M]. Adding to this comment, another learner felt that the iPads were amazingly helpful in their English language learning, including how to pronounce words, to spell correctly as well as with comprehension skills. The following extract shows what the learner said;

> …on my side, I used to have problems on spellings, pronouncements of word and comprehension. hmmm but now, I can read a lot of word and answer question …
> R: oh…you mean word pronunciation and you can now answer questions?
> Ps: [*laughter*]….
> P: imwe mwilaseka (hey don't laugh at me…) sir am tell the truth, hmmm because if you don't know how to read proper, you can't answer question for exercise… [*laughter*].
> [**Group Interview: School K**]

Table 18

You find assessment tasks after the teacher has taught the lesson easy.
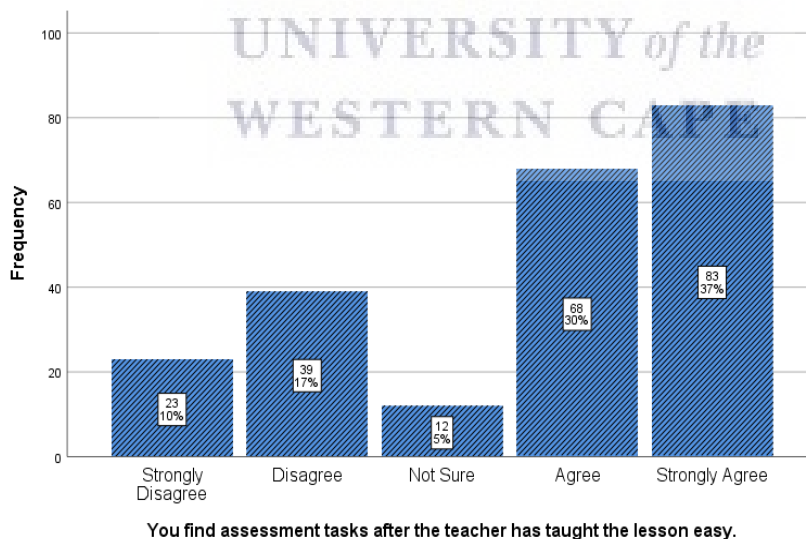
The foregoing extract is consistent with the questionnaire responses regarding whether or not learners' literacy performance was enhanced after they had been introduced to the ZEduPad technology. This question was not only necessary but also important in determining the efficacy of iPads on literacy development among the disadvantaged sixth graders in Zambian schools. Of the 225 learners who responded to the question, more than 65% confirmed that

the tablets enhanced their literacy performance from the time they had started using them; 4% strongly agreed to having improved their literacy skills through ZEduPads; 18% [41] claimed not to know whether ZeduPads had helped them improve their literacy skills at all. And this is slightly different from the 6% and 7% respectively depicting those who disagreed and strongly disagreed in their responses. The table that follows illustrates the distribution of learner responses.

Table 19

Your performance has increased (very much) since you started using the iPad for literacy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	15	6.7	6.7	6.7
	Disagree	13	5.8	5.8	12.4
	Not Sure	41	18.2	18.2	30.7
	Agree	147	65.3	65.3	96.0
	Strongly Agree	9	4.0	4.0	100.0
	Total	225	100.0	100.0	

From Table 20, it is clear that the majority (69%) of learners felt that the iPad was a potential resource for improving literacy skills. This perception directly answers the aims and goals of this study on the role and use of iPad as a technological device that might support the development of literacy skills amongst primary school learners in Zambia.

Recently, in having to confront challenges relating to the Corona Virus (Covid 19), the future of education and the efficacy of emerging technologies such as the iPad and other related apps were arguably useful to keep the children not only safe at home but also to foster continued education during the lockdown. In Zambia, while this was a time of trial, it was also one of repositioning and rethinking educational technology for future educational needs.

From the learners' responses, the study reveals that the potential of ZEduPad in the Zambian primary education system for literacy development appears to have come at the right time. Considering that ZEduPds, like every iPad, are highly portable, learning during lockdown would take place inside the house and anywhere. This is consistent with the literature in Episode 3. The literature review revealed that the portability of the iPad makes it suitable for learning anywhere, everywhere and anytime (Mallernee, 2017; Mango, 2015). The data has

implications for the policy makers, based on the number of responses as reflected in the bar chart that follows in Table 21.

Table 20

Your performance has increased (very much) since you started using the iPad for literacy
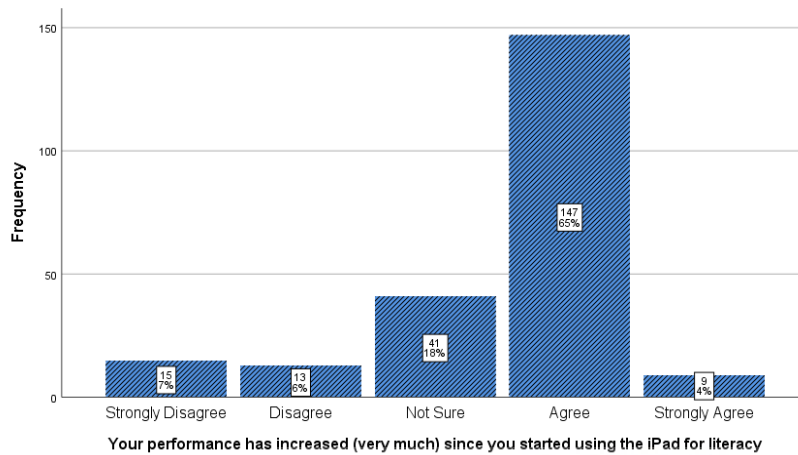
As can be seen from the bar chart, the data clearly shows and confirms the role the ZEduPad technology plays in literacy development among language learners. Of the 225 learners who were involved in the study, over half, 69% [156], indicate that their performance improved as they interacted with the iPad technology. In the focus group interviews across the three schools, the learners revealed that their performance would have been exceptional had their teachers allowed them to take the iPads home. As indicated in Episode 1, the ZEduPad in question is a 'ruggedized' type of iPad specifically made to endure and withstand hard shocks in harsh usage environments or even when dropped accidentally.

The learners argued that if they took the iPads home, they would be able to extend the learning at home as opposed to using and interacting with the iPads at school only. At home, they added, '*we can even show our parents what we are doing and they can help us do the homework*'. Perhaps the parent-learner engagement at home and how parents might be the knowledgeable other or vice versa could be investigated. However, learners were optimistic that carrying iPads home with them would allow for extended learning time beyond the classroom. This would also provide more opportunities for collaboration and a basis for conversations around language. More exposure to such opportunities enhances the chances of implicit language development according to Stephen Krashen (Krashen, 1982). The following extract shows learners' responses during the focus interviews.

R: Do you think your literacy skills have improved since you started using the iPads?

Ps: Yes.

P_k: Hmmm for me, I used to struggle a lot for knowing thing.. when we write a test, I never pass I was always fail…hmmm, but after improving reading, I can now pass for 50% and I now feel good…[*laughter*].

P_M :For me, I have now started speak English because I follow the one talking inside the iPad sometimes…[*laughter*]

R: You mean you mimic words recorded on the iPad? [*Mimicking explained*]

P_P: Yes, when I you follow what the man inside is saying and you say the same thing, you know how to say things well…

P_k:Hmmm but sir, why can't they allow us to taking the iPad at home. They can write our name if you bring back it properly you can take again…

R: You mean you want the teachers to allow you take the iPads at home and if you bring it back in good condition then they can give it to you more often?

P_k: Yes, because at home we can learn more [*laughter*] please tell them for us…

The foregoing extract clearly depicts how learners felt about the use of iPads, which they revealed had been helpful in improving their performance. Nonetheless, learners desired access to the iPads beyond class time. This points to the fact that iPads have been a motivating factor in their literacy experiences at school. It emerged as one of the themes during qualitative data collection.

Learners reported that they do not feel bored when completing tasks on their own. Even though others might stray into other apps that allowed them to do some art work (sic), they considered the iPad a great tool for their literacy learning skills. The majority were eager to do their tasks and try new things each time the iPad was in front of them. See the photograph in Figure 9.

Figure 13: Learners listening and answering comprehension Questions

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The photograph in Figure 13 shows learners exploring the use of the iPad on their own. Generally, they exhibited happiness when working on the iPad, on various topics. Having the iPads in their hands was not only fun but also stimulating for literacy learning. According to the learners, the iPad was preferable to the blackboard. Responses to being asked for their views on chalk-board teaching and learning revealed that learners were bored and learning was teacher centred. It did not allow for much participation and most learners were making a noise and distracting others.

By contrast, using iPads was literally hands-on as learners were able to use the drag-and-drop apps to answer questions on a given topic and exercise. They could use the headsets to listen to the instructions recorded on the iPad for that particular lesson. Learners were also able to use the iPad for word-processing content as well as art drawing.

Moreover, not all learners were given iPads at the same time, which is a strategy employed in the teaching model that has already been outlined. Further detail follows under the section about the teachers' methods and strategies for literacy instruction.

In the next section I explore the learners' experience of ZEduPads when they were learning literacy.

6.2.3 Experience with iPad Use [ZEDuPad]

In this study one of the questions relating to learners' general experience of ZEduPad denotes whether the iPads were user-friendly and whether the learners would like to have them for learning.

Depending on one's experience, one may be open to further similar opportunities or remain closed to the same. According to the Cambridge Dictionary (2019) [available online], experience is "the process of gaining knowledge or skill from doing, seeing, or feeling things". In research, the term "lived" is added. A lived experience therefore refers to "human experiences, choices and options and how those factors influence one's perception of knowledge" (Given, 2008). In other words, the learners' experience of *(Makhalilo)* of ZEDuPad technology refers to the kind of knowledge or skill they would acquire in a given practical period, an experience of using iPad technology for developing their literacy.

Based on the responses of learners during the focus group interviews and observations, it was clear that they enjoyed learning on the ZEDuPad. When they were asked what their experience of it was like, most responded that their motivation and engagement were enhanced during literacy instruction or during English lessons in class. Whether in a reading lesson, phonetic, vocabulary, or comprehension activity, learners' responses indicated that they were engaged. The features of ZEduPad presented learners with integrated tools which proved beneficial for learning how to read and write. Because of the enjoyment in this experience, most revealed that their performance was improved. Generally, learners contended that using the ZEduPad for literacy learning was their preference, as can be seen from the response distribution regarding their preferences between the chalkboard and the iPad shown in the table that follows.

Table 21

The iPad is better than the chalkboard in literacy learning.

		Frequency	Percent	Valid Percent	Cumulative percent
Valid	Strongly Disagree	20	8.9	8.9	8.9
	Disagree	15	6.7	6.7	15.6
	Not Sure	31	13.8	13.8	29.3
	Agree	116	51.6	51.6	80.9
	Strongly Agree	43	19.1	19.1	100.0
	Total	225	100.0	100.0	

Clearly, 52% representing 116 learners, preferred learning with the iPad to using the chalkboard. Those who strongly preferred learning from the iPad constituted 19.1% representing 43 learners across the three schools under investigation. Those who did not prefer the iPad constituted 6.7% representing only 15 learners; and those who strongly disagreed made up 8.9% representing 20 learners, whereas 13.8% [31] represents those who were not sure whether or not they wanted to use the iPad at all.

From these figures, it appears that disadvantaged learners in rural schools are deprived of access to the multimodal literacy texts that encourage viewing literacy as existing in more than one mode. In the main, rural schools do not only lack teaching and learning materials, but also teaching staff. Added to this, sometimes existing staff spend days going to the district to collect salaries for those who are at the station. In this way they are absent for the duration of this excursion, leaving a behind a teacher vacuum. Such erratic patterns in the

availability of teaching resources (human, in this case) account for the large percentage of learners who underperform. In other words, those affected are learners in rural schools who then operate below the the standard of their grade level in reading and writing.

I observed that even the learners who were generally quiet in class were given a voice as they discussed issues and engaged one another. This process of engagement is consistent with the major theory framing the current study on input hypothesis, a multifaceted, complex and rigorous concept. Learners appeared to have liked the ZEduPad tablets for their multimodal text presentation which is audio as well as visual. They preferred the iPad because they were more engaged in writing, drawing and active listening through the audio-visual sounds that characterised most of the lessons digitised on the tablet. The highly multimodal literacy content on the iPad arguably motivated them to prefer lessons on a tablet to those without. The ZEduPad undoubtedly exposed the learners to linguistically rich teaching and learning materials on the iPad.

The bar chart that follows represents the distribution of responses in favour of iPad use during lessons across the three schools participating in the current study.

Table 22

The iPad is better than using the chalkboard in literacy learning.
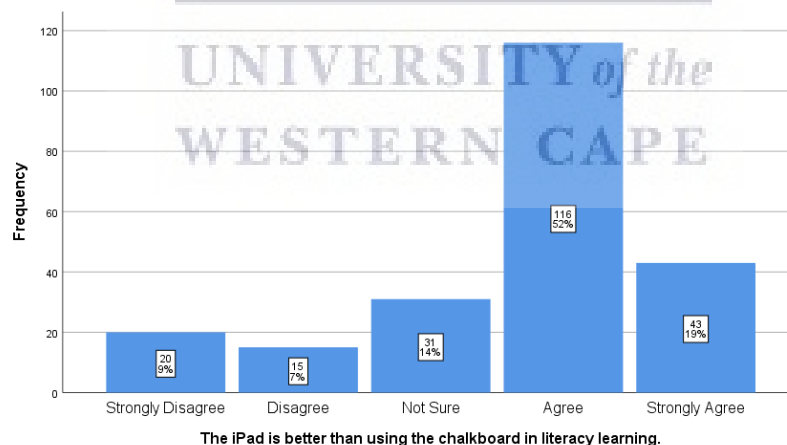
Largely, 71% which is twice the number of learners who were not sure, disagreed and strongly disagreed combined, preferred the use of ZEduPads for teaching and learning of literacy. As can be seen from the bar chart 23, 9% of the 225 learners involved in the study strongly disagreed, 7% disagreed and 14% were not sure whether the iPad was better than the chalkboard during learning. The data clearly shows how eager and excited learners were to learn via tablets and how they would have liked to be more exposed to teaching and learning

materials that are multimodal in nature. According to the learners, the tablets were better because when handling these, they had an opportunity to listen and play back several times to listen to the same information repeatedly. They [the learners] argued that when the iPads were in use, even their friends who never spoke in class wanted to try them out and thus contribute to learning in pairs. For instance, one of the learners from P School commented: "*It's always good to educate with technology because you are listening to what it say and answer question*".

Another pupil from M School explained that learning with iPads has given him an opportunity to learn how to operate the iPad, how to access the lesson link, how to improve his spelling and pronunciation as well as how to draw. According to the learner, most learners feel shy to stand in front of everyone to write on the board. The extract that follows captures the conversation with the learner:

> R: …Tell me what you prefer, learning through the iPads or through the blackboard?
> P: Eh for me I want to learn on the iPad because, I try a lot of thing and eh I even draw and listen to the voice and then I try talk like the one talking inside [*laughter*]. Also, when I am with iPad, I learn spelling yes and sometimes I draw a car and animal.
> R: What else, why do you prefer learning through the iPads?
> P: [*laughter*] Eh because no one is laugh to you in class because you have ear sets and your friend also so you work together two of you to help each other. Even when teacher is go somewhere I can teach myself a lot of thing. [Group Interview: School M]

In the extract, the learners' responses suggest how technology is able to spark self-directed learning amongst learners. This suggests that the more disadvantaged learners are exposed to iPad and its multimodal content, the more they become informed about the world around them. This spurs on language and literacy teaching and planning in an unprecedented manner – to close the digital gap between disadvantaged and privileged, rural and urban, learners. Furthermore, the interest exhibited in learning through and with the iPads is consistent with the Input Hypothesis Theory and the Affordances Theory inherently available through iPad technology.

Adequate input through the affordances of the iPad technology enhances the learner's interest and motivation to learn reading and writing. The excitement exhibited by learners during observation was understandably phenomenal. For example, two learners, one from School K and the other from School M, grew particularly excited when they got almost all the answers correct in a particular exercise they were doing. The learner from School K shouted in excitement, "*I have do it, I have do it sir, it say excellent…[laughter]*" and the teacher,

encouraging the learner commented, "*Well done, now, can you proceed to the next exercise and the questions that are there and you will be free to go home.*"

Two other learners from School M who had been working together, upon achieving the task by getting the correct answers also shouted in ecstasy, "*Yeah! We did it, we did it…hey come and see!*" [inviting others who had not yet accomplished the work]. Upon having successfully completed the task – which had been a bit challenging for them – the excitement was evident in their eyes. At this moment, I wondered whether the same resilience would have been attained had they been doing work from the blackboard or in their own exercise books. But one thing was clear to me: the excitement. The excitement was to some extent sparked by the fact that they were working with technology that presented content to them in a highly multimodal fashion.

The excitement further foregrounds the need for immediate feedback when dealing with learners. Constant feedback and positive word-framing from the iPad and the teacher encouraged the learners to want to continue working at the tasks on the iPad. Scant feedback has been one of the major teaching deficiencies contributing to low performance amongst pupils. Such seemingly trivial teaching practices were all brought to light in classroom observation and through the focus group interviews; and were confirmed by teachers.

Receiving affirmation for doing well as feedback from the iPad had a positive effect as this instant feedback motivated learners to learn more or to persevere. Affirmation served as encouragement to attend lessons every day, as was confirmed by teachers [see teacher responses]. The following photographs depict the feedback learners got each time their task had been completed correctly after every lesson.
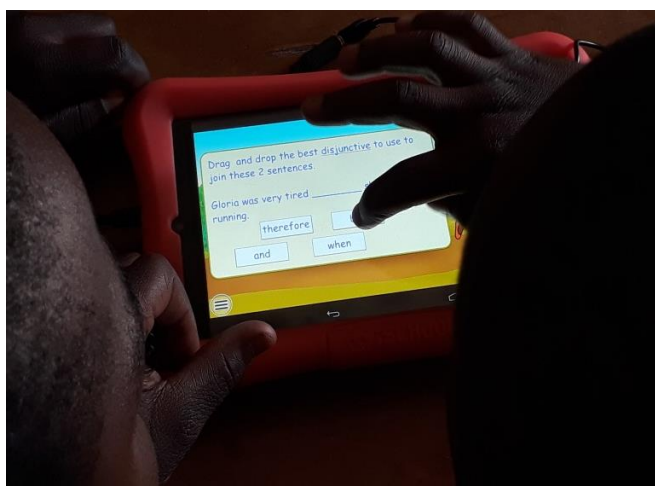
Figure 14: Pupils Gets Answers Right   **Figure 15: Pupils Exploring Answers**
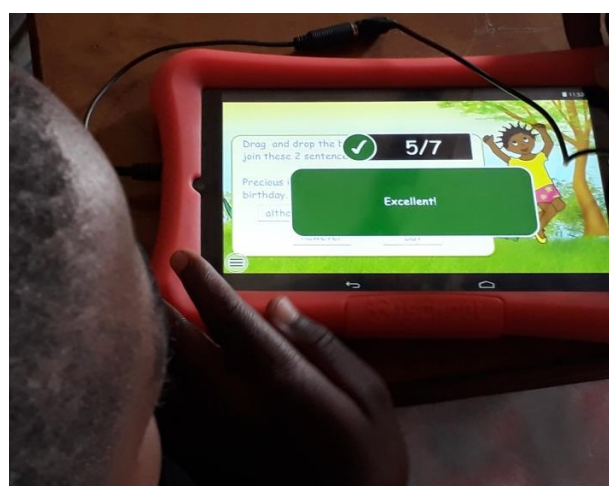
As can be seen in the first picture, learners are doing the drag-and-drop game to find the answers to the exercise about conjunctions and disjunctives in sentence combination. This type of exercise gave learners several opportunities to attempt getting the correct answers. Making several attempts at a task as a form of repetition, arguably leads to content fusion in one's awareness, and hastens and deepens the content engagement process.

As learners asserted, learning through iPads enabled them to view and review content or play back the lesson several times before attempting questions. This form of content delivery offered learners ample opportunity to process the linguistic teaching material for their assimilation. Since the study is about interventions that can spur literacy development, repetition was one of the themes that characterised the content on the ZEduPads for the learners. Quality teaching and learning goes with conscious design and planning that involve repetitive engagement.

During classroom observation, it was evident that learners liked to play back the lesson content several times to understand the linguistic concepts that characterised a particular lesson. As discussed in Episode 2 concerning teaching aids that have evolved into numerous teaching technologies in the 21st century, the mix of time frames and teaching tools creates numerous opportunities to repeat concepts in a lesson. Robert F Bruner points out that repetition is the first principle of all learning (Bruner, 2001).

The learners appeared to have been enjoying the playbacks whether this was done consciously or not. What seemed clear to me was that learners had much to explain about their experience with the iPad during lessons. The fact that they were able to explain the

excitement of learning with and through the iPad was indicative of the importance of the role multimodal devices played in their literacy skills development. This also was indicative of how they [learners] are not usually exposed to adequate linguistic teaching materials either in school or at home.

In their excitement during one of the classroom observation sessions, some learners showed me what else they did with the iPads beyond just learning the linguistic content with the teacher or on their own. This question was a follow-up question to a learner on what else she did with the iPad they had been given. '*Hmmm* [*laughter*]…' She looked bashful about what she said about instances when the teacher had not yet issued instructions on what to do… "*I drew a people or anything on the iPad*", continued the learner. "Oh you mean you can draw just anything?" I asked, "*Yes*", she replied with enthusiasm while showing me what she had been drawing (see pictures below).
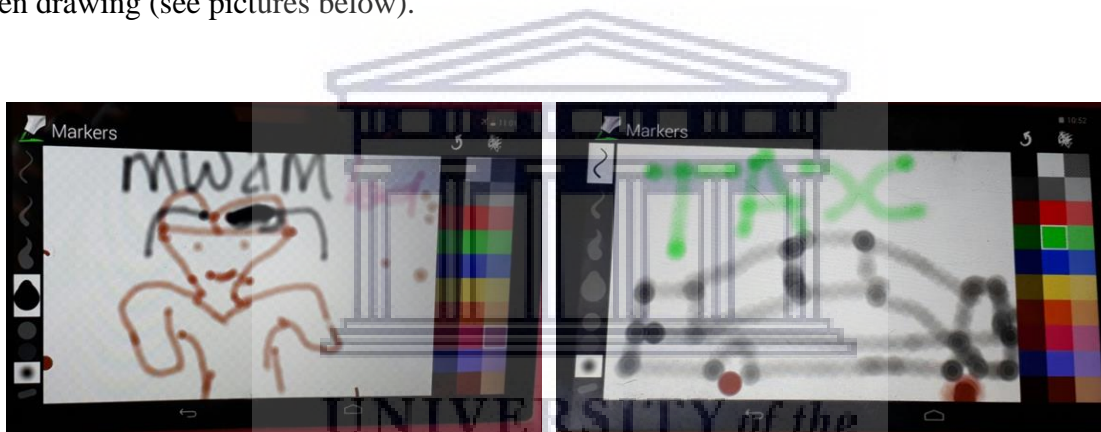
Figure 17: Pupils Motor Skills (a)   **Figure 16: Pupils Motor Skills (b)**

These pictures depict the learner's creative writing processes on the smart screens in their own free time when they had finished working on the class exercise. But the excitement in the response of the learner in question here was almost palpable and readily articulated throughout what she said.

Another learner also showed me how he drew a car on the touch-screen canvas when he had nothing else to do after completing the task given by his teacher. "*What are you doing?*" I asked "*Am draw a car sir*", he answered. "*Wow! This is so pretty*", I replied. So, it appears you can do a lot with the iPad, right?

> P: Yeah, I write on it like to draw the car or a man and sometimes I took pictures and even make video camera and show my friend doing something in class. Yes, it's very nice and happy to learn on the iPad.
> R: Oh, you mean you are excited to learn with the iPad?
> P: Yes, because before, we were not do this in class but now can do it alone…

At this point in our interaction, I was reminded about the four language skills, namely speaking, listening, reading and writing and the role the ZEduPad played in all four skills. This was after unbroken exchanges between the learners' positive explanations to me, and my affirmative responses to their statements. Their experience with technology meant they could review their own learning because it was virtually accessible on a multi-sensorial tablet. As they expressed what they were feeling and experiencing, their learning in situ captured my imagination of what was possible in terms of learning and internalising content.

The greater part of their classroom walls was lifeless and dead as they had no 'talking walls'. The learners could see only the teacher in front of them and a few scribbles on the board. Not that this is what their teachers wanted but as noted earlier, rural and disadvantaged schools lack teaching and learning materials.

I took notes in the field on how helpful the ZEduPads were to the learners who experienced fun in learning while assimilating linguistic content. An extract confirms this:

> Here I pondered on how sensual and sensory multimodal linguistic representation can enable us teachers to capture our lived worlds in a manner that can reveal complex lived worlds, alive, situated and multi-sensorial phenomena. These experiences are still so fresh in my mind as the observations took place in the morning. Usually the morning radiates an incredible atmosphere of peace and calm. All I could see and hear was the noise that came out of their shouting and screaming if they had managed to do the exercise correctly. As I watched them [learners], I was captivated by their sense of eagerness to try out many things on the ZEduPad speaking and many more. [Field notes: Chabinga, 2018]

Thus the learners' recount of their experiences with the ZEduPad were phenomenal and enriching to my study. The captured data demonstrates the necessary exposure to the kind of linguistic material required for successful literacy development. This is commensurate with the idea of adequate input in the form of multimodal, sensual or multisensory media.

The learners also debated other questions raised on the questionnaire concerning whether or not their experiences were better learning with an iPad as opposed to using the exercise books. They preferred using the iPad to using the books. In their interview responses, they revealed how books were heavy and sometimes worn which made it difficult to read even what they themselves had previously written.

So learners generally argued in favour of the iPad with regard to their overall literacy experience of the iPad. Furthermore, they contended that the applications on the iPad were user-friendly making their tasks much easier to access. In response to the question on whether

they would choose iPads or books, why they would make that choice, and which one they preferred, I was intrigued by a response. It came from one learner at School K, a school which could be described as peri-urban as it is near the provincial capital. The learner had the following to say:

> P: I think hmmm from the time I start learn I have good experience with ZeduPad a lot. The way I learn now is good than long time ago. Even the link in the ZEduPad is good it take [sic]me fast to the lesson and there I do everything and I answer question. It just that no take iPad home [*laughter*] at home I can learn more with iPad and I can show my parent what am do on the iPad at school. But when am with book, just threw it away and I go to play with my friend. So, it's [*iPad*] better than book [*laughter*] [Focus Group Interview: School K]

The responses and in particular the foregoing response directly addressed my objectives as to whether the ZEduPads were indeed useful in their learning experience and whether the iPad technology played a role in developing literacy skills amongst sixth graders in Zambian disadvantaged primary schools.

The next section focuses on the role of ZEduPad in literacy development.

6.2.4 Role of iPad in Literacy Development

Regarding the role of ZEduPads for literacy development, the learners had fairly varied responses most of which were thrilling and captivating. One of the questions asked on the questionnaire was whether the iPad helped the learners to learn, remember and participate in literacy lessons. In their responses, most learners indicated that there was a major difference before and after using the iPads for learning. It was evident that learners maintained that the technological device had a significant role in their literacy learning development.

Table 24 indicates that cumulatively only 9% disagreed with the statement that the iPad had helped them to learn, remember and participate in the literacy lessons, while 12% of the 225 were not sure whether the iPad had helped them learn or remember in their literacy lessons at all. This observation shows that cumulatively 21% of the 225 learners involved in the study were not sufficiently encouraged in their classroom participation. Because of this, their enthusiasm levels to learn with technology were not adequate and therefore they did not find learning with technology interesting. The table that follows highlights the response distribution of the learners regarding this question.

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Table 23

The iPad has helped you to learn, remember and participate very well in literacy lessons.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	2.7	2.7	2.7
	Disagree	14	6.2	6.2	8.9
	Not Sure	27	12.0	12.0	20.9
	Agree	158	70.2	70.2	91.1
	Strongly Agree	20	8.9	8.9	100.0
	Total	225	100.0	100.0	

The majority of respondents 79.1% [178] said that the technology had helped them learn, remember and participate in literacy learning. The data indicates that the frequency in exposure to the multimodal tablets has the potential to enhance performance and therefore literacy skills development. This also suggests that efforts by government to scale up eLearning for Zambian rural schools should be prioritised, especially since these schools are hard-hit by a critical shortage of both teachers and teaching and learning materials. In addition, this observation reveals that the iPad is a teaching and learning resource supplement as one of the teachers explained (see teachers' data in the next section). As can be seen from the bar chart in Table 25, 70% [158] and 9% [20] respectively, show the learners' estimation of how the iPads had helped enhance their literacy learning.

Table 24

The iPad has helped you to learn, remember, and participate in literacy lesson very well.
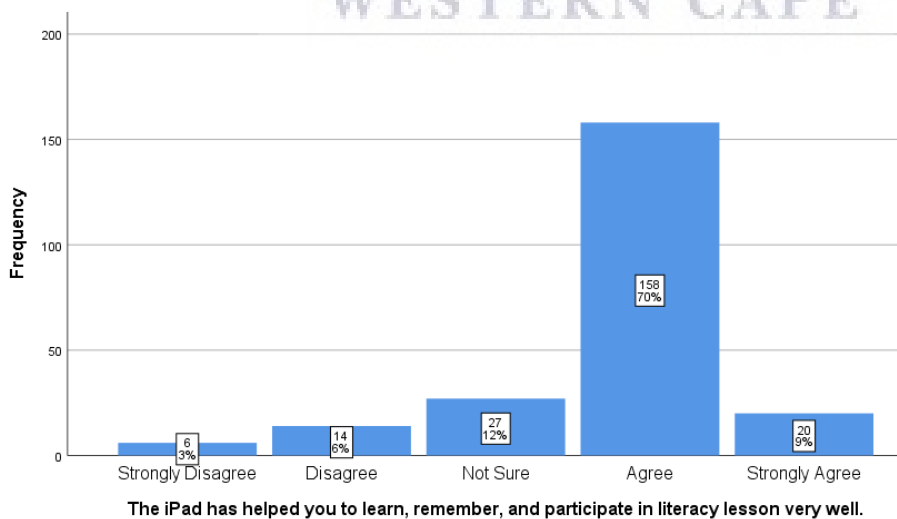
In addition to the data represented in Table 25, one other equally important related question was about whether the iPad was helpful to learners in the domain of reading and writing. While it might sound similar to other questions, this question dealt specifically with reading

and writing. The purpose of the question was to establish whether the iPad was helpful in enhancing their literacy skills in general. As with other responses on the role and use of ZEduPads, the learners' responses varied. However, in this case the responses did not include the "strongly agree" (SA) option. In other words, the majority, 57% [129] of the responses returned the questionnaire skewed towards "agree" on this question; with none or 0% marked "strongly agree" (SA).

As can be seen from the next table (Table 26), only 8% "strongly disagreed" and 10% "disagreed" resulting in a cumulative total of 18% of the learners who indicated the iPads did not help them learn how to read and write. 25% [57] of the learners were not sure as to whether the ZEduPads helped them to read and write.

As indicated in Episode 1, the sixth graders have recently just transitioned from Grade Four (4) where they were learning in local languages from the first grade. In other words, linguistically they are at a critical stage. Some might have broken through in terms of reading and writing and others might not have. The data reveals that the majority failed to break through in terms of reading and writing by the time they were in the fifth or sixth grade. This can be attributed to the lack of teaching and learning materials referred to earlier. The lesser percentages could represent those who did not see any improvement in reading and writing since they already knew how to read and write. The bigger percentages could indicate the learners had little literacy fluency and therefore the introduction and exposure to the iPad enhanced their literacy skills at the time of the study. Table 26 shows the response distribution on this particular question.

Table 25

You find the iPad helpful for learning how to read and write.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	17	7.6	7.6	7.6
	Disagree	22	9.8	9.8	17.3
	Not Sure	57	25.3	25.3	42.7
	Agree	129	57.3	57.3	100.0
	Total	225	100.0	100.0	

The data indicated in Table 26 is consistent with the responses given during the focus group interviews (FGI) in the three schools under investigation. Each focus group of 8 comprised of learners selected with the help of teachers. In total there were 24 learners across the three

schools. The data obtained from the interviews was analysed using simple quantification of what learners revealed. The data indicates that the majority felt that the (ZEduPad) iPads helped them learn how to read and write. From the interview results analysed (see Table 27), 13% [3] (strongly disagreed, 8% [2] only disagreed and 8% [2] were neutral. The highest, 46% [11] revealed that the iPad helped them read and write and 25% [6] felt that the iPads helped them very much in their quest to learn how to read and write. The table which follows shows the distribution of responses from the learners across the three schools.

Table 26

S/No	Question Criteria across three schools	SD	D	NS	A	SA
1	You find the iPad helpful with learning how to read and write	3	2	2	11	6
		13%	8%	8%	46%	25%

Table 27 clearly shows that disadvantaged schools require more than just a teacher explaining concepts to them. Rural school learners require adequate exposure to authentic linguistic materials, and consistent immediate feedback as is the case with the digitized curriculum content on the ruggedized tablet (aka ZEduPad). The bar chart that follows shows the distribution of responses on this question in a more vivid manner.

Table 27

You find the iPad helpful with learning how to read and write.
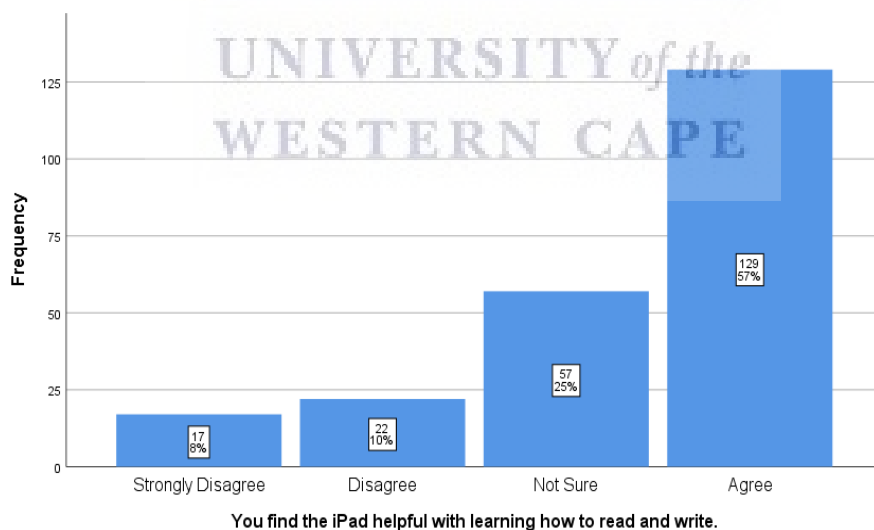
The data gathered from the learners was similar to what the seven Grade six (6) teachers who participated in this study revealed. According to the teachers, the introduction of the ZEduPads into the schools brought along several good things that they had never experienced before.

The section following is devoted to the data gathered from the teachers in the three schools.

6.3 Demographic profile teachers

As noted earlier, demographic data is an important aspect of any particular research study as it informs the results of the report about the kind of sample used in a particular study. This data is important because it shows whether or not the sample is representative (Connelly, 2013).

In this case, seven Grade six teachers of English were involved because the study's aim was to investigate the role and use of ZEduPads for literacy development from the perspective of both the teachers and the learners. Apart from the perspective of learners, the study set out to investigate the experience of teachers in the use and integration of ZEduPads in their teaching practice. In this regard, 3 (43%) of teachers were from School K and another 3 (43%) from School P. School M, however, involved only 1 (14%) making a total of seven male teachers from the three schools. No female teachers were found or posted in any of the schools unfortunately. School M had had the majority of its teachers transferred to other primary schools within the district. The pie-chart which follows in Figure 12, shows the distribution of teachers who participated in this study.

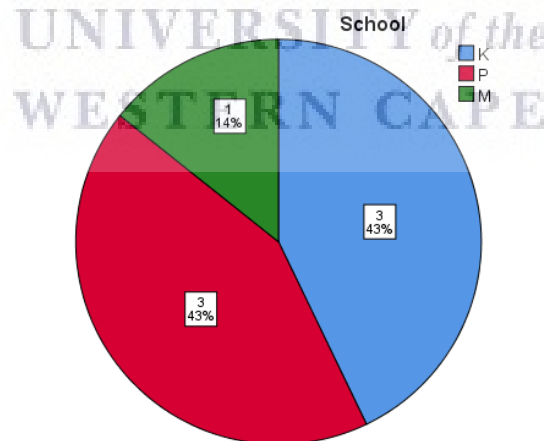**Figure 18: Representation of Schools**

As stated in Episode 5 (on research methodology), teachers were purposefully selected because they were teaching the sixth graders and they were not only oriented in teaching with iPads, but they were indeed *using* the devices. All the teachers met the primary requirement for teaching sixth graders which is to be in possession of either a primary education diploma

or a primary degree in education which allows them to teach all Grades. Due to lack of teachers in rural schools, teachers not only teach all subjects in all Grades but also teach all Grades 1 up to 7.

In primary education, teachers teach all the subjects. Of the seven teachers, 5 (71%) were certificate holders, 2 (29%) were diploma holders and none (0%) were degree holders. Two of these teachers were already upgrading their qualifications to a degree certificate. However, their upgrade as they indicated was not in line with primary school teaching. Teaching the lower grade did not attract a considerable salary and some schools in the remote and rural areas did not receive a remote and rural hardship allowance. Table 29 represents the distribution of qualifications of the seven teachers:

Table 28

Qualification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Certificate	5	71.4	71.4	71.4
	Diploma	2	28.6	28.6	100.0
	Total	7	100.0	100.0	

In the foregoing table we can see that all teachers were qualified to teach in the primary sector. However, their qualification did not involve the integration of technology in their teaching practices. For example, during the individual interviews, most teachers revealed that their teaching experience in the college had no component for learning how to teach with the latest technology to enhance their teaching. Thus, their qualifications were purely normal qualifications like those of everybody else. The extract from the interview transcript that follows depicts the sentiments of teachers regarding their qualification and the integration of technology in their teaching.

> R: …in the questionnaire I saw that some of you are certificate and diploma holders. Tell me, did you have any prior experience in using technology in college to integrate technology in your teaching?
> T_1: Hmmm, no sir. At college most of us were not exposed to this type technology. The word technology was narrowed to knowing how to make simple teaching aids with our own hands to enhance the learning experience for the learners. However, making teaching aids before they brought in the ZEduPads was difficult because one, it's very rare that we have flip charts and other related teaching materials in these rural schools.
> T_2: Sir, here it's a nightmare to have teaching materials from which we can even make teaching aids. The reason is simple; we are given K500 after one year. How can you work like that? So we fail to spice our teaching with more appealing teaching aids because we don't just have money to purchase the teaching aids frequently. But at least, we are now glad because these tablets Sir, even if I am not around, as long as we have shown them to operate them they even learn on their own…
> [**Interviews: Individual**]

As the individual teacher interviews indicate, the lack of teaching and learning materials prevents both teachers and learners from accessing adequate linguistic input and exposure to authentic and meaningful linguistic content in the classroom. On a governmental level, this was attributed to the non-provision of adequate resources, and the erratic funding of rural and disadvantaged primary schools. It might imply that even if the sums are small, the government has to enhance their funding strategies to incorporate these rural schools in the budget for the necessary teaching and learning materials. Reliable access to resources would enhance the teaching experience for teachers and the learning experience of learners.

Additionally, teachers felt that the ZEduPads training they received was inadequate; insufficient time had been allotted to this. Thus, they felt the need for more training in order to become better acquainted with the technology and to gain more experience with how to integrate it successfully into their work.

In terms of experience, this varied. Some had few years in the teaching service while others were slightly more experienced. One had between 1and 2 years (14%), two between 5 and 6 years (29%) and four– the majority– had between 3 and 4 years (57%) in the service. Generally, all seven teachers were relatively new in the teaching service (TS) because all of them had fewer than 6 years' experience in formal employ. The following table shows the distribution of their years in the teaching service.

Table 29

Experience in Years

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-2 Years	1	14.3	14.3	14.3
	3-4 Years	4	57.1	57.1	71.4
	5-6	2	28.6	28.6	100.0
	Total	7	100.0	100.0	

Table 30 leads one to conclude that the majority were posted in these schools on their first appointment. It also means that their experience had been limited to these rural schools, judging from the number of years they have spent in the teaching service. Usually, first-time teachers do not have the experience they need to take learners across the literacy bridge. This makes it difficult for them to know how to help learners who are not yet literate to cross that bridge to literacy.

Added to this, quite often the capacity to motivate learners and hold their attention lies with experienced teachers – those who have taught for many years. These teachers know how to manage their classrooms effectively and can even change course midway in a lesson to take advantage of the unplanned opportunities that will enhance the learners' learning experience. The bar chart that follows shows the respondents' distribution in experience in the teaching service.

Table 30
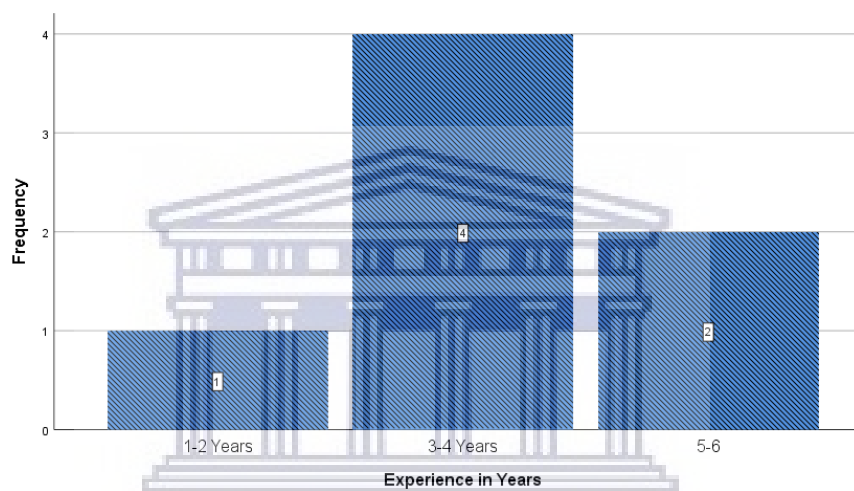
From the foregoing bar chart, we can see that four teachers had taught for between 3 and 4 years; and these were the most experienced teachers in these schools. Although my study did not attach a bar to what experience meant, basically, the category "experienced teacher" implies any teacher with 2 or more years of teaching experience who is able to handle a classroom and hold its attention.

However, teachers then asserted that experience comes with the duration of exposure to using technology in the practice of teaching and learning.

This was revealed in response to questions on the time spent, and frequency, in using the iPad with learners in one week. In their response teachers revealed that the iPad was used one period of 40 minutes twice a week, which comes to about 240 minutes or four hours per week. English language has six (6) periods and this means that two other periods were reserved for other lesson activities. Figure 13 captures a sample of the Grade six subject time-table.

Figure 19: Sample of Time Table

Table 32 – shows that 5 (71%) teachers confirmed using the iPad for 80 minutes or two periods three times a week, while the other 2 (29%) said they used the devices for 40 minutes three times a week because of a shortage of teachers who could use them without abandoning the class for another class.

Table 31

Minutes for iPad Use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Period-40 Minutes	2	28.6	28.6	28.6
	2 Periods-80 Minutes	5	71.4	71.4	100.0
	Total	7	100.0	100.0	

The data in the foregoing table shows that 29% of the teachers use 40 minutes. The teachers who revealed that they used 40 minutes attested to the fact that their schools suffered a teacher shortage. We can clearly see that the lack of teachers and lack of materials for teaching and learning adversely affected the learners' opportunity to access adequate linguistic input for literacy learning – owing to the inadequate time of exposure to ZEduPads. The pie chart in Figure 14 clearly depicts the responses.
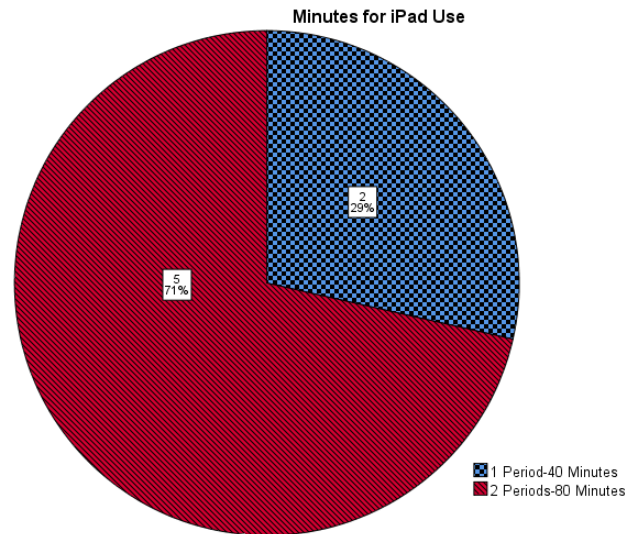
Figure 20: Periods of iPad Use

The larger percentage of respondents, 5 (71%), who indicated that they used the iPads three times per week argued that their teaching staff numbers were relatively adequate, which gave them time to concentrate on teaching their own classes. Hence, they were able to use the iPads more than twice per week. In schools where more than one teacher used the iPads, a literacy time table was designed to allocate periods equal to 240 minutes or 6 periods in a week. All conditions being equal, all six periods were purposefully used, provided there were no external factors such as staff meetings or travelling for salaries in the boma[11]. However, the teacher respondents indicated that when teachers travelled, they entrusted certain learners with the monitoring of others' use of the devices.

This led to the question of what they saw as the role of iPads in literacy development. In the next section, I dwell on teachers' perspectives on the role of the iPads for literacy development.

6.3.1 Role

Apart from the frequency of iPad use, one of the goals of this study was to investigate the role of iPads in emergent literacy development among the Grade 6learners in rural Zambia. This was based on the assumption that the inherently soft touch-based screens offer seamless opportunities for learning how to read and write. When I asked teachers for their own perspective on the role of iPads they revealed that the learners were quite excited each time

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[11] 'Boma' in Southern Africa and particularly in Zambia is believed to be the British Overseas Military Administration.

the devices were used for learning. On days when learners knew the ZEduPads were not being used, they were not very excited and some even bunked classes.

As a well-known handheld interactive multimodal tool, the iPad helped to deliver literacy lessons in fashionable and exciting ways. Excitement was a literacy learning recipe for most learners as they spent much time trying out several things on the iPad. For example, one of the teachers at School P argued that for any learning to be successful and meaningful there must be some form of enjoyment. When learners enjoy what they are doing, it is easier for them to engage with content. The following extract depicts what the teacher revealed:

> You see Sir, these iPads have really excited the learners and has improved the attendance and enrolment as compared to the time before we received them. The tablets have really motivated learners to learn. When the learners see the tablets they are excited and even some of them who are not part of the class they snick in to just come and learn using the iPad. Even us as teacher we are now motivated to teach because most of the materials we never used to have are now on the iPad. Lesson plans are there. You can either modify it or use it the way it is. So, teaching is now easy to do… **[Teacher Interview: School M]**

The extract clearly shows that teachers saw the iPads as their saviour in the light of the absence of teaching and learning materials. The teachers were excited to use the iPads because the iPads transformed the way they taught. In addition, all the teachers were excited that iPads had been given to their schools because the iPads seemed to bridge gaps in the availability of teaching materials. The teachers also revealed that since the iPads were brought to the schools, they had seen a remarkable improvement in the learners' literacy performance and skills dexterity. For example, 6 (86%) agreed that the performance of the learners had remarkably improved while 1 (14%) strongly agreed that the performance had been enhanced. The following table shows the distribution of the responses from the returned questionnaire on this particular question.

Table 32

You have seen measurable improvements in your learners literacy learning outcomes because of iPads

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	6	85.7	85.7	85.7
	Strongly Agree	1	14.3	14.3	100.0
	Total	7	100.0	100.0	

The table clearly shows that all the teachers, 7/7 (100%) confirmed that the iPads were significantly helpful in assisting learners who had very little proficiency in English literacy,

and that the devices improved their reading and writing skills. Learners in these parts of the Northern Province in Zambia receive English linguistic input only when they are in class learning. When they are at home they receive very little or no English language input at all. Thus, learning literacy skills is confined to classroom activity. Outside the classroom, none happens.
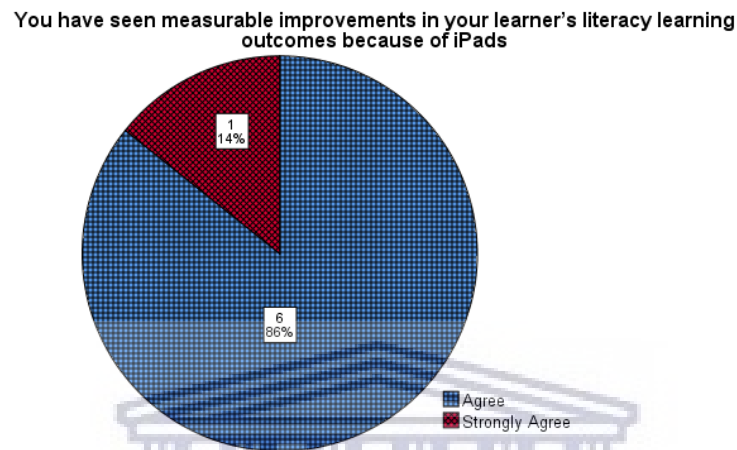
Figure 21: Pie Chat Indicating Pupils Improvement or Not

This was also confirmed by the learners during the interviews when they revealed that the iPads assisted them to the extent that the devices helped them recognise word spellings, word pronunciations and ways of speaking as they listened to recorded clips on the iPad.The pie chart depicts the teachers' responses more vividly. It reveals how strongly teachers felt about whether the iPads were helpful for literacy learning or not.

In their comments during the individual interviews, teachers felt very strongly that the iPads brought some change to these rural and disadvantaged schools. While they were not able to provide statistics from their own analysis, teachers revealed that most learners had now learnt how to read and write, a skill which should have been acquired before Grade 6. In Zambia learners from Grades 1 to 4 learn in local languages and learn English as a subject only and not as the language of instruction, as is the case from Grade 5 onwards. For example, when the question was probed about how sure they were if iPads had enhanced literacy skills amongst learners one of the teachers from School K stated vehemently:

> "Sir, I know what I am talking about…I have been teaching these kids since grade 5 when they just transitioned from learning in Zambian local languages to English as an instructional language. I have used these iPads since when they entered grade 5 and up to now am still using them. Most of them never spoke a word in English, Sir. They never read a word, but because they are able to listen to the recordings and watch videos of how to make pronunciations, they have remarkably improved, hear it

http://etd.uwc.ac.za/

from me. My language may not be as clear as you might want to hear, but I know what I am talking about…" [**Teacher Interview: School K**]

The extract from the teacher at School K reveals the perspective of a teacher who feels iPads are a positive enhancement for both teachers and learners in these rural and disadvantaged schools. The teachers were in no doubt that the ZEduPads came to them as a relief. However, they felt the training they received for using the ZEduPads could have been longer in duration and more comprehensive in substance for them to have become more digitally fluent themselves. Teachers revealed that the five-day training they received gave them only a basic idea of how they could operate the iPads for teaching and learning. Two years after having received the technology most of what teachers were found practising at the time of data collection, were self-taught skills.

Despite the relief to both teachers and learners following the introduction of portable and content loaded devices, I was set on finding out whether the ZEduPads were distracting to the learners, as most parents believed they were. Based on this belief, most schools have gone as far as adopting a policy of no technological devices. The learners are not allowed to bring with them to school any form of technology apart from the calculators which are mainly used for Mathematics, Physics or Business Studies. Teachers' seemingly uninanimous response to this matter was that iPads were a distraction only if learners were not guided in their use of the devices.

However, in the interaction I had with teachers in one-to-one interviews, the majority felt that iPads could potentially be a distraction. Reiterating the earlier point, one teacher at School M contended that, '*iPads can only be a distraction if the learners are left alone without guiding them on what to do in that particular lesson*'. Another teacher from School K commented that:

> When a teacher fails to do classroom management properly and if he did not prepare for the lesson, yes, it could be a distraction. Because the teacher will spend time on figuring out what to do with the iPads…meanwhile the learners who are active will start going in certain apps that will make them learn other things other than what was planned on that day's lesson. [**Teacher Interview: School K**]

The distraction, according to the teachers was only that which took the learners away from accessing lesson content, to other non-relevant apps like apps which made them practise handwriting through drawings, as earlier shown in pictures of drawings.

According to the teachers, it was important to understand that iPads or technology was not there to supplant the role of a teacher during teaching. They advocated for the proper use of iPads in order to foster guided learning. In view of this, 4 [57%] of teachers noticed distracted behaviour, arguing that with proper lesson preparation, the teacher would know how to guide the learners, thereby reducing the chances of them accessing apps other than those relevant to the lesson on a particular day. While only 1 (14%) teacher agreed that iPads were distracting, 2 (29%) were not sure the iPads were distracting in nature during lesson delivery. The table that follows shows the distribution of the participants' responses concerning the question of whether the iPads were a distraction or not.

Table 33

You notice class distractions when learners use iPads (ZEdPads) in literacy lessons

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	57.1	57.1	57.1
	Not Sure	2	28.6	28.6	85.7
	Agree	1	14.3	14.3	100.0
	Total	7	100.0	100.0	

This table indicates that 1 (14%) agreed that iPads were distracting in lesson delivery. Following up on this question during the interview, one teacher cautiously commented that iPads could be distracting if the teacher was not well prepared. Other teachers argued that they noticed more distractions in lesson delivery before having received the iPads. At the time one teacher commented, "*Teaching was so frustrating that you wondered why one would be in such rural place where the learners did not value learning so much. Especially that we lack teaching and learning materials*". This resonated with the literature in Episode 2 where iPad technology is described as addictive in nature. By this it is meant that iPad technology is an attention-holder. Thus, the teachers made sense when they responded that learners were not particularly distracted during iPad lesson presentation. The bar chart in Table 35 depicts the teachers' responses graphically.

Table 34

You notice class distractions when learners use iPads (ZEdPads) in literacy lessons
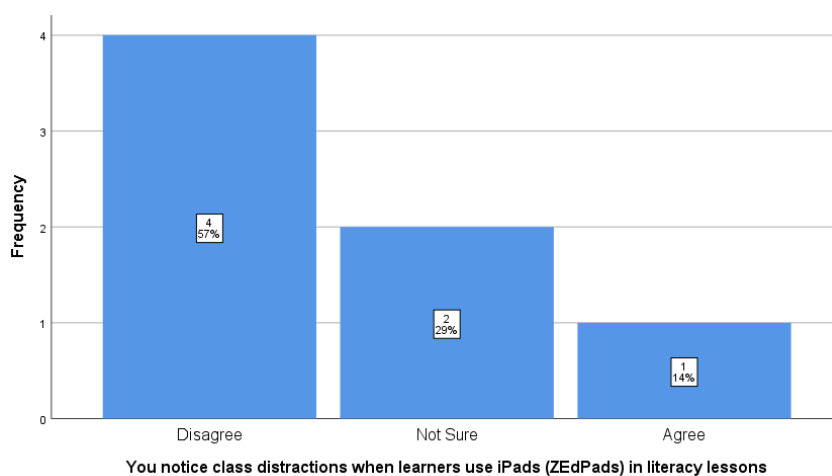
The bar chart shows that only 1 (14%) agreed to noticing the distraction. However, as noted earlier, they modified this by asserting that distraction can arise for reasons unrelated to the materials themselves, even iPads. They stated that distraction is more likely to result if: (1) the teacher has not fully prepared for the lesson; and (2) if the teacher has no classroom management skills. Most teachers disputed noticing any behavioural problems when learners were using iPads. What was clear however is that teaching with the iPad (ZEduPad) brought much joy to both teachers and learners.

In view of this, on the questionnaire all seven teachers affirmed that teaching with the iPad engaged learners. This was in response to the question regarding whether learners were engaged while learning with the iPad. Their responses indicate 2 (29%) strongly agreed that the learners were engaged while 5 (71%) agreed that the learners were only engaged. Surprisingly enough, there were no doubts about this from the responses.

Thus, consistent with responses regarding whether or not the iPad technology was distracting, the responses to this question were indicative of the perceptions of teachers on how they perceived the iPad technology. The table that follows shows the distribution of responses.

Table 35

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	5	71.4	71.4	71.4
	Strongly Agree	2	28.6	28.6	100.0
	Total	7	100.0	100.0	

Your learners are engaged when they use the iPads in your literacy classes

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Judging from these responses, one could argue that the ZEduPads were a 'life-saver' to the teachers who bemoaned the lack of teaching resources in these rural schools. It can further be concluded from the responses that the role of the ZEduPad in teaching and learning was transformative. ZEduPad technology made teaching relatively easy as all or almost all the teaching materials were digitized on the iPad. One teacher commented:

> Teaching has become easier now than before because all the lesson plans are on the iPad. The learners like lesson that involve iPads. Even noise Sir, the noise has reduced among learners including absenteeism. When they open the links most of them are engaged trying to look for the link and listening to the recorded presentations. For me as a teacher, even before I teach, I can even listen to the way the lesson has been presented on the iPad and from there I plan mine with few or no modifications to the lesson. This time, we have the teaching aids readily available on the iPad especially that the iPads comes with the LCD projector to beam the lesson while dividing the learners in three groups also known as stations. [**Teacher Interview: School P**]
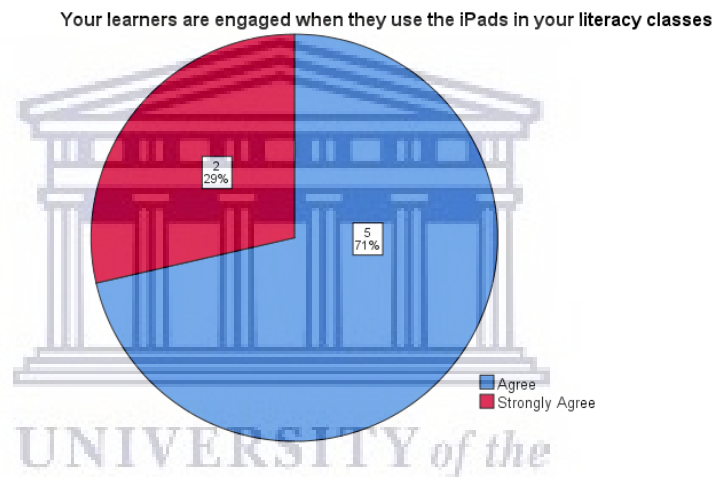
Figure 22: Pie Chat Pupils level of Engagement with iPads

As can be seen from the pie chart, responses are 100% for the question on whether the learners were engaged or not when learning with iPads. Arguably, this is an indication that if learners were engaged, then literacy development must somehow have been taking place.

As indicated in Episode 4, adequate input and the ability to hold attention through authentic creatively used teaching aids are essential for literacy development. The question concerning whether learners are engaged by the iPad can thus be seen to tie in with the earlier question on whether their literacy performance has improved in the process.

This question was followed up with the question on whether their literacy thinking skills are enhanced when they use the iPad. Responses in individual interviews revealed that mere contact with the iPad and listening to the content there, freed learners to start speaking with more ease. In other words, the iPad acted as a model for their learning behaviour, and

interaction with the iPad enabled most learners to improve their literacy skills. What follows is an extract of what a teacher from School K had to say about the iPad functioning as a model for learners:

> …Sir, I have been teaching for the past four years now in this school on my first appointment and I have never seen an enthusiastic learner than what I have been experiencing since the iPads were brought in school. As I said earlier on, learners are fast at learning with something that interests them. I only showed them how to operate the gadgets and in no time they started accessing lesson contents and other apps faster than I thought. Now these are rural school learners who have no access to such gadgets. Now tell me Sir if you think they cannot improve their literacy skills if they are interacting with authentic materials on the same iPad. To tell you the truth, maybe those that already know how to ready, it can be difficult to tell but these who were struggling and you can see the changes so easily. [**Teacher Interview:School K**]

From what we can see in the extract, it can be argued that educational iPads are ideal tools for most rural learners. From the interaction I had with both teachers and learners, it was clear that the ZEduPads were more than just tools for learning. ZEduPads were slowly becoming part of the socio-materiality that helped learners expand their knowledge on most the things besides improving their vocabulary, grammar and literacy skills in general. What the teachers were now ensuring was to maintain the iPads by always charging them and storing them nicely.

Based on these responses, the next question therefore was to find out from the teachers whether they had identified differences between theories or approaches and strategies to language teaching and if at all they were conscious of the methods or approaches they were using in teaching literacy skills. Both the questionnaire and the individual interviews revealed a variety of interesting results.

In the section that follows I focus on the methods of language teaching as employed by teachers in their classrooms.

6.3.2 Methods

Most teachers appeared to know a fair amount about methods of teaching literacy. For example, when teachers were asked whether they knew the difference between methods, approaches and strategies the majority gave positive answers. However, when a follow up question on the differences regarding methods, approaches and strategies was asked, most appeared puzzled and some were not sure if differences existed at all. Only a few were able to state the differences.

In their responses, it was clear that teachers had an idea of language teaching approaches and were comfortable commenting on or picking the approach with which they were familiar. Those approaches that were unfamiliar with were not picked, which indicated that they were therefore not comfortable commenting on them. The pie chart in Figure 23 provides a graphic representation of methods preferred by the teachers.
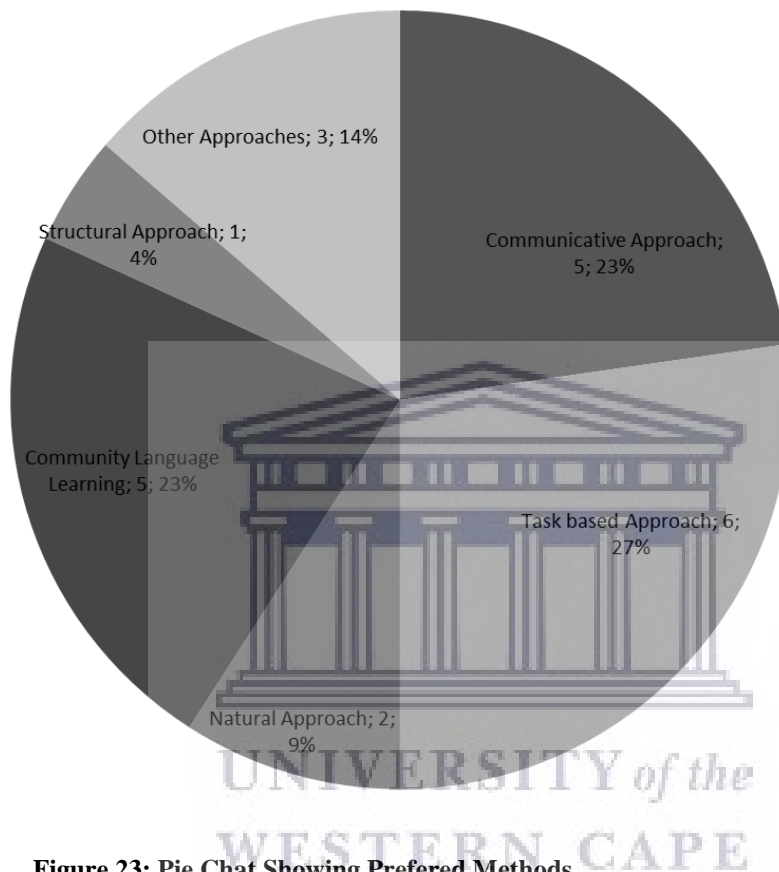
Figure 23: Pie Chat Showing Prefered Methods

As can be seen from the pie chart, teachers preferred the Task-Based Approach (TBA) which stood at 6 (27%), followed by the Communicative Approach (CA) and Community Language Learning Approach (CLA at 5 (23%) respectively. While 3 (14%) chose other approaches, what was indicated on the returned questionnaire were not classified as approaches, according to this study.

For example, in referring to other approaches, teachers indicated group work and individual work or whole class discussions as approaches. This further revealed the confusion amongst teachers on differences between an approach and a strategy. This result further revealed how theory and practice were arguably still two parallel lines that might not meet. It exposed teachers' concern for workable immediate activities rather than ones developed over a longer period. In this case, strategies were more immediate than the overall procedure in how the

lesson is conducted. It appeared to me that the plan of the lesson was implicit rather than explicit. What was explicit was how the literacy activities were to be carried out. For example, a teacher from School P noted that in most cases teachers focused only on the things that work in the classroom.

> We have no time to start differentiating methods from strategies. What we know is that whatever we use to carry out a lesson is a method or strategy and that these words can be used interchangeably. Thus, why my focus is, how do I get the learners to start reading… on methods I just use pair work, individual work or even group work…   [Teacher Interview: Schook P]

The extract depicts how teachers are eager to implement curriculum goals and to avoid being bored by theories or methods. It further reveals that teachers may have knowledge of approaches but without consciously using them to teach. Pair work and group work were mostly used to teach literacy development. For example, learners were asked to identify animal names in pairs or in groups, while the teacher affirmed their answers where necessary. Thus, in the next section, I highlight some of the strategies that teachers used for literacy teaching.

6.3.3 Strategies

Apart from the methods, I wanted to establish whether teachers had specific strategies for teaching English and literacy skills in relation to methods or approaches outlined earlier.

Strategies are intent carriers in a lesson. These are terminal objectives also known as measurable objectives learners must be able to 'do' after having completed a lesson. In other words, strategies are immediate in nature because their results are 'the now' rather than 'the then'. From the returned questionnaire concerning what strategies teachers were using for literacy teaching, teachers indicated that they used pair and group work as their main pedagogical strategies. The strategies are described in Section 6.4 in addition to a few other strategies.

When teachers were asked about which strategy they preferred, responses varied. As can be seen from the pie chart, the least is 0% for both field work and drama respectively.

The highest or the most frequently used strategy is group work at 37%, followed by pair work at 19%. The following pie chart shows the distribution of teacher's preferences in their strategy use for literacy learning.

Strategies for Literacy Teaching
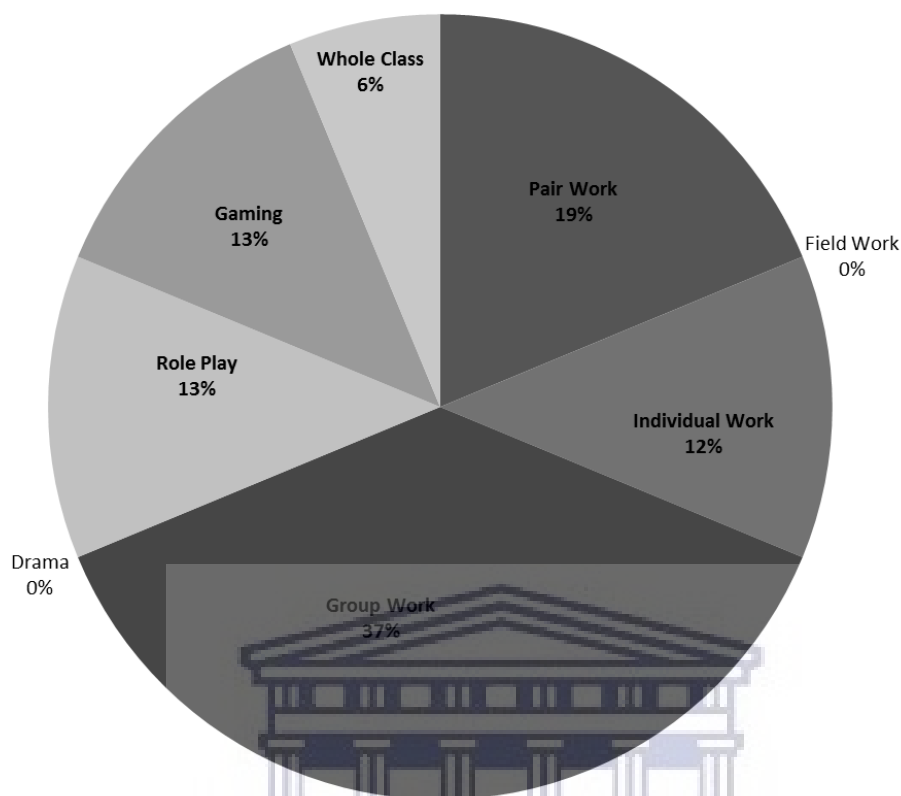
Figure 24: Pie Chat Showing Strategies for Literacy Teaching

As can be seen from the pie chart in Figure 24, 37% of teachers revealed that they used group work as a strategy to teach literacy skills using the ZEduPad. This revelation was interesting and consistent with the model strategy introduced by World Vision (WV). So it was not surprising that the two strategies were in fact the most preferred and used.

The literacy model by WV uses a three station or group strategy. It involves one group being given the iPads and instructed to listen to a particular lesson while the other group is given some exercise from the iPad to complete, and a third group is focused on another part with the teacher. The groups rotate until all are able to experience learning with an iPad. The pair work involved the group of learners who were paired to listen to a lesson on the iPad before working on an exercise. As was explained by one of the teachers:

> Sometimes before we received the iPad, we could only engage certain learners by calling the bold ones in front of the class to demonstrate to others certain concepts for example on the phonemic awareness. But now, engaging the learners has changed because the iPad has increased participation in a different way. This time, collaborative learning is taking centre stage and there is more talk now than before. Teaching has become more learner-centred now because most of the things are explained very well on

the iPad. The noise talk Sir is all about literacy discussion or what the topic is about. Even the quiet learner Sir can talk now kkkkk [*laughter*].

The foregoing extract confirms that the iPad potentially fosters collaborative teaching and boosts participation in class. In classroom observations, it was interesting to see how the learners worked together to get their tasks done. This form of collaboration encouraged learner talk, a feature that is consistent with the notion of literacy as a social and cultural practice as discussed in Episode 3.

As indicated in Episode 1, most teaching in Zambian schools is characterised by rote learning and so the introduction of the iPad has arguably shifted this trend in schools that have been privileged to learn via these emerging technologies. Thus, the multimodal nature of the iPad has impacted on the way children learn, notably in disadvantaged rural schools. The implementation of the new technologies for literacy development can therefore be implemented using what Wolfe and Flewitt (2010, p.397) call the collaborative multimodal dialogue. While the implementation of literacy learning inspired both teachers and learners, teaching with the emerging technology was not without challenges. In the following section, I focus on some of the challenges associated with teaching with ZEduPads.

6.4 Challenges and Barriers to iPad use

Both teachers and learners revealed that they had had several challenges when first they received the iPads. Among these, was operating the iPad, which both groups found to be a major hurdle. For example, a teacher from School K lamented that he had difficulty in mastering the steps to access particular activities for a day. Despite having been through orientation, they still experienced challenges in finding the lessons for a particular day, for a particular term and for a week. The following extract highlights the challenges captured by the teacher at School K.

> We were oriented on how to operate the iPads. This was not easy because mastering all the steps that leads you to a particular lesson for that particular week and term was something very challenging. You see, in Zambia we have three terms and the way the iPad has been programmed is that the terms have been divided into two parts of 6 weeks. So in term one (a) there are lesson and term one (b) has its own lessons and so on completing a year. So locating lessons with all these steps was a challenge at first. [**Teacher Interview: School K**]

The challenge of operating the iPad or technology in general resonates with the literature in Episode 2 where most people who are not digitally fluent fail to cope with the new normal especially if this becomes a requirement for the classroom. In highlighting the challenges

further, another teacher from School M commented that challenges were rife, but cited only one that was particularly disturbing and a lesson disruption to him. According to this teacher, when the iPads came into school, lessons on the iPads were accessed using links. However, some of these links were were not matching the lesson they intended. For example, if the link showed that the lesson unit was on Tenses, yet the link took the learners to a different lesson unit altogether was disturbing. They thus by-passed the material they had intended to look at in that particular lesson. The extract that follows highlights this particular challenge.

> Sir, there were several challenges that came with the use of iPads the first time we received them. Apart from knowing how to operate them, certain links that were supposed to lead you to a particular lesson were not taking you to that particular lesson for the day.
> **R:** What do you mean by links not taking you to the lesson for the day?
> **T:** …hmmm (*continued the teacher*)... Sir, what I mean is, these iPads have been programmed in such a way that the apps affords you to access unit topics and lesson. So, some links on the iPad were a huge mismatch between what you are supposed to teach and where it will take you. And in this case it will show you a different topic. When this happen, it was a huge challenge to start again to locate the lesson so that you can proceed with your teaching. On your tablet it can be okay, but on the learner tablet that's where things were going bad. As you can see, the whole curriculum is programmed on the iPad from Grade 1 to 7 so when are you going to find the lesson you are looking for
> [**Teacher: School M**]

Probing to find out how they resolved this challenge, I learnt from the teachers that the iSchool who are the authors of the tablets, were asked to help and since then new links had been provided (on a piece of paper) that took them directly to the required lesson. Subsequently, iPads have been updated with fresh links.

Other challenges included charging. The teachers indicated that you needed to charge the batteries every time you required them for a lesson. As one teacher from School P noted:

> Here we do not have electricity. So, if you want to use the iPads you have to charge them and you must wait for them to charge and put other iPads to charge since the charging cables were not many. Otherwise, learners complain of the iPad running out of battery in the middle of the lesson and therefore changing the iPad in the middle of the lesson means a whole lot of fresh start for the particular pair of learners. **[Teacher Interview: School P]**

According to the teachers, this meant suspending personal activities a day in advance to ensure all iPads are charged and tested for the lesson to proceed smoothly the next day. This takes a committed and passionate teacher who puts the interests of the learners before their own. It expresses a positive attitude towards work and an interest in the continued effort to transform the education system through enhanced technologies to the advantage of learners' experience. The teachers performed this mammoth task with minimal supervision. As was revealed, other schools also received the tablets but had simply packed them in the head

teacher's office after trained staff were transferred. However, in the schools participating in this study, teachers took it upon themselves to continue using the tablets to their benefit and that of their learners. This extract shows the teachers' views on challenges relating to the transfer of teachers:

> Sir, other challenges that we face which impact on learning negatively is the uncontrolled transfer of teachers by the District Education Board Secretary (DEBS) office. Since you have come Sir, please help us talk to the Provincial Education Officer (PEO) to monitor and control the way teachers are transferred. What is worse is that, I don't know if this program is known by the office because if they know they cannot be transferring teachers leaving such good initiatives by government through World Vision to die just like that. Me I was not part of the training but because I have interest am using the iPads as though I was trained, so please help us sir. [**Teacher Interview: School M**]

The extract from the teacher at School M reveals how efforts by government through its cooperating partners could be hampered and hindered due to District officers who appear unconcerned about the use and integration of Information and Communication Technology/ies in transforming teaching and learning. It also reveals that perhaps the District officials had not been sensitized at the time of the implementation by World Vision. This was consistent with what was revealed by the District Resource Centre Coordinator (DRCC). The DRCC coordinates all the teaching and learning resources for all primary schools. DRCCs are in charge of the analysis and reporting of all the District's performance levels, and for conducting in-service activities aimed at making interventions regarding the current teaching standards. The following (long) extract reveals further concerns about uncontrolled teacher transfers in the affected schools.

> **R:** You are in charge of all primary schools regarding teaching and learning resources and reporting of performance levels among other in the District. Tell me; are you aware about the iSchool program and the integration of ZEduPads for teaching and learning?
> **DRCC:** Yes Sir, first of all, I must say that I monitor all the performance related issues in the District and ensures that I provide guidance to all teachers in matters relating to and not limited to preparing literacy schedule forms which teachers use to report the literacy performance in their schools. And yes, I am aware that World Vision (WV) gave iPads to three rural schools in the District in their catchment area. But we haven't been there to monitor and see how they are using them. In fact, head teachers are supposed to report on the progress of this exercise termly but they do not do that.
> **R:** You mean from two years down the line you have not been in the schools to monitor progress?
> **DRCC:** Unfortunately, yes Sir. I am sure you have been there with your vehicle and you have seen the kind of roads that are there. The thing is we do not have transport as a district to monitor schools. The only time we have in most cases is during examination periods in November/December that when we usually take advantage of the examination vehicles. Moreover, we just heard that World Vision came and trained teachers
> **R:** Schools have complained of teachers being transferred in these schools especially those who were even trained to handle ZEduPads. What your comment on this?

DRCC: On that one sir, I can't really comment and please off script [….] I don't think we have been fair in this area especially that the Ministry of General Education (MoGE) is trying hard to ensure that there is an improved education system through the integration of ICTs in schools. Maybe the District Education Standards Officer (DESO) could have been in the position to answer your question on teacher transfers in these schools.

The foregoing extract confirms efforts were futile when I attempted to discover why teachers were transferred and whether when transferring the teachers, the office thought about the programs taking place in these schools. By all indications, teachers were just transferred without any regard for efforts made by World Vision as a cooperating partner in improving the education system.

In view of this, the PEO and DEBS offices need to be kept abreast of the programs taking place in the province through cooperating partners, in order to provide effective implementation of such programs. Also, WV should ensure that when such programs are taking place in the province, not least in districts, all stakeholders or officers including teachers, are kept informed of such programs in order to implement them (activities) effectively.

Apart from the teacher transfers, other challenges related to time.

Positive responses from teachers captured (if not directly expressed) a theoretical perspective of the devices as entangled in the socio-materiality of the learning spaces for enhancing literacy skills amongst learners. They were aware that the enculturation of technology was now underway in schools. However, according to teachers, while the iPads were arguably exceptional multimodal tools, the time taken to complete one lesson was twice that of the normal period. Teachers revealed that presenting a lesson required dedication and discipline in terms of managing time and facilitating learning. Hence, the pair or group work referred to earlier, were key to completing the lesson on time. The teachers rotate the groups to ensure that they have met all the learners before concluding the lesson. The exercises after the lesson on the iPad gave the learners instant feedback on their work as the device marked the attempted answers and so the teachers were assisted in this way. As one teacher commented, "*It's a challenge to teach with an iPad but we are excited about it. You will find that teaching with an iPad takes more time than teaching without iPads. Even if you wanted to finish the lesson within time, some learners are slow at listening to the recorded instructing voices, so it's a challenge I would say*".

Apart from time spent on one lesson, iPads presented technical challenges. For example, the arrangement of the iPads was such that two learners were paired to listen to one lesson so that they might assist each other. This was in an effort to encourage collaboration amongst the learners. So, two headsets were provided but connected by what is known as a splitter that enables learners to listen to the same lesson at the same time.

As I observed the lesson, I could hear learners asking one another for help, or teachers responding in their local language (Bemba), one of the major lingua franca in Zambia, '*boi, ifwe tafileumfwika*' literally translated as '*friend, for us we cannot hear anything*'. In this regard, more digitally fluent colleagues or the teacher would then assist them by changing the splitters or plugging them into the iPad securely.

Once they (learners) were settled, all would be listening to the lesson, but some would be discussing answers to the task while others were focusing on the part of the lesson on the slide-show projected onto the board. What was interesting was the level of engagement whenever the lesson was in motion.

In other words, besides facilitating a lesson, the teacher also worked as a simple technician for the iPads. This type of job was not particularly addressed in the five-day workshop they had received. The photograph in Figures 25 and 26 shows two learners sharing one iPad after changing the splitter and the iPads that still did not work after they had tried them out several times.
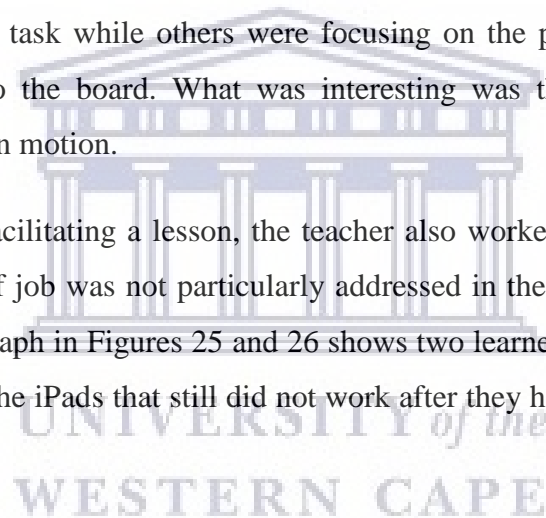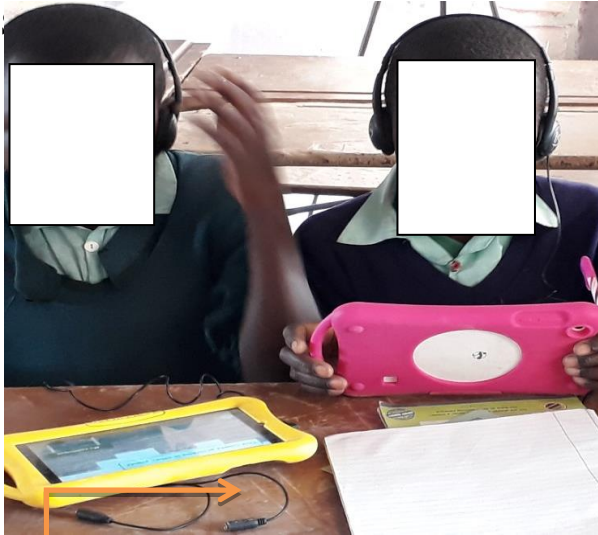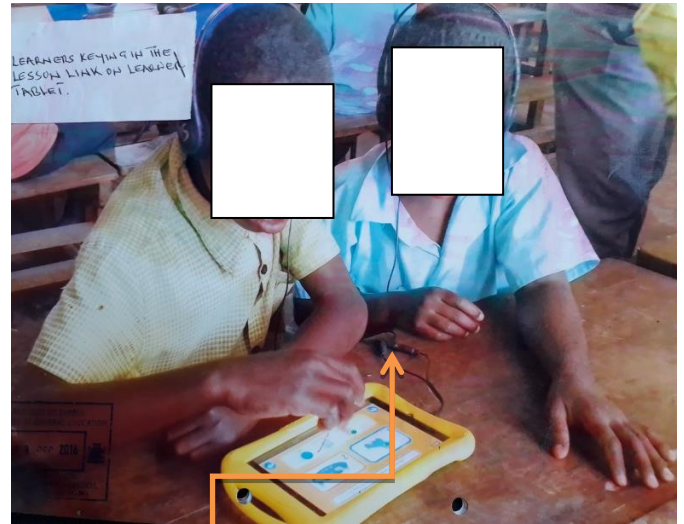
Working Splitter

Figure 25: Pupils working together

Working Splitter

Figure 26: Pupils working together

From the photographs, one can tell that the learners were settled, operating the iPad to access the lesson of the day and attentively listening to the lesson presentation on the iPad. Once the learners were settled, the teacher would proceed with lesson presentation to the learners without the iPads. When the teacher had finished presenting the lesson, they would begin again to assist the learners with iPads in case they had had any challenges such as accessing the lesson link.

The model is similar to a gallery walk in which the teachers deal with the different stations until every group will have had a chance to handle a lesson on the iPad. In my observations, this was particularly interesting as it effectively helped the teachers to manage large classes such as the ones in grade six.

This way of doing things also helped the teachers minimize the potential for negative behaviour as each group and learner had something they were tasked to work on. It gave learners an opportunity to share ideas especially those pairs using iPads. They were able to lead each other to find the link and follow it to the lesson of the day; to discuss answers and instructions guiding them to answer questions. Learners who had a basic linguistic ability in English acted as translators for those who literally had inadequate language levels. As already stated, the Bemba – a major lingua franca – was used by learners to translate the instructions, thus enabling them to help each other in doing the exercise after a lesson. This was

additionally interesting because it made me realise that thinking has no colour and border; it crosses any language and dialect.

6.5 Episode Summary

I devoted this episode to data presentation and analysis. In my data presentation, simple and basic statistical analysis was used in addition to compact descriptions of the experiences gathered during the fieldwork. In investigating the use and role of ZEduPad technology in literacy teaching and learning, themes and coding followed the structure of the questionnaire and the interview schedule. ZEduPad as a multimodal literacy tool for teaching and learning was arguably a valuable tool for teaching and learning in the rural school spaces where teaching and learning materials are scarce.

Rural schools appeared to have not only liked the ZEduPads but commended the iPad's multimodality and semiotized lesson content digitized therein. ZEduPads presented a good multimodal tool for teaching literacy skills in the sixth Grade in rural Zambian schools. Thus, the ZEduPad has served as a semiotic resource for literacy learning spaces for both learners and teachers. Consequently, the ZEdPad has been used in linguistic literacy mixed spaces to help learners acquire the necessary reading levels up to their grade level.

As the evidence shows, both the teachers and the learners indicated that as a semiotic tool for literacy learning and teaching the ZEduPad should be encouraged in all the primary schools in Zambia. This is reinforced by an aspect of the literature study in Episode 2, in which the viability of technology as a teaching tool was appraised.

From this perspective, it was clear that teachers' and learners' perceptions about the use of the ZEduPad in literacy teaching were mostly positive. This is consistent with Hebb's theory of perception which suggests that past experiences, attitudes and beliefs coupled with long periods of learning and practice, shape an individual's habit and perception (Hebb, 1953). This suggests the necessity for persistent use and acculturation of the multimodal artefact, the ZEduPad tool for literacy learning.

While definite progress was made, challenges relating to charging, faulty splitters, prolonged teaching time and misplaced lesson links were also recorded. However, these challenges did not outweigh the advantages of using the tablets for literacy teaching and learning in general and for other subjects. Thus, in the next episode, I focus on these advantages of the ZEduPad in its role and use as a potential semiotic literacy tool for primary school language learners.

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EPISODE 7: WINNOWING THE HARVEST

7.1 Introduction

Episode Six covered data presentation and analysis, or the strategies and structures designed to yield valid results. Episode 7 correlates the data with the relevant key questions of this investigation and discusses each finding.

The basis for the data analysis is my appreciation of literacy as a social practice. This theoretical perspective serves as a scaffold for the discussion on the use of iPads [ZEduPads] and the ways in which they are entangled in the re-semiotization of spaces to enhance literacy practices. The discussion thus incorporates my exploration of how technology has transformed the way literacy is being taught.

In the process of presenting the results, the data analysis is assessed in relation to other scholarship in the field. Hence, the knowledge of other studies forms part of my effort to make sense of the data I procured in my investigation. The analytical discussion thus involves examining the results against the existing literature to validate it for the sake of further study by potential researchers in the field.

From this perspective, the data underpinning the role and use of emerging technologies for literacy development among the sixth Graders was presented and analysed. The raw data was gleaned through statistical narratives, interviews, and classroom observations. It was provided by seven (7) teachers, one (1) District Official and 225 learners across the three primary schools in the Mungwi District of the Northern Province.

The chief objective of this investigation was premised on two sound theoretical frameworks: The Comprehensive Input Hypothesis (CIH) and the Affordance Theories (AT). These facilitated a thorough exploration of the aims of the study, which can be said to have been met. The hypothetical question underpinning the study was whether emerging technology/-ies that is, iPads, enhance teaching and learning, and the acquisition of literacy skills. The study sought to establish whether iPads (ZEduPads) are indeed prospective tools for literacy acquisition especially in rural and disadvantaged schools where teaching and learning materials are not only in short supply but also deficient in [semiotically] rich content. The present study investigated whether there is a correlation between the use of iPads and an improvement in the development of literacy acquisition.

The teachers as well as the learners involved in this study agreed that the ZEduPad tablets enhanced literacy acquisition in the sixth graders' classes in rural Zambia. The results further indicate that ZEduPads are viable socio-material artefacts, multimodal in nature, which enhanced how the learner interacted with rich literacy materials.

Indeed, with the scarcity of teaching and learning materials in rural classrooms, ZEduPad tablets or the use of the iPad is one of the most useful, successful and cost-effective teaching tools for enhancing literacy skills acquisition amongst learners. The results show that teachers were excited about the use of iPads for teaching and learning. They stated as much in my interaction with them.

Furthermore, the study revealed that synergy and symbiotic vitality coupled with good literacy practices and teacher disposition play a role in enhancing literacy acquisition. The results of this study are in alignment with the contention that there has not been sufficient research into the role and use emerging technologies such as iPads [ZeduPads] for the acquisition of literacy, and the experience of second language acquisition amongst learners in Zambia. Although similar studies have been conducted (Phiri and Silumbe, 2016; Phiri, 2016) in Social Studies and Mathematics, the use and role of iPads [ZeduPads] in literacy acquisition has largely been neglected. This was identified as a gap that needed further exploration, and it proved ground-breaking for this study.

In the following sections, I discuss the results presented in Episode 6 in relation to the research question and aims.

7.2 The Use of Emerging Technology/-ies – ZEduPad

President Lungu, in his inaugural speech in 2016 opened parliament by affirming the role of technology in transforming the education system. In his speech, the President of the Republic of Zambia said:

> Mr Speaker, I have approved an initiative for transforming the education sector through eLearning by using an innovative educational tablet called the #ZEduPad developed by the late Mark Bennett in consultation with the Ministry of Education. The ZeduPad tablet is pre-loaded with lessons, learning materials and extension agriculture and health information. I expect that by 2017, 50% of our children will have access to the ZEduPad and put us on the path of smart education. (Edgar Lungu, 2016)

The president's commitment to transform the education system into a smart learning hub through the iSchool tablets and other related technologies is indicative of the role technology plays in transforming any education system, particularly in language learning.

According to the results of the current study, one of the primary objectives was to find out if both the learners and the teachers know how to use iPads. The results indicate that the majority of learners understand how to use the iPads because their teachers have undergone an orientation programme inducting them into the operation of the ZEduPads.

Research shows that the teachers' operational familiarity with iPad technology is key to successful literacy teaching (Mango, 2015). ZeduPads form part of the technological affordances that if used well, illustrate the value of affordance theory, one of the two cornerstone theories of this study. This entails an appreciation of the association between humans and technology, and technology's capacity to provide adequate input for literacy skills development

In my interaction with the learners and teachers here in actants, I was able to visualize that an affordance is an ongoing element of action potential. It is interlaced with other features in forms that can be explored further to appreciate how emerging technologies [ZeduPads] might be implicated in learning to actualize these affordance features (Volkoff, and Strong, 2013, p.824).

It can be argued therefore that the affordances are the potential of ZEduPads to enhance literacy skills. Furthermore, here these affordances are intricately intertwined with both the user and the object. This is because an affordance which comes as a result of the link between a structure/object and a goal-directed actor or actors, must be triggered or even actualized by the actor/s. In this case, the learners and the teachers were actors who perpetually acted upon the literacy-linked affordances (apps or links taking learners to specific lessons) to successfully access the literacy lesson. This assemblage comprising micro-networks of affordances, where the connections produce force and other related effects, arguably helped the learners to have epistemological access to knowledge as they positioned their identities through digital usage for literacy learning. This implies that unless the learners and the teachers were able to operate these affordance assemblages, their use of emerging technologies for learning and teaching would have been futile.
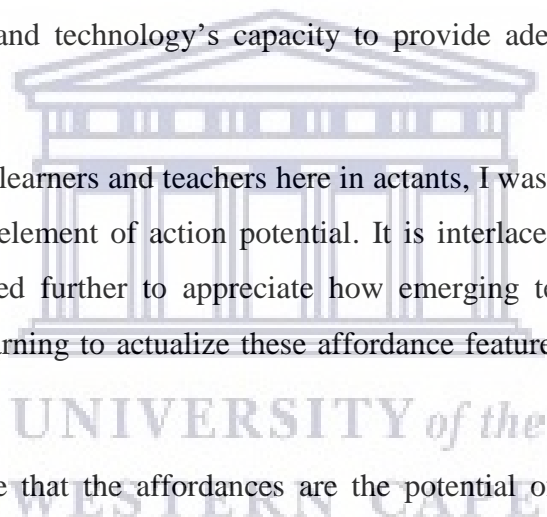
Moreover, using emerging technologies for literacy learning as I conceptualise it meant having some level of knowledge to operate an artefact which is part of the material school culture. To use it, means to see its action potential. In this case, the action potential was enhanced and hence contributed to adequate input for successful literacy learning. Thus, for the purposes of this study, the affordance theory was integral to understanding the factors inherent in the emerging technologies that contribute to adequate input for language acquisition (Krashen, 1982, 1985a).

Additionally, the affordances that iPads or technology brings to teaching and learning are positive effects that can enhance language teaching in that input. According to S. Krashen's, (1985a, 1985b) input hypothesis, language acquisition takes place when the volume of one-way comprehensible input is received. As the learners interacted with the iPads, it was observable that they were happy with the recorded voice-overs (VO). More precisely, language acquisition was arguably evident and reached a higher level because iPads provided additional assistance resulting in instrumental and sufficient comprehensible input.

As explicated in Episode 4, testing the research implements used in the study allowed me to interpret, appreciate and understand the practices, and the interaction between the learners and the teachers in relation to the artefacts or objects [ZeduPads]. The affordances of the technology are thus implicated in providing adequate input for literacy learning.

For the purposes of this study, affordance is described as the latent potential that teachers perceive in particular emerging technological tools to support teaching and learning activities in the context of their classrooms. And while the qualities of the ZEduPad as a teaching tool contributed to such affordances, it is critical to keep in mind that supporting literacy learning is less about the technology [iPad] and (increasingly) more about the uses to which the technology is subjected (Egbert, et al., 2011; Sharp, 2011). Hence, teacher digital disposition was and is significant in contributing to the affordances both teachers and learners perceive.

Based on Haines et al.'s definition of affordance in the effort to contribute adequate input for literacy development (Haines, 2015; Kono, 2009; Singleton, and Aronin, 2007), I argue that the orientation teachers received for five days should have been more thorough. In part, this is because, their training should have been about how the affordances of ZEduPads interfaced with literacy teaching rather than about the general attributes of a new tool.It might have

provided a holistic picture of potential opportunities that could be explored in action over time, as Orlando (2009) suggests.

In this case affordances are perceived and conceptualised as emergent properties for both the teacher and their context (Stoffregen, 2003). In my 13 years of teaching English as Second language in Zambia, I have come to experience that an integral part of teachers' e-pedagogical fluency and competence is their "capability to adjust the potential of any tool to their pedagogical intents as well as to the relation they wish to establish with their learners" (Egbert, et al., 2011 p.191).

For pre-service teacher training, this is an aspect that needs attention (Kessler, 2010). The point was borne out by recent events when Television 2 of the Zambia National Broadcasting Corporation (ZNBC), launched an e-education channel in response to the effects on education of the Corona Virus Disease (COVID 19), notably through lockdown. Apparently, most in-service teachers were technophobic and unprepared for the telecast lessons. This suggests that greater emphasis should be placed on eLearning for pre-service teachers who have an extended period in which to familiarise themselves with the technology. Their training may involve a more thorough approach than the participants of this study received in the five-day in-service workshop for e-integration in teaching (referred to earlier).

As Blake, (2008, p. 99) remarks, ePedagogies cannot be underestimated because even seasoned language teachers find the use of computer-mediated communication (CMC) in language learning "intuitively palpable." Thus, effective use of emerging technologies for language teaching requires that teachers have a broader appreciation of the affordances of the new tools for facilitating literacy learning (Comas-Quinn, 2011). Affordance identification and the way such action-perception develops over time (Haines, 2015), through the continuous use of new tools, is an important aspect of extending the teachers' knowledge. They can be shown how the new tools may be usefully and seamlessly integrated into literacy teaching classrooms. Using the new tools as it was observed, has transformed teaching and learning in many ways. Now individualised learning has amazing possibilities, and collaborative learning the potential to be even more interactive.

Beyond its [iPads] function as a teaching and classroom tool, the mobile technology [ZEduPad] undeniably was and is the primary conduit for many learners' learning experiences. From this perspective, affordances arise from the conceptualisation of how

actants and objects interact, in this case the learners who appeared happy with the technology each time they were in class.

So, there is a need for teachers to have training regarding how to use and integrate iPads in their language teaching. According to the data, though limited, teachers were given a 5-day orientation course in how to use the iPads to teach their learners at all grade levels, from 1 to 7. This means that teachers are expected to know how to make video lessons, create power point presentations and be competent in many more skills before they can ask their learners to follow suit. This type of knowledge stood true to how the ZEduPads might have transformed the teaching of language to the Grade six learners across the three schools under investigation. Using this twenty first century media for literacy teaching appeared to be transformative and motivating.

However, it is important to note that the teacher was a key person for the successful use of iPads in the teaching of language among the Grade six learners. Knowledge of how to use the iPads as a semiotic and multimodal tool enhanced the teaching and learning experience of literacy lessons in the schools. For example, the use of iPads enhanced learner participation in most of the lessons which were taught through the ZEduPads.

Participation in literacy lessons was made possible because of the multiple apps or affordances with which the iPads are designed. Teachers had an opportunity to use the iPads in numerous ways but only followed the lesson presentations of the iPad religiously. Teachers have the opportunity, for example, to engage even reluctant learners and learners who cannot learn in the most traditional ways. The wealth of apps and multimodal semiotized content available in ZEduPads meant teachers were able to reach learners with multiple learning styles through pair work addressed under 'Results' in Episode 6. The digitised images such as pictures; both motion and still, recorded voice-overs which accompanied digital texts were all features that helped (afforded) learners to grasp lesson content more easily. These motivated them to keep learning. This is consistent with the literature discussed in Episodes 2 and 3.

Motivation was one key aspect of literacy learning demonstrated by the learners and teachers as they used the ZeduPads. The teachers across the three schools confessed to the difficulties they had previously faced in trying to keep learners engaged and motivated to stay on task. This challenge, according to the teachers was worsened by the lack of teaching and learning materials as well as the human resources to teach all the grades from one to seven. What then

sparked this motivation previously unimagined and what kept the learners motivated to learn? Of interest to this enquiry is the link between motivation and literacy learning with the introduction of novel educational devices.

In thinking about these questions, I was reminded of the work of developmentalists who suggest that children are born with the innate desire (intrinsic motivation) to learn (Harter, 1978). Thus, self-determination theory (SDT) (Deci and Ryan, 1968) sparked by cultural artefacts may hold 'answers' to such questions. ZEduPads appeared to offer learners the motivation to stay on task for prolonged periods. The SDT seemed present, providing self-motivation to learn by using the tablets.

SDT endeavours to shed more light on why people choose to act in particular ways in certain situations (Deci and Ryan, 1985). The perception is that human beings of all ages have particular psychological wants that ought to be responded to for the person to be motivated to do something. Deci and Ryan (2000) call these perceived needs as competence, relatedness and autonomy.

Autonomy, like learner-centeredness, relates to the learners' own desire or volition to work on the task they have been given. Thus, the use of ZeduPads as an emerging technology in the area of education in Zambia appeared to have the capacity to trigger the learners' intrinsic motivation to engage in literacy activities on their own. Intrinsically digitized and non-digitized motivated activities may have an internal locus of causation (deCharms, 1968; Heider, 1958). The implication of this is that the learner possesses a natural and spontaneous desire to do any task (Deci and Ryan, 2000).

Another question I was particularly interested in is how to maintain learners' intrinsic motivation. And, if ZeduPads appeared to have reduced the number of learner absentees, as indicated in the results section of Episode 6, how can this motivation for literacy learning be maintained?

The answer to such questions, I argue, lies in making sure that learning takes place in the absence of threats such as task deadlines. The latter, I observed, could hamper the learner's free interactions thereby undermining the need for creativity and problem solving. Eventually the locus of causation would shift from internal to external, especially if teachers are under pressure to enhance the literacy performance of their learners by controlling teaching strategies (Flink, Boggiano and Barrett, 1990). The learners' performance is put under duress

by reducing the intrinsic desire to learn in a free unthreatening environment. This can be perceived in terms of the behaviourist concept of learning.

In behaviourist learning theory, strategies or stimuli that induce motivation should vary so that learners do not overly depend on stimuli to be motivated. In this case, ZEduPads could be perceived as positive stimuli (Schultz, 2015; Skinner, 1965) leading to the learners' persistence at completing tasks autonomously while sustaining an eagerness to collaborate with others. Using ZEduPads as learners explained, made it easier to organise their work, to work at their own pace and to get feedback instantly on the tasks they attempted collaboratively.

Collaboration was another semiotic affordance the ZEduPad offered the literacy learning process. While collaboration is elusive and extremely intricate with various facets of attributes, it offers literacy learners the opportunity to shape their literacy habitus. Habitus entails possessing socially ingrained despositions, habits and skills (Bourdieu, 1993). It involves two or more chain associates working together to generate a competitive benefit by sharing information, making combined decisions and sharing them.

Thus, collaboration is a crucial element of all aspects of language acquisition in education. As a semiotic system (Eggins, 2004; Threadgold, 1986) that is aided by semiotic and multimodal resources entangled in the material culture, iPads have also been described as tools that aid mobilisation of meaning-making through the discursive practices of everyday life in the literacy classes. Through collaboration, literacy learning is sustained. This is facilitated via an ongoing and uninterrupted progression towards a shared vision and shared goals by establishing and sustaining realities and experiences for the development of literacy acquisition. As Bankston and Glazer (2013) remark, encouraging partnership and collaboration can have a progressive bearing on literacy acquisition and performance.

7.2.1 Theorizing Collaboration Practice

Collaboration is fundamental to any literacy business or academic endeavour (Daniels & Khanyile 2013; Miller et al. 2015). Whether it involves co-operation in writing a paper, the evaluation of students or the construction of a more complex relationship around shared research facilities or teaching programmes, most academics will immediately recognise collaboration as endemic to the academy. According to Zamanzadeh et al. (2014), collaboration is an essential element of work relationships in any profession, as it is through

this ongoing and continuous process that a common vision and common goals and realities are developed and maintained by learners of language.

In this study, I explain the relevance of collaboration as a way of conceptualizing literacy as a community of practice. This implies practice-oriented activity that aims at enhancing a practical understanding of literacy acquisition strategies and skills. According to my observation of the semiotic collaborative interactions, collaboration empowers interlocutors by legitimising frustration while providing theoretical support. The latter entails assistance for tackling the practical challenges involved (Huxham, 2003).

As a literacy semiotic strategy while using ZeduPads, the concept of collaboration was intentionally premeditated through pair and group work. The purpose was to develop strong literacy acquisition skills through classroom communities of practice in which learners would learn and grow. It was interesting to see how collaboration was used to the advantage of the teacher who maintained the role of facilitator in most cases. The strategy proved to be flexible enough to support literacy teaching in a variety of settings and formats. The remote facilitator guidance the teachers adopted during lessons enabled them to create smooth transitions between the pair and group work tasks. This entailed moving from technology to traditional teaching and back (see Episode 6). It was the epitome of blended learning because learners remained engaged as they collaborated in their learning.

As learners moved across the classroom, I envisaged collaboration as a learning paradigm in which social and emotional learning is an intrinsic part of literacy learning.

Engaging the learners in collaborative work reflects various principles. One involves learners developing into independent readers, thinkers and writers. Another concerns learners' access to authentic writing and reading experiences. And yet another is about equitable epistemological access as they were all learning at the same pace and using the same lesson content on multimodal ZEduPad tablets. The purpose of exploring the concept of collaboration in my study was to test its value in relation to literacy development via ZeduPads. However, in order to appreciate the concept of collaboration, one needed to be present in the natural setting of literacy learners as they engaged in literacy practices, and in how they negotiated the sharing of information. The term collaboration therefore, required contextual definition for effective maximisation and utilisation of its efficacy as well as the outcomes explained in literacy education.

As one is reminded by D'amour, Goulet, Labadie, San Martín-Rodriguez and Pineault, (2008) as well as Montiel-Overall (2005), [c]ollaboration and partnership are valued greatly in organisational life today including literacy education. In fact, collaborating with knowledgeable others during literacy classes, as the learners did via tablets during literacy lessons, can have a lasting impact on literacy education. This is because collaboration is useful for achieving outcomes and effecting changes which cannot be attained by an individual. Kirschling and Erickson(2010) and D'amour et al. (2008) report that collaboration is an integral component in any collective undertaking.

In the main, literacy collaboration constituted self-initiated and self-directed learning as an inquiry-driven practice whose goal placed the obligation of how and what to learn on the shoulders of the learners. It remained for learners to attempt to explore other tasks as soon as they had finished any they had been working on. This act is an example of self-directed learning (SDL) enacted by collaborative learning (CL) and supported by technology-[ZeduPad]. As a goal in education especially in the 21st century, fostering SDL and CL is said to be cultivating life-long skills among learners of literacy and other disciplines (Voogt and Roblin, 2012). In the words of Bolhuis (2003), 'when learners are engaged in SDL practices it cultivates in them the ability for educational advancement throughout their lives'.

The ZeduPad tablets appeared to have been fostering SDL among the literacy learners. Similarly, as learners engaged in CL they shared and built a community of classroom knowledge that arguably enhanced their epistemic literacy agency as a lifelong learners (Knowles, 1975).

Hence, SDL through CL allowed learners to take charge of their learning as they sought to explore what was of interest to them within the literacy framework. Linked to SDL and CL was the issue of becoming independent writers, readers as well as thinkers. SDL and CL indeed facilitated the acquisition of these skills with ZeduPad in classrooms. As I observed them, I noticed learners daring to take risks in their literacy learning, and increasingly becoming independent writers, readers and thinkers. High levels of courage on the part of learners shaped, curated and built their confidence as well as their capacity to express their own thinking. Mediated by cultural artefacts [ZeduPads] and social interaction (Vygotsky, 1978), literacy learning became seamless and informal.

In support of collaboration, Vygotsky's Sociocultural Theory (SCT) suggests that social interaction leads to uninterrupted step-by-step changes in the learner's behaviour and thought, which can vary from one culture to another (Woolfolk and Shaughnessy, 2004; Woolfolk, 1998). Vygotsky's theory posits that development hinges on the interaction learners have with others and the tools [ZeduPads] that the culture offers to assist in forming their own perspective of the world.

Three issues were noted about working together as a cultural tool that can be passed on from one person to the other. Topping the list is imitative learning. This type of learning is where one individual attempts to imitate things performed by another person, or even the person themselves. Coached learning is also highly rated as it encompasses retention of the directions issued by the teacher and uses the same instructions to regulate the self. Additionally, cultural tools can be passed to other individuals by collaborative learning, involving a group of peers striving to understand one another as they work with each other to learn a particular skill (Tomasello, 2016). However, the learning should mimic the informal learning style. This emerged as they implicitly reflected it in most of the lessons I observed in the process of data collection. In most lessons – as indicated in Episode 6 covering data presentation – learners had the privilege to mix freely and walk around the classroom attending to and assisting one another. This level of informality gave rise to collaboration and open discussion.

As Cross (2007, 23) puts it, "Formal learning is like riding a bus: the driver decides where the bus is going; the passengers are along for the ride. Informal learning is like riding a bike: the rider chooses the destination, the speed, and the route." I observed that with the ZeduPad technology in their hands, collaboration exposed the learners to innumerable kinds of interaction beyond the traditional bricks and mortar classroom setting. Thus, understanding the diverse settings and the many ways in which learners can interact with one another socially is an important skill teachers should appreciate. As ZeduPads activated collaboration, it became evident that the iPad technology offers numerous modalities that affect the way in which learners can interact with one another in the literacy learning process. This included promoting learning that was natural and not predetermined.

This type of informal learning induced by collaboration and the use of the ruggedized ZeduPads, is according to Marsick and Volpe), (1999) "predominately unstructured, experiential, and non-institutional" (p.4). The manner in which learners took learning into

their own hands, and the kind of freedom they exercised was amazing. Learning without being conscious of it is the best way to learn (Fu, Bin, Dienes, Fu, and Gao, 2013). This can only take place when authentic activities are well planned for the learners to work collaboratively.

As in the case of the multimodal ZeduPads, all learning content was well-digitised with voice-overs (VOs). Learners were able to listen to the instructions of the lessons and attend to the tasks without the intervention of a teacher.

However, this approach requires that the learners have some level of linguistic competence as a basis from which to listen to the instructions on the iPads to execute the work (Cummins, 1979b, 2011). From this perspective of informal learning induced by collaboration, learning can take on a reactive form. It involves a situation in which learning has not been planned for, yet learners are able to recognize the learning process retrospectively.

As discussed in Episodes 2 and 4 of the current study, learning a language is at best done incidentally through daily informal social interactions (Malcolm et al., 2003; Marsick and Watkins, 2001). What characterises this kind of learning as can be seen in this study, is the concept of collaboration.

Consistent with the literature discussed in Episode 5, an iPad forms part of the socio-materiality of the learning environment in this study, theoretically and practically interpreted. As a social tool the ZEduPad tablets enabled and supported the learners' collaboration, creativity and critical thinking. The learners who were paired in a three-station literacy model were observed arguing with each other over which answer was the best choice as the app kept saying "Oh no, try again!". This is evidence of the ignition of cognition and the shaping of critical thinking as learners continued the interaction afforded by the iPad.

Learners also helped each other to co-create an artefact, as is borne out by the drawings presented in Episode 6 under data presentation. Together some drew pictures of human beings and others, of a car. This gives an idea of the potential of the iPad in enabling the mind and activating the sensory, auditory and visual perceptions of learners through informal learning 'collaborations' (Güney, 2019).

7.2.2 Describing and theorizing Informal Learning

Over time, learning has been perceived in many ways. Consequently, informal learning has come to be conceptualised as self-directed learning or self-teaching (Tough, 1967, 1971). Tough (1967, 1971) has shown that adults are fundamentally capable of setting projects for themselves, thereby learning new things with little or no help from 'teachers'. It can be argued that this kind of learning is both intentional as well as unintentional. It may happen as a by-product of task-orientated activities such as the one digitized on the ruggedized ZEduPads.

Furthermore, from a United Kingdom perspective on informal learning in the community McGivney (1999:1) postulated that:

> [T]here is not a singular definition of informal learning because the concept is a wider and elusive ... that encompasses diverse kinds of learning, learning arrangements as well as styles. It is sometimes unpremeditated, intentional and planned as well as self-directed. It can be initiated by individuals (for example in the home, in the workplace); it can be a collective process (arising from grassroots community action or social protest), or it can be initiated by outside agencies responding to perceived or expressed needs, interests or problems.

This perspective, of informal semi-formal collaborative interaction, as was observed in the learners' interaction, happens both outside and inside the classroom. It is thus possible for the teacher to be intentional and incorporate informal or semi-formal learning in their lesson preparation and delivery.

The concept of informal or semi-formal learning in a classroom can be conceptualised in several ways. The social interaction learners had on the ZeduPads helped them to continue listening, discussing answers and clicking on the apps to attempt further questions. The discussions were evidently natural and informal or semi-formal, allowing the learners to help one another, to make their own decisions and to take turns regarding who types answers first. This is one instance of self-directed education or learning, which transforms everything for those involved. This type of learning (self-directed) allowed learners to become inquiry driven and places the responsibility of learning on their shoulders.

Learning informally like this gave learners the opportunity to pick up language in doses they were able to manage as opposed to their being forced to master linguistic generative and formal grammar. A constructivist view of learning suggests that language is best acquired

when learners or recipients of the target language are socialised in some kind of informal learning (Wang, 2011). For Vygotsky, the make-up of an individual's mental system is a direct consequence of and inseparable from social experiences (Vygotsky, 1987). Knowledge is thus co-constructed by learners via proactive mental processes.

As I observed, the ZeduPads appeared to have given the learners this kind of learning. As learners engaged in shaping knowledge-sharing via iPads, they (learners) became builders, creators and curators of their own knowledge and meaning. Thresonated with the constructivist view of learning in which a learner-centred approach involving in/formality takes place.

A learner-centred approach exposes learners to experiences that enable them to hypothesize, predict, manipulate things, question, inquire, explore, visualize, and invent. As Krashen's (1982, 1985a, 1985b) Comprehensive Hypothesis suggests, adequate input which can either be in formal or informal social interactions leads to incidental language learning. As learners interact unconsciously, they develop a high standard knowledge because in their discussion they will repeatedly shape and refine their language skills. Their language develops from basic interpersonal communication (BICS) to cognitive academic language proficiency (CALP) (Cummins, 1979a).

CALP in this case, is the language competence level they need in order to handle more demanding social and academic interactions. So, anything that assists them to acquire this high level of language proficiency directly or indirectly, can be used to teach them literacy skills. In this case the ZeduPads gave the learners such an opportunity plus a considerable amount of motivation to forge ahead with whatever they were working on.

7.2.3 Conceptual terrain in Literacy Motivation, Engagement and Participation

In my observation of and interaction with the teachers and learner's literacy practices on the multimodal tablet ZeduPad, three elements became evident. These were heightened levels of motivation, engagement and participation, which do indeed represent key factors in successful technological integration for literacy learning.

In assessing the manner in which learners paid attention and were willing to continue uninterrupted, I became aware of the unique value of the use of iPads for literacy learning, that is, the interdependence between socio-materiality, material culture and literacy learning.

In this study, I refer to the three concepts as conceptual terrain. Concerning the conceptual terrain in literacy motivation, engagement and participation, one cannot do without the other, although, I argue here that motivation sets the ball rolling for the rest. A learner might be engaged in some literacy learning activities yet might not be immersed in them because they feel they have been compelled. Motivation is the reason or the 'why' we take action, and engagement is the 'what' aspect. Conversely, engagement can be an emotional commitment too.

In the next section, I dwell on these three concepts as they emerged as part of the themes.

7.2.3.1   The Concept of Motivation

Motivation was one thematic area that kept arising during the course of my study as well as in my interaction with the learners. I wondered whether the motivation of the learners to remain occupied with their literacy tasks was self-induced or due to the tablets before them. Whichever was the case, throughout their use of ZeduPads, the learners appeared motivated to do more with the tablets.

As noted in Episode two of this study, the concept of motivation may be described in many ways. The term is taken from the word "motive". According to the online dictionary Merriam-Webster, the word 'motive' means "something (such as a need or desire) that causes a person to act" (Merriam-webster.com, 2020) available on https://www.merriam-webster.com/dictionary/motive . While as a noun the word "motive" denotes an objective, as a verb it denotes swinging into action. Scott (1988)describes [m]otivation in terms of the practice of stimulating individuals to action in accomplishing desired goals. Flippo (1984) describes motivation as [t]he process of trying to induce people to do their will by the possibility of reward or gain. The meaning of motivation therefore is complicated since it encompasses several theories and models (Dornyei, 2003; Dörnyei, 1990).

In this study, motivation was seen as a deliberate premeditated managerial procedure that teachers applied, demanding that learners do their literacy tasks to the best of their abilities. In fact, motivation for the teachers was about pressing the right button (ZeduPads) to get the

desired human behaviour, especially since the teachers were not present when they left to collect salaries and they wanted the learners to self-teach. Thus, it appeared to me that motivation was indeed both internally and externally induced, in other words, intrinsic and extrinsic.

Intrinsic or external motivation for literacy classes was the 'instrument' used by all the teachers with whom I interacted. The desire of the teachers was that at some point learners would still come to school and learn as much as they could with or without the use of ZeduPads for literacy development. As can be seen from the sentiments captured in the field notes' extract in Episode 6, motivation was and is an indispensable quality for enhancing reading, writing, listening and communication skills. In the absence of anything prompting the desire of an individual to learn, learning itself turns out to be problematic. However, in order to enhance literacy development as it was observed during data collection, teachers can facilitate a stimulating and relaxed atmosphere to enhance the learner's literacy acquisition.

With the use of various multimodal genres, teachers are able to facilitate an attractive literacy atmosphere for their learners (Iyer, Radha and Luke, 2010). In fact, the teachers themselves are models and motivators. In this case, the multimodal tablets popularly known as ZeduPads, were used to induce and kindle the learner's desire to learn more during literacy as well as in other educational classes. Thus, we can conclude that motives induce people to behave or act in certain ways. This allows certain human desires to be fulfilled in particular ways at particular times. Besides, it is said that every human's action has a motive. The motive for bringing the multimodal literacy tablets appears to have been perfectly thought out.

From this standpoint it was understandable that during literacy activities teachers provided the learners with motivating texts that inspired learners to stay on task. Most learners were motivated not only to come to school every day as long as they knew they were going to learn on ZeduPads, but they also completed tasks without challenges.

Motivation is at the coreof inducing interest in human beings to do things. Applegate and Applegate (2010) suggest that motivation to engage in literacy activities contributes greatly to a learner's success in school. It can be argued that to realise proficiency in literacy, learners ought to be motivated to participate [engage] in literacy activities to enhance their competency as writers and readers. As we are reminded by McGeown, Goodwin, Henderson

and Wright (2012), literacy requires interest as well as some effort mutually linked to motivation.

In my study, however, and evident from the statistical results, not all the learners were adept at using and learning through ZeduPads. There were learners who exhibited no desire to learn even when the iPads were seemingly motivating. Those who showed no interest in learning or reading using the ZeduPads were those for whom it did not come easy. They struggled with the practical process of using ZeduPads, felt defeated, and often exhibited no motivation. From this, it can be argued that their exposure to reading and reading skills affected the struggling learner's motivation. While the motivation to learn is inherent, the process to learn to value reading and to become a good reader requires patience and practice, including prodding sometimes. This also requires teachers to set up classes and their literacy activities in a manner that would help activate the motivation for the learners to learn. It is not easily achieved as it requires a lot of effort and ingenuity on the part of the teachers.

However, most learners as indicated from the results section, found ZEduPads to be motivation catalysts for literacy learning. This result entails that first-class educational applications or apps are essential tools for blurring the socio-economic status (SES) (Chabinga, 2015) attainment gap. This was especially exciting given that the ZEduPads were able to boost the learners' motivation to learn and reportedly reduced the high rates of absenteeism. Also, they enhanced literacy skills among the learners. Most learners enjoyed learning with the tablets. While rural schools are disadvantaged in terms of teaching and learning material, the tablet came as a teaching and learning tool that not only helped the learners to access all the teaching materials, but also saved the teachers from laborious paper-work as lesson plans were already on the device.

The devices in these rural schools provided important and practical enhancement, fostering literacy success even amongst at-risk literacy learners. As this discussion indicates, the multimodal nature of ZeduPads gave the learners new ways of learning. This observation is linked to motivation and to self-directed learning.

Self-directed learning changes everything. This insight was part of the first theme that emerged from the data, namely that the iPads were motivating to the students. This theme became evident in the process of completing the questionnaires and during the group interviews. For example, most learners appeared to be keen to do the tasks on the iPad, typing

in the answers or dragging and dropping answers, but they were more reluctant to learn and complete tasks on paper from the blackboard.

During my interaction with the learners, they revealed that they were more motivated to come to school and complete tasks when they knew they were going to learn from the ZeduPads. This was evident amongst the majority. The learners were apt to try new things each time the ZeduPads were in front of them and whenever the ZeduPads were integrated in the literacy instruction (Zora, 2011). As explained by teachers, ZeduPads gave the learners the ability and agility to work on educational tasks which in turn enhanced their learning.

The learners were held responsible for looking after the ZeduPads every day. They also made sure that the iPads were charged because they knew they would use them the following day. This level of responsibility would translate into a good habit not only in the classroom where they learned how to read and write but also in future. The learners were motivated to look after the ZeduPads because if they were found using them improperly they would lose the privilege to use the iPads. In other words, ZeduPads were also used to modify and manage the learner's behaviours. The teachers used the tablets to make the learners earn points for the following day if they remained focused on their literacy activities. Thus, each task earned the learners a point. This encouraged them to stay engaged in their literacy tasks, and on their best behaviour during lessons in the classrooms. This is because motivation often leads to engagement in literacy practices.

7.2.3.2 The Concept of Engagement

As with any other learning activity, improving literacy – reading and writing – requires an investment of the learners' time and interest. Against this background therefore, enhancing literacy skills entails being engaged with the literacy materials. In my observations during data collection, while the learners were using the ZeduPads, I witnessed a correlation between motivation and engagement. However, motivation preceded engagement.

Humans are naturally motivated to engage in something of interest or tangible when it is associated with a purpose. So, motivation to engage is the first step on the road to improving literacy habits and skills. Instruction and practice then provide the coaching and feedback necessary for gaining competence. Thus, motivation and engagement go hand in hand. From the lessons observed, ZEduPad tablets were linked to motivating the learners and engaging them to do more literacy activities.

Moreover, the concept of learner engagement has become increasingly prominent in literacy education and has a long scholarly history (Schindler, Burkholder, Morad, and Marsh, 2017). From the analysed data, it was clear that learners' engagement was not detached from how the teachers planned the literacy activities for their lessons on the ZeduPads. This realization was also consistent with research that while technology has potential to transform the teaching and learning, especially for literacy acquisition (Chabinga, 2015), it cannot replace the human or teachers' warm affection and connection. The argument is that technology is arguably a potential augmentation to the teacher. This means that technology can assist the teacher in the process of delivering the lesson but cannot substitute for the role that the teacher plays in the process of teaching.

Teachers further argued that the tablets were also meant for them in the sense that the tablets were loaded with teacher preparation content. This implies that the tablets as literacy teaching tools could be used at home where there is no teacher. However, this kind of teaching too is provided by a teacher as the content curator. Therefore, whether or not one is referring to specific aspects of literacy learning and enabling an environment for literacy development, teachers play an exceedingly critical role in facilitating conditions conducive to student engagement. This role can be referred to as faculty engagement.

As Krashen, Lee and Lao (2018) put it, one effective manner in which young learners can be encouraged to read is to organise them so that they can habitually read what they want to. In other words, literacy skills are acquired effortlessly when we are able to understand what we read or hear, but the message should be compelling and comprehensibly interesting (Krashen, Lee and Lao, 2018). When the input we receive is compelling, all anxiety disappears making motivation less necessary (Krashen, Lee and Lao, 2018); Krashen, 1982, 1985b). As it was observed with the ZEduPads, the learners' interaction in literacy development practices was consistent with Krashen's, (1985a) view that: "language acquisition and literacy development occur without the acquirer realizing it". When the learners have increased literacy competence, they are continuously inspired and motivated to engage in literacy activities.

Literacy engagement appeared to be a multidimensional construct. I realised from the data that it comprised aspects of behaviour with cognitive, emotional, motivational and social dimensions. In literacy teaching and learning, the aspect of behaviour engagement is "[t]hat observable act of learners when they take part in learning and it denotes learners'

participation in academic activities and efforts to perform academic activities" (Lawson and Lawson, 2013; Suarez-Orozco, Pimentel, and Martin, 2009).

From the perspective of social capital theory, I argue that through these engagements with the use of ZEduPads, peers provided one another with the psychosocial and literacy resources that enhanced their literacy acquisition performance (Coleman, 1988; Hughes, Luo, Kwok and Loyd, 2008). Behavioural and emotional engagement are bi-directionally related because each of these was a basis and an outcome of the other. I could not see a child who was not emotionally engaged. This was observable through their actions, as they smiled on having completed the tasks successfully. Emotions were also directly associated with motivation and motivation was directly linked to performance in literacy acquisition (Guthrie, 2004; Guthrie and Wigfield, 2000). From the data it was clear that engagement was not a unified and single construct but a multifaceted composition of behaviours, feelings, thoughts as well as social interaction the learners experienced while using the ZEduPad tablets for literacy development. This signified the learners' willingness to be agents as well as actors in the progression of their own learning.

In this study, engagement was therefore conceptualised as the learners' intentional involvement in practices, processes and experiences that facilitate literacy development. As Cummins (2011) puts it, "[l]iteracy engagement is a principle basis for literacy achievement". As noted earlier, it appears that when learning is devoid of engagement, there is little or no achievement in performance. From this perspective, the harvested data revealed that there were several paths learners could follow to be engaged in literacy development and learning, as was true for the teachers too.

Teachers confirmed that they had adopted several approaches to enact learner engagement in literacy activities via ZeduPads. One of the ways in which the teachers engaged the learners in literacy activities was through what I would call theoretical sub-constructs of engagement (Fredricks, Blumenfeld and Paris, 2004). These include but are not limited to affective, behavioural, cognitive constructs.

As suggested by intrinsic motivation theories, affective engagement involves the learner's curiosity, interest, and the inclusion of the tasks they prefer (Deci and Ryan, 1985). Similarly, theories of self-regulation (Bandura, 1993) and behavioral engagement (Zimmerman, 2008) denote those observable overt actions during literacy tasks that show the levels of learner

attention in their interaction with others. This was observed during the learners' use of ZEduPads. The learner's interaction with the multimodal tablets was phenomenal.

Cognitive engagement, which is premised on information processing theory (Baddeley and Hitch, 1974), is described as "[c]hanges that occur in learning as a result of strategic involvement with the activities in the process of trying to encode new information". This suggests teachers ought to be intentional in their preparation of activities that will achieve meaningful literacy teaching and learning.

Moreover, learners were more engaged in what appeared to be informal tasks, as described in Episodes 2 and 4, where informal learning is said to enable learners to use communicative strategies as they interact. Thus, taken together the three engagement sub-constructs represent the existing interpretation of engagement as a multidimensional construct (Appleton, Christenson and Furlong, 2008). As I sought to observe literacy practices with regard to multimodal ZEduPads, I concluded that learner engagement is a fluid construct in literacy tasks. In other words, engagement should not be presumed to be a fixed and one directional activity. Instead, engagement should be dynamic, mind-engaging and flexible.

Unmistakably, literacy engagement via ZeduPads symbolizes the learner's ongoing participation in literacy activities as well as practices that enhance skills, knowledge and attitudes for understanding and creating text varieties in visual, print or digital formats. With these devices engagement meant processes that showed the active and productive participation of learners in literacy activities. However, as indicated, using them requires that the learners are adequately motivated, knowledgeable and strategic active participants in literacy activities.
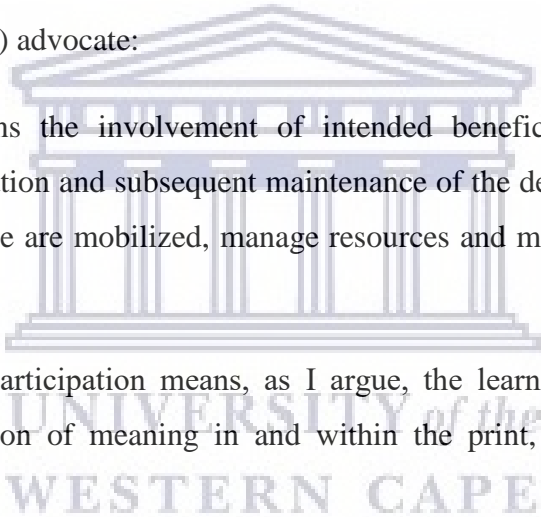
While engagement appeared to be one of the determinants for success in literacy learning via ZeduPads, what has not been clear is whether the term engagement or literacy engagement could be used to denote a specific participatory practice. I am aware that literacy engagement entails the willingness of learners to be physically or cognitively active participants in literacy practices that support their own literacy development and learning. However, the status of the learners' own, infrequent choice of literacy acts was not clear in relation to the concept of engagement. Instead, as noted earlier, the literacy tasks were those administered by teachers in the course of teaching literacy.

The next section develops the discussion on literacy participation in relation to the data.

7.2.3.3 The concept of participation

Like motivation and engagement, learner participation in literacy practices enhances and shapes their literacy skills. Bourdieu observes that participation in literacy practices expands the learner's literacy social capital (LSC), habitus and field (Bourdieu, 1993). As a concept, participation points to an expansive range (Lane, 1995) which denotes several things to diverse people (Hussein, 1995). In fact, the term is usually used by individuals from diverse ideological positions, thereby giving it several connotations (Nelson and Wright, 1995). In other words, participation is an 'ideologically contested concept' that produces an expanse of competing connotations as well as applications (Pelling, 1998). Owing to this, Agarwal, (2001) argues that there are diverse perceptions regarding how participation is defined, whom it involves, what it can achieve and how it is brought about.

As Price and Mylius (1991) advocate:

Participation means the involvement of intended beneficiaries in the planning, design, implementation and subsequent maintenance of the development intervention. It means that people are mobilized, manage resources and make decisions that affect their lives. (p.6)

In literacy development participation means, as I argue, the learners' involvement in the construction and negotiation of meaning in and within the print, digital, verbal material culture.

Participation is one of the major contributors to enhanced literacy development skills. It requires that learners take into account each other's views and the consequences that append to these. Hence learner participation encompasses active collaboration. This implies sharing of information and other communicative practices as well as expression by which learners of all ages participate in dialogues. Participation in literacy activities was a theme that kept itching for discussion as learners engaged in the literacy activities via ZeduPads during lessons. Frequently during my observations and interactions with both teachers and learners, I witnessed an exceptional willingness to participate in working on the tasks that were given after each unit topic.

Moreover, Tarnas' (1991) conceptualization of participation as an "epistemology theory of knowledge which holds that meaning is enacted through the participation of the human mind

with the world' was consistent with the learners" active involvement in discussions as they took turns in the use of the ZeduPads. Indeed, the learners had several discussions going on between them. Sometimes arguments erupted on which was the correct answer before they punched in the answer.

Since meaning is neither objective nor subjective and to be discovered, this goes contrary to the positivist or modern perception which sees it as founded entirely outside of an individual's mind in the objective world. Meaning is also not, as the constructivist or post-modern perception would have it, projected or constructed on an inherently meaningless world through the individual's subjective mind. Instead, as Tarnas (1991) argues, '[m]eaning making is enacted by the back and forth logical exchange of opinions [participation] of the individual's mind within the bigger meaning of the cosmos'. Hence meaning exists in the potential cosmos. However, it must be articulated by the individual's consciousness through participation before it can exist in reality.

Through active participation on the ZeduPads, the learners' negotiated potential literacy meanings through dialectical participation. In doing this, whether consciously or not, learners began to internalise the literacy practices made possible by the use of ZeduPad technology. Thus, the role of ZeduPad technology in meaning-making and in inculcating linguistic literacy knowledge was apparent among the learners. As the learners shared information with one another in the natural literacy spaces in digital modes; as they negotiated for meaning, they carved and shaped their own identity. Thus, the tablets played an exceedingly important role in all these practices.

I develop this discussion about their role in the next section.

7.3 Role of ZEduPads

Regarding the function of the ZeduPads in literacy teaching and learning among primary school learners, it was apparent that the tablet played an exceedingly important role. The meaning of role as it relates to sociology denotes "the behaviour expected of an individual who occupies a given social position or status" (Onwuegbuzie and Collins, 2007). In other words, "[A] role is a comprehensive pattern of behaviours that is socially constructed, recognized, providing a means of identifying and placing an individual in a society" (Argyle, 1952). The role of the ZEduPads in enhancing the linguistic literacy competence was clearly seen when the learners attempted several means by which to answer the many tasks that were

given to them. In fact, the role of the ZEduPads manifested in several ways, including vocabulary acquisition and listening skills. As indicated in the data presented in Episode 6, learners attested to the fact that among other language skills, their vocabulary and listening skills were improved.

7.3.1 Emergent Communication (EC)

One of the first things that children develop and do as they grow is to learn how to communicate. This communication is done in various ways from childhood to the time the children get into school. The reason for this is because humans need language in order to make sense of the world and to interact with others in meaningful ways; and language derives its meaning from use (Wittgenstein, 1953). It involves the negotiation of resource allocation (Cao, Lazaridou, Lanctot, Leibo, Tuyls and Clark, 2017), such as the ZEduPads which could be referred to as integrated input, provided in each lesson of the literacy classes.

Humans also need language to solve tasks. During the study, EC was evident as the learners worked in collaboration to complete the lesson exercises on their tablets. The ZeduPads could be described as artificial agents (Kajić, Aygün, and Precup, 2020) for promoting language communication skills. Developing good communication skills also requires efforts of output, Swain argues (Swain, 1985, 1995, 2000, 2008). Verbalizing or 'languaging' or making use of dialogues, collaboration, writing and speaking as a meta-linguistic strategy helps in shaping communication skills. As the learners used ZeduPads to hone their communication skills, they engaged in what could be said to be psychological processes which emerge in collective behaviour (collaboration) with other interlocutors. In turn, these become internalised and eventually become the individuals' own possession (Stetsenko and Arievitch, 1997:161).

In this study, teachers facilitated several types of tasks that engaged the learners in discussion with others. This was evident for example, when the learners used ZeduPad technologies in lessons by relying on real technologies as props to access images and games through 'the medium of' information and communication technology. ZEduPads were used as tools to enhance their communication skills. This was possible through collaborative tasks that were given by the teachers. The collaborative tasks are squarely informed by the interactionist theory referred to in this study as part of the group of theories focusing on the provision of adequate input for literacy development.

Through their interaction on tablets, the learners attempted to make sense of what they were doing and their world, using the tablets as instruments to mediate language learning. Engaging the learners in communicative tasks may thus be seen as a communicative strategy in their learning context. The idea of a communication strategy may be defined as those planned activities aimed at achieving intended goals. Based on Mintzberg's work (1988) on emergent business strategies, Jeffrey Goldstein (1999) comments on emergence in organisational complexity theory where the perception of emergence through communication might be understood from a constructivist view.

On the basis of the data obtained, this study defines EC as interaction within the context of listener-reader-hearer-response.

Emergent communication sparked by communicative tasks that got learners to talk via ZEduPad led to communities of practice (COP) within the classes. Enabled by the digitized content, learners indirectly formed small communities of practice (COS) (Wenger, 2011). In their attempts to dialogue, solving tasks helped them shape and internalize their linguistic competence. This enabled me as researcher to probe the impact of these COPS for the success of their literacy acquisition. An ethnography of communication (Hymes, 1974; Geostz, 1973; Hymes, 1968) was briefly employed in order to understand further how Zedupads enhanced or inhibited the acquisition of literacy skills.

According to Hymes (1968), the study of language and its acquisition must be approached by describing as well as analyzing the capacity of its speakers to use it for communication in real communication situations (communicative competence), rather than in terms of how an ideal speaker or listener might produce grammatically correct speech. As learners used the tablets, they practised literacy activities in their socio-cultural context. In other words, learners experimented with culturally appropriate usage in their literacy acquisition. For example, when one of the learners came across a word in relation to comprehensive sexual education (CSE), they argued amongst themselves and debated whether it was good to utter such a word anywhere, anytime.

This kind of discussion made me conclude that literacy acquisition does not occur in a vacuum. Literacy acquisition is only successful if and when all factors aiding its acquisition are taken into account. This is consistent with the input hypothesis by (Stephen Krashen,

1985), presented in Episode 4. We acquire knowledge when input is comprehensible, especially when it is packaged in acts of communicative task practices.

In these literacy practices ZeduPad became the tool through which the learners' thinking was articulated and transformed into a resource available to them. Their improved communication skills (writing, speaking, listening and reading) enabled them also to express how they perceived ZeduPads as literacy tools. This was borne out in the interviews when I asked whether the tablets were helpful for learning literacy skills, and a learner from School K explained that the tablets were good. According to the learners, most of the words they did not understand or pronounce, but they listened to the voice-overs or audio recordings to refine their speech utterances. The feature of a voice speaking through the tablet to the child could be described as digitized authentic material as it exposes the learners to authentic teaching and learning content.

ZeduPads as I observed provided children with adequate (Krashen, 1985a, 1985b) input or access to a range of literacy input through tablets, and this encouraged them to explore their metalinguistic literacy skills through dialogues. They searched for new information and found help for presenting and sharing their ideas through efforts of collaboration, as outlined earlier in this episode.

Goodman (1989) and Goodman (1986) argue "that young children view themselves as writers and willingly produce writing by drawing or making scribble forms, letter-like symbols, or letters". In the course of my research, the learners viewed themselves as little literacy stars who were optimistic about becoming well-versed literacy experts by the end of Grade Seven. For example, as indicated in Episode 6, they were able to write letters and draw human depictions using an app called the canvas on the iPads. The app was an aid requiring merely their finger-tip to type on the keyboard. They were able to take photos both outside and inside the classroom. Interestingly, they also discussed their writing on the ZeduPads extensively, commenting as they worked, *"I am drawing my family and a sports car at our house",* and, *"I am writing this for my dad and mom".*

It became evident that the ZeduPads indeed formed the catalyst of the EC whenever the learners had tablets in front of them. These drawings and writings as presented in Episode 6, depict the learners' ability and willingness to communicate ideas through pictures or writing.

All the practices noted thus far were possible because the learners were able to carry the ZeduPads around the classroom (Chabinga, 2015). Using these iPads in the classroom – as revealed by the teachers – could be greatly challenging as well as overwhelming. This suggests the teachers envisaged that it was the task of the teacher to choose the best practices to overcome this. However, as the findings show, the learners were excited each time they used the ZeduPads, clearly indicating that teachers felt that using tablets each time for literacy lessons was helpful as they did not have to struggle to keep the learners on task.

The finding that iPads play an exceedingly important role not only in transforming pedagogical practices, but also in promoting the acquisition of literacy skills, led Edgar Lungu, the President of the Republic of Zambia, to make a pledge. In his inaugural speech in 2016 he stated that he would ensure education became paperless in his tenure of office. He asserted that as technology was another form or medium of socialization, if used appropriately, it could transform the nation. Platforms such as Facebook have since become a major socio-literacy and communication or instructional tool (Hunter-Brown, 2012) where people share and take positions on certain matters affecting them.

7.4 The Socio-Literacy and iPad Interface

The data shows that the ZEduPad plays an exceedingly important role in literacy development. As a mechanism within socio-material culture, the ZeduPad was perceived as a social tool that fostered motivation in learners' to gain more in class. From a material point of view, ZeduPads became a fundamental tool inextricably linked to the process of enhancing literacy skills amongst language learners. In fact, this material interaction represents an anthropocentric ontology which perceives 'materialism' as knowledge that is constructed in relations between non-human and human bodies (Barad, 2003, 2007).

This perspective is critical of the view that literacy learning be understood in isolation, independent of the mind, the body or the material-culture (ZeduPads) and the user (Jusslin and Höglund, 2020). The alternative view it advocates is that through ZeduPads, literacy and meaning-making may be understood as relational, cognitive, affective, embodied and continuously on the move (Østern, Dahl, Strømme, Petersen, Østern, and elander, 2019). These important educational processes would always focus on an interface or the interaction taking place both internally, and amongst the learners.

This was an interesting part of my research because I was able to realise then that meaning-making through technology could also be extended to include relations between meaning and matter. For instance, theory and practice as well as the mind and the body, including the researched and the researcher, are binaries that cannot be read in isolation.

This unity of mind and body, researcher and researched is consistent with the concept of reflexivity in any research. In reflexivity, the researcher acknowledges that knowledge is not one-way traffic but rather that it is co-constructed. According to Barad (2003, 2007), such insights can be acknowledged as resonating with non-existing intra-active 'becoming-boundaries' of the world. The complex nature of this interpretation encompasses associations of responsibility.

Thus, the emerging technologies for teaching and learning – the subject of this study – fall under potential technologies that can be harnessed for literacy development.

Moreover, research conducted in the field of computer-assisted language learning (CALL) provides adequate literature on the potential and value of emerging technologies for enhancing the teaching and learning of language (Chapelle, 1997; Warschauer and Healey, 1998). It further shows that both learners and teachers have benefited significantly through its contribution to transforming the way literacy development is taught and learned.

Both teachers and learners confirmed that the ZEduPad tablet is a semiotic resource for literacy development among the sixth Graders. The data acquired through robust instrumentation has produced evidence which points to the potential in the ZeduPad for constituting a viable aid for the acquisition of literacy due to its touch screen interface. This fact might not only promote ZeduPads in consideration of literacy development but may also reveal this technological device as a part of the socio-materiality and material culture of the spaces of literacy development in the three schools under investigation.

7.5 Literacy Entanglement: Linking Listening, Speaking, Reading and Writing

When ZeduPads were integrated in literacy teaching and learning, the tablets became integrated into the ecology of literacy learning. The study revealed that the tablets were indisputably linked to motivating and encouraging the learners. Most notable of the skills was that of listening. In many cases they hung their headsets as they listened to authentic reading

materials on the iPads. Equally important was their growing confidence in speaking, because each time they paired to work on a certain task, learners were forced to speak to each other as they made decisions about taking turns.

Furthermore, ZeduPads were linked to reading and writing because the learners always saw the tablets as an opportunity to play with the devices. Primarily, this was evident when the learners used the ZeduPad to listen to recorded voice-overs, or read digital texts which were available each time they accessed the tablets for literacy lessons. They were more often than not engrossed when reading and listening to digitized short stories for comprehension exercises. In fact, the learners appeared thrilled at listening to the stories, as their smiles clearly showed. Listening to stories told nicely and fluently appeared to be one of the things the learners also lacked from their teachers.

The voice-overs or otherwise, reading the stories fluently, was one of the activities teachers could have been incorporating in their traditional teaching methods, but as was argued by the teacher, rural schools lacked teaching and learning materials, and this meant teachers did not make use of certain pedagogical practices such as story reading.

On the tablets, learners had the additional opportunity to record their own stories if they so wished. However, the teachers hardly harnessed this potential: the access and opportunity the recording app afforded learners to listen to their own mistakes and refine their literacy skills. In this practice learners were painstakingly guided in how to organise stories and express their understanding of their knowledge of the short storylines. Yet despite this, self-initiated discoveries were evident. During the process, the learners were spotted taking selfies, recording fun utterances and laughing at their own voices when they played them back and when they read. Because they were able to use various apps they could still navigate most of the links that took them to various self-taught lessons. They were able to proceed to the next exercise.

I was thus able to observe how exploring and navigating various apps enhanced and reinforced the link between listening, speaking, writing and reading. This ability by the learners would have easily translated into enabling them to use the drawings and writing presented in Episode 6 to create digital stories which they could listen to in future. The creation of digital stories using familiar words and matching them with pictures of one another would have further reinforced the literacy skills via ZeduPads. This would have

reinforced the connection between these four language aspects in ways more meaningful than before.

However, the degree of guidance offered by the teacher depended on whether that teacher, had had adequate training regarding the use of the ZeduPads for teaching and learning. This could have been coupled with the fact that the teacher's beliefs about the use of technology in teaching were strong or not strong.

In the next section, I introduce an in-depth discussion on beliefs about the use of technology in teaching and learning from both the teachers' and the learners' perspectives.

7.6 Teachers' beliefs about literacy teaching

My interaction with the teachers and learners drew forth a variety of views regarding the use of ZeduPads, or technology in general for teaching literacy. Some teachers believed that the ZeduPads were a powerful linguistic multimodal and semiotic tool that transformed not only the way teachers taught, but also the learner's attitude towards learning.

This change of attitude in the learners translated into a gradual acquisition of literacy and competence as observed in the new vocabulary learners had imbibed from the time the tablets had been brought into the schools. This was two years after the data had been collected. Equally, some teachers were of the view that the tablets were potential instruments for literacy development as they motivated the learners to do more. However, the inadequate five days training or orientation on how to use the ZeduPad tablets was a challenge for teachers for quite a period before they became a bit more comfortable with their use.

As reported in Episode 6, amongst the challenges encountered was the extended instruction time directing learners in how to operate the devices to access the lesson links. In discussing the use of technology for pedagogical purposes, several studies suggest that teachers' integration of technology as an instructional tool largely depends on their beliefs and assumptions about the use of technology in class, and the selection of appropriate methods (Munby, 1984; Nespor, 1987; Richardson, 1994).

Based on this, researchers have come to believe that appreciating the teacher's beliefs and attitudes about their use of technology is crucial if integration is to be successful. However, investigating these seemingly implicit beliefs and attitudes is fraught with challenges (Harste

and Burke, 1977). Implicit beliefs may not be articulated, and because they do not essentially transfer into practice, beliefs cannot be directly inferred from practice.

Moreover, even though teachers' beliefs on the integration of technology are perceived to be extremely important for effective literacy teaching, the literature in this area is generally scant regarding how they might be put into practice. Thus, even in the absence of direct questions about teachers' or learners' beliefs concerning the use of technology, discussion on the subject of how devices might inhibit or enhance the use of technology kept arising. I had deliberately set out to investigate this link, and our working assumption was that effective teachers of literacy would develop and articulate fixed beliefs concerning the nature of literacy learning that would act as guiding principles in their selection of teaching methods.

My data indicates that beliefs about the efficacy of technology regarding literacy development determine whether the teacher might use technology for literacy teaching. The effective literacy teachers, they argued, identify teaching activities that are consistent with their beliefs concerning literacy teaching. Effective teachers are versatile and can adapt to accommodate the new literacy dispensation.

In this regard, it was clear to me from the conversation that the linguistic space or classroom environment had to be optimal to foster literacy learning. This is consistent with the Input Hypothesis (Krashen, 1985) framing this study. Krashen (1985) posits that acquisition of language takes place when learners understand input that is slightly beyond their current stage of knowledge. This is by means of context as well as other extra-linguistic signals. In addition, Krashen (1985) argues that while we should not provide input which specifically aims at the next stage, 'comprehensible' or simply adequate input is particularly beneficial for literacy development.

In the current study, I argue that emerging technologies play an exceedingly important role in facilitating both adequate or comprehensible input as well as input slightly beyond the learners' initial level. As argued in Episode 4 regarding emerging technologies' role in literacy development, the current study breaks new ground as no study has been conducted in Zambia with the aim of investigating the role and use of ZEduPads in literacy development. Thus, the role of comprehensible input facilitated by the multimodal and linguistic semiotic resources such as the ZEduPad, forms the niche of this current study. However, in order to facilitate adequate input, the learning spaces must be linguistically rich.

7.7 Classroom environment and Literacy

The relevance of the concept of providing an optimal literacy environment to support and enhance literacy activities in classrooms emerged in the data collection. By definition, a literacy-rich environment is an environment that supports and stimulates multilevel learners to engage and participate in literacy and language tasks pertinent to their day-to-day lives. This environment gives them the ability to understand the utility as well as the function of the written as well as the oral language.

In the process of research, I observed features that contributed to the rich literacy environment. As observed in the classrooms, the decor and atmosphere of the classroom was conducive to the interaction with fellow pupils and teachers. Teachers tried to enrich every part of the classroom; most had talking walls to enable the learners explore the features of literacy. Consistent with the Input Hypothesis theory framing this study, (Krashen, Lee and Lao, 2018; Krashen, 1985a), a literacy- or linguistically-rich environment underscores the importance of compelling linguistic features of literacy acquisition.

Furthermore, the teachers stressed the importance of listening, speaking, writing and reading consistently. The teachers use of pair and group work to literacy instruction through ZeduPads exposed learners to all literacy and linguistic features and functions before they would explore further content on their own. In the pair or group work activities, one group received instruction directly from the teacher who mostly introduced the lesson and unpacked the grammar features and vocabulary, while the other group completed an exercise in their books and the third group accessed the literacy content directly on the ZeduPad tablet following instructions to complete literacy tasks therein. This pair and group work strategy helped the teachers handle large multilevel classes with less difficulty as all the learners had experience of all the literacy features by the end of the tasks.

This approach meant much preparation for the teacher to ensure that technology did not fail halfway. The teacher carefully selected materials that facilitated language and literacy prospects which included reflection and thought-through 'intentional instruction and facilitation by teachers and staff' (Snow, Burns and Griffin, 1998). The literacy-rich environment – also known as adequate input (Krashen, 1978) – created by the teachers' presence through ZeduPads, also individualized learning to meet learners' needs. In this regard, teachers made efforts to create both independent as well as guided tasks to enhance

comprehension of digital and print words by drawing the learners to the linguistic and phonemic awareness of words, and vocabulary development. Teachers made substantial efforts to draw the attention of children to functions and features of literacy. For example, one of the teachers had a bank of vocabulary friezes each time he unpacked the concepts from the tablet displayed through the projector; and he usually displayed the work of the learners at the end of the class. Such strategies to teach literacy through the tablets enhanced and reinforced what learners were learning.

In the following paragraphs, I focus on the methods and strategies of language instruction.

7.8   Methods of Language Instruction

In discussing what methods teachers use to teach literacy, the data showed that strategies were synonymous with the methods. The methods could be associated with the pair and group work strategies used by teacher in the process of teaching literacy. The findings further revealed that beyond the three station model the teachers did not explore further methods and strategies of using the ZEduPad to deliver lessons. This explained why teachers felt they needed further professional development in using the iPads in their lesson delivery – beyond the initial training they had received. As argued by Fullan and Langworthy (2013, p.33; Fullan, 2007), technology can "unleash deep learning" if sound pedagogical practices are used. Sound pedagogy is described as "creating and using new knowledge in the world" (Fullan and Langworthy, 2013, p.7).

In the current study, we see evidence of sound e-Pedagogical strategies manifested through the strategies teachers used that gave learners access to resources and opportunities to discuss and clarify their understanding. In other words, the analysed data supports previous studies that the use of emerging technologies (ZEduPads) for teaching and learning enhances pedagogical practices. Accompanying this insight is that it leads to more learner engagement as well as adequate linguistic input opportunities for literacy acquisition.

Technology is and will continue to be an essential part of the teaching and learning environment. It is an essential teachers' alibi in their profession. As the data indicates, the ZEduPad technology was used to facilitate learning. It was at this stage of the research that I realised the full meaning of integration. With the ZEduPads playing a part in enhancing the literacy experiences of the learners, further studies could focus on how we can aim to embed technology in the Zambian School curriculum beyond the programmed lesson content, to

support flexible learning as well as teaching. This is to say, the ZEduPad became an integral part of the teachers' experience. In this way, technology became an integral part of the learning experience and a significant tool for teachers from the start, in preparing learning experiences, and throughout the teaching and learning process (Eady and Lockyer, 2013).

7.9 Episode Summary

This episode focussed on data analysis in an attempt to validate the findings, and to prepare the way for possible changes. In the process the literacy-related use of emerging technologies was discussed. Furthermore, the concept of collaboration was theorised and validated through the frames of informal and formal learning. Motivation, engagement and participation were also examined in further exploration of the role of emerging technologies in literacy teaching and learning. Emergent communication as a result of the use of technology in literacy activities proved an important paradigm.

Consistent with the literature review, literacy learning via technology was further examined through the lens of literacy as a social practice and literacy teaching via technology as an entanglement of listening, reading, writing and speaking. With the most helpful beliefs, it was revealed that teachers can enhance the literacy experiences of the learners in the process of literacy acquisition by creating a literacy-rich environment in the classroom. Finally, the strategies and methods of literacy instruction were discussed in relation to successful literacy instruction via tablets.
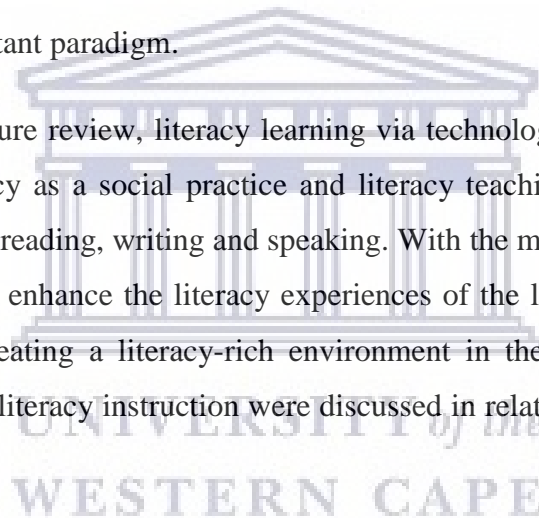
EPISODE 8: RESEARCH FINDINGS, RECOMMENDATIONS AND CONCLUSION

8.1 Introduction

The purpose of the current study was to investigate the role and use of emerging technologies in enhancing literacy skills development among Grade six English Second Language learners in Northern Zambia. This episode concludes the thesis by outlining my contribution to the field of literacy and the significance it may have in relation to both its limitations, and recommendations for further work in this domain (Phillips and Pugh, 1994, p.59). The research project has thus sought to advance knowledge within the existing body of literature on emerging technologies and the role they play in enhancing literacy skills.

In this research the theoretical framework depicts the context that made possible an investigation into literacy through emerging technologies. It connects this work to that of others who have used a similar paradigm. The instruments by extension, depict the actual strategies used to harvest and to analyse the data. This is followed by a report in which the findings are distilled, presented and discussed. The concept of 'episodes' was used to convey the idea that data in the literacy field is a set of related events that had to be discovered, collected and have meaning assigned to them.

In investigating the role of emerging technologies for teaching and learning, through emergent learning with ZEduPad literacy apps, I did not exclude its broader significance as a social practice (Street, 1995). The study is based on paired and group work strateigies, as detailed in Episode 6. These pair and group work activities opened up opportunities for improving the learners' social skills through the sharing of ZEduPads and the communication with one another that ensued.

The study took into account the significance of new literacies, knowledge and the potential impact of emerging technologies (ETs) on children's understanding of literacy and peer interaction. It pointed to the value of seeking the integration of emerging technologies in literacy learning in school.

As stated, the study aimed to uncover the teaching of literacy skills via emerging technologies (ETs) with the objective of finding out to what extent ETs foster and stimulate the learner's interest, and enhance their literacy skills. To achieve the goals of this study,

literature reviews together with a theoretical overview were presented to examine questions about the role and use of emerging technologies for literacy teaching and learning among the Grade 6 learners. As the study is situated within the context of existing theoretical and methodological paradigms of language and literacy education, I briefly explore the contributions it has made to the general theorization and conceptualization of literacy acquisition in the context of ETs as semiotic and multimodal resources for teaching and learning.

8.2 Research Findings

In keeping with its aims and objectives the study has shown that ETs are potential semiotic and multimodal tools for enhancing literacy acquisition among learners. Key findings of this study follow.

8.2.1 Emerging Technology acts as Semiotic Material Culture

The study has shown that the ETs form part of the semiotic material culture comprising classroom itinerant, fluid and unfixed tools available to most social literacy actors (the learners). By focusing on meaning making, the study authenticates studies that support the use of multi-modal and semiotic resources for literacy development and contributes to the theorization of comprehensive input. This research process thus probes the ecology of literacy acquisition with emerging technologies for teaching and learning.

Material culture encompasses the use, consumption, creation, and trade of objects, as well as the norms, behaviours, and rituals associated with such objects. This includes literacy practices. ZEduPads as a form of material culture thus represent a social reality with which the literacy learners who participated in this study engaged (Woodward, 2007). These devices played an important role in facilitating literacy development, as tablets presented literacy materials in real time while learners interacted and worked together. Each time the learners shared and learned through the ZEduPads, they all appeared motivated to continue.

8.2.2 ZEduPads reinforce learners' motivation in multimodal learning

The overall picture emanating from the data procured in the three rural school sites reveals that the learners were generally motivated to learn and to stay on task each time they were using the ZEduPads for literacy activities and indeed for other subjects. The significance of

the data regarding the investigation of the role and use of ETs for language acquisition can be summarized as an ability to connect, play as well as create and learn in a manner unimagined a few decades back. Ultimately, the current study seeks to contribute to the development and operationalization of multimodal ETs (tablets) and the extended notion of semiotic remediation (Prior, and Hengst, 2010). It is envisaged that this might be realized by providing comprehensive input for optimum literacy development. The extended notion of semiotic remediation acted as a point of motivation for literacy.

In this regard and as revealed in the data, teachers could appreciate how well the ETs are helping learners meet the learning objectives, and potentially enhancing the learning aims through specific strategies (Kolb, 2017). Here the significance of the data to theorizing the role and use of emerging technologies (ETs) for teaching and learning in the literacy field can be summarized in terms of technological integration.

8.2.3 ZEduPads enhance language and literacy learning

The results of this study show that the literacy learners exhibited an improvement in literacy acquisition. This included phonological awareness and graphemes. This major achievement was confirmed by the teachers and the learners.

Another major contribution of the current study is that it proves the multimodal and semiotic ETs (ZEduPads) show improved social capital skills (Coleman, 1988; Dika, and Singh, 2002) resulting from peer collaboration. It also indicates that learners improved their social skills which transformed from those of dominance to collaboration.

As discussed in Episode 3, in the field comprising literacy, multi-literacies and trans-literacies, children come to know how to read and write (literacy) by interacting with their environment (Goodman, 1986). The environment they are surrounded by in their everyday life constitutes the socio-materiality that is implicated in literacy development (Leonardi, 2013). In fact, there is no particular set time or manner by which children learn to be literate (Teale, 1986). Rather, children develop their knowledge about the functions and purposes of written language in multiple ways through their experiences (Kantor, Miller, and Fernie, 1992). This includes exposure to multimodal and semiotic artifacts (Flewitt, Kucirkova, and Messer, 2014).

These objects called artifacts such as the ZEduPads, play a major part in providing comprehensive input (Krashen, 1985) thereby supporting literacy development. As argued in Episode 4, input is facilitated by multimodal and semiotic tools such as emerging technologies for teaching and learning. Increasingly, these have a pivotal function in displaying literacy texts in multiple ways, for instance, through image, motion and sound.

It became clear that the tablet affordances enhanced interaction amongst learners, from solo to collaborative efforts in problem solving tasks.

8.2.4 ZEduPad affordances strengthen collaborative learning

In the framework of literacy as a social practice (Street, 1995), the affordances of the tablets in the current study enhanced the social capital networks amongst learners. They showed instances of competitive problem solving whenever the ZEduPads were not working, or else simply when doing the exercises, or tutoring etcetera in the observation period involving all participants.

A critical finding in the current study is that collaboration led to peer relationships which in turn contributed to learners' engagement with literacy content on the tablets. I believe that through the affordances of the tablets (ZEduPads) and the touch screen features not only were learners provided with comprehensive input, but that input led to the successful intake (Sato, and Jacobs, 1992) of literacy content. Peer engagement, according to social capital theory (SCT), provides both the psychosocial and the academic resources that in turn enhance individual learners' academic outcomes (Coleman, 1988; Dika, and Singh, 2002), in this case literacy acquisition. In their peer engagement as they collaborated on tasks, learners felt a sense of freedom from the pressure of teachers talking at them.

8.2.5 ZEduPads encourage independent and self regulated learning

The results also indicate that children enjoyed learning with the ZeduPads over an extended period even in the absence of the teachers. This form of freedom when learning is consistent with the concept of learner autonomy where learners take charge of their own education by setting their own goals (Ariza, and Sánchez, 2013). It appears that this form of autonomous learning enhances comprehensive input via ETs that is, ZEduPad tablets, because learners become immersed in their tasks, as was observed during data gathering.

In the current study, an 'immersive experience' means helping a person into a new or augmented reality such as the ZEduPads, thereby enhancing everyday life by making it more engaging or satisfying with technology. The latter is another insight gained in this study as its effect would be to shift literacy teaching from the rote and transmission approach as is the practice in many Zambian classrooms, to a learner centred approach. A measure of their interest is that learners spontaneously skipped break-times to complete the task with which they were engaged.

When learners are empowered through involvement, autonomy and ownership as was exhibited during my classroom observation, this leads to deep learning (Godwin-Jones, 2011; Sewagegn, and Diale, 2019). Indeed, the latter is a recipe for comprehensive input. This was borne out as I observed the digitized learning content at each level exhibited the i+1 level (Krashen, 1985). Thus, once the learners had successfully worked on the task, they had the freedom to proceed to the next lesson unit that was slightly beyond their current level. This procedure facilitated active learning, which is an important aspect of the teaching process.

In addition, the basic concept of active learning aims at advancing the learning experience of learners and the teaching experience of teachers.

When learners are active in the classroom as it was with ZEduPad tablets, they engage in higher-order thinking (analysis, synthesis, evaluation) and in a variety of activities such as reading, discussing, writing, and problem-solving (Bonwell, and Eison, 1991). Confucius (551 to 479 BC), a fifth century Chinese philosopher wrote: "I hear and I forget; I see and I remember; I do and I understand," and this quote is highly related to active learning and therefore adequate and comprehensive input and intake.

This is the 'new knowledge' that the study presents, as argued in Episode 4. The concentration accompanying the autonomy with which they worked, contributed to linguistic competency enhancement with the aid of the input facilitating tablet, ZEduPad.

The data as presented and analyzed in this study, points to the potential of ZEduPads for enhancing the linguistic competence of the learners across the three schools. The rationale is that this technology, as indicated earlier, is a multimodal and semiotic resource for literacy acquisition. In fact, the teachers confirmed that the ZEduPads enhance the teaching experience; remarkably, they were able to handle large groups using pair and group work to deliver a literacy lesson successfully.

8.2.6 ZEduPads promote interactive pedagogical strategies

One of the research questions that guided this study was about the methods and strategies teachers use to engage learners in ESL literacy, using ZEduPad. This question was specifically aimed at establishing the connections between the methods and strategies applied and the acquisition of literacy via emerging technologies.

According to the analysed data, the pair and group work strategies proved to be effective not only at managing the behaviour of learners while they worked in groups, but it also enhanced their intellectual discipline for solving problems while forming strong social bonds. Strategies such as turn-taking, were evident as the learners used ZEduPads across the curriculum. This was true for differentiated learning and engagement.

Although these emerging technologies are considered supplementary, they complement teaching by enhancing participation, differentiation and engagement. In other words, the ETs should not be seen as a means of obfuscating the literacy acquisition process, but rather as a way to enhance it and keep literacy learning relevant and meaningful.

In their report, "The Digital Imperative", Terri Duggan Schwartzbeck and Mary Ann Wolf argue that "[s]imply slapping a tablet on top of a textbook ... will not necessarily lead to significant outcomes" (2012, p. 8). In short, the emphasis should not be placed on the actual ETs but rather on how and when they could be used. Across all three schools, teachers found the recorded lesson plans helpful for explaining concepts. Sometimes learners did not need the help of teachers as the voice-overs were delivered in simple language, and so were easy to understand. However, such strategies brought their own challenges.

8.2.7 There are barriers to the integration of Emerging Technologies (ETs) in schools

One of the main objectives relating to the integration of ETs such as the ZEduPads, entailed understanding the challenges from the perspective of the teacher and the learner. The question concerned issues and challenges that arise from the integration of the ZEduPad tablet in ESL. These challenges proved to be both external and internal.

External challenges included access to adequate training for teachers. Teachers felt that the five-day training course was not enough. Thus, this posed some challenges for the successful

integration of ETs. However, after a while – during the integration – teachers gradually began to feel more confident about using the ZEduPad.

This study demonstrates that the effectiveness of professional training for teachers is essential if the integration of ETs is to succeed. According to Johnson, Jacovina, Russell, and Soto (2016), "the iPad, and mobile devices in general, are particularly appropriate technologies to target, given their pervasiveness and the abundance of educational software available that is often difficult to sort through."

In addition to professional development, teachers reported that a lack of technological support is a challenge they faced, especially in the initial phase of the integration. Although it is difficult to tell how the future of professional development will evolve, it became clear that today teachers need adequate technological support. Among administrators whom research suggests must be in the forefront of the process of supporting teachers for successful integration (Johnson et al., 2016), none were tech-fluent, much less up to the task of providing support.

Though we cannot be certain how the future will impact on professional development, it is clear that teachers in current employ do not have optimal access to technological support. This shows there is still much work to be done in Zambia in relation to external factors inhibiting the technological integration of instructional processes. I argue that with adequate support, teachers will experience fewer barriers. Instead of worrying about integration, teachers can concentrate on the learners and not the technology.

From the study, it was clear that adopting new educational technology was time-consuming especially when the teachers first began using the tools. For example, teachers complained about how much time may be wasted setting things up within a 40-minute lesson period. In other words, teachers needed extended support time as opposed to the five days training before the ZEduPads were unleashed on the teachers. Teachers also reported that after the initial training, the creators of the technology appeared only once and left for good. I understand that there is financial constraint attached to this extended support even for the creators of the technology. However, "(w)ith high quality support from both the creators of educational technologies and school employees, teachers will have access to the resources they deserve" (Johns et al., 2012).

The knowledge that support will be available all the time can enhance an acceptance of new technologies and their eventual successful integration into teaching and learning. One of the solutions suggested to ameliorate this challenge was professional support from colleagues in the vicinity. However, due to distances between schools, professional development amongst colleagues was hampered. Had this not been the case, peer support discussions would expose teachers to issues of novel uses of the tablets for their classes, such as the use of the cameras to document stories about anything requiring images.

If such support is more readily available, this could change the perception and beliefs of teachers regarding the new technologies for teaching and learning.

8.2.8 Teachers' perceptions and beliefs influence the implementation of ICTs in literacy teaching and learning

In the previous section, I briefly discussed external barriers to technology integration in the classroom. However, as Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur and Sendurur, (2012) point out, even we take away the first-order barriers, digital technology would still not be immediately and seamlessly integrated for teaching and learning using appropriate pedagogy. This is because the barriers relate to teachers' personal beliefs and attitudes as these greatly influence their use of technology in the classroom. In this way, teachers are ultimately responsible for using technology, and therefore it depends on them to choose how they could implement technology for literacy teaching, in this case. This is why I focus briefly on perceptions as reported by teachers during the study.

One of the most common issues raised by the teachers themselves was attitudes and beliefs about technological integration. Their concern is amplified by Johns et al. who point out that teachers' attitudes and beliefs are critical in determining the effectiveness of successful technological integration. (Johns et al., 2012)

Another challenge reported concerned confidence and skills about technology use. As observed, most teachers were not fully confident about the use of Zedupads to teach literacy activities. Sometimes, as reported in the results section, learners by nature exhibited more confidence than teachers. Given the abundance of these new technologies, it is important that teachers feel comfortable, confident and fluent in using ETs for teaching effectively. In the next section, I highlight the implications of this for the study.

8.3 ZEduPAds: implications for English (L2) Literacy Development and Instruction

The findings of my literacy research project have several implications not only for me as an educator, but also for policy-makers around the world, including Zambia where this study was carried out. The ZEduPad tablet continues to render help to learners of English as a Second Language (ESL) or even as a Foreign Language (FL), especially in rural schools where English is hardly heard outside of school. Through the tablet, learners develop new literacy skills by listening to and interacting with authentic linguistic materials aided by the multimodal tablet, popularly known as ZEduPad by the locals.

Furthermore, the ease of use that emerging technologies such as the ZEduPad tablets enables collaboration, participation, and accessible opportunities for engagement as noted earlier. In addition to what was observed, ZEduPads further afford not only collaboration but also co-creation, learning and interaction which in this case, greatly contributed to enhanced teaching and learning. Of particular importance to the current study, ETs can enhance learners' literacy acquisition and their access to social learning networks (Gachago, Bozalek and Ng'ambi, 2013). They may also bridge the gap between formal and informal learning. It was clear that for most learners who struggled to learn English, the ZEduPad tablet became a companion for developing literacy skills. In other words, the tablets assisted learners whose mother tongue is not English, with their difficulties in acquiring the latter.

In addition, the tablet provided different avenues for teaching and learning. This was true for both learners and teachers. The results of my study reveal that the tablet is a great teaching and learning resource not only for learners of English as a Second Language, but for literacy across subjects. That notwithstanding, one of the most important implications of the ZEduPad is that the tablet motivates learners. According to Chao, motivation is a recipe for acquiring literacy skills (Chao, 2013). The concept of motivation was a recurrent theme throughout the study in my interaction with both the learners and the teachers.

During the informal observations, I noticed that the learners were exceedingly keen to keep up with curriculum requirements whenever they were given the chance to learn with the aid of tablets. This result is crucial since the study set out to investigate the integration of emerging technologies for teaching and learning, and the ZEduPad tablets actually provide new and multifaceted avenues for learning. Previously unimagined, these are now accessible through differentiated instruction. Most learners with whom I interacted, exhibited high levels of

motivation to try to correct their literacy gaffs as they participated in literacy activities via the tablet. On the strength of such evidence, if policy makers were to subsidize the tablet this could make it accessible to most vulnerable rural schools that have almost no teaching and learning materials.

The initial intention behind the tablet was to raise the staggeringly low levels of literacy among school-going children in Zambia. However, this appears to be idealistic as the tablet cost more than had previously been budgeted for. It has thus proved difficult for disadvantaged schools to envisage using the tablets to raise literacy levels.

For example, in the Northern Province where I work, learners do examinations without adequate knowledge of reading and writing. Thus, through this study, I have learned that the iPad presents potential for literacy instruction in the classroom setting. The ZeduPad is a user-friendly tablet and several learners have come to enhance their literacy competence levels because they have been exposed to the device. The point here is that learners were even able to self-teach and access many more apps than the teachers who had initially undergone orientation sessions on how to use them. This fast access to knowledge about how to use the tablet directly impacted on the literacy skills of most learners.

Furthermore, the other implication of ZeduPads in my current study is the actual integration of the tablet into the Zambian curriculum. Consistent with the literature reviewed earlier, emerging technologies for teaching and learning, as revealed by the study, encourage literacy learning through learners' exploration of print, in the form of icons, symbols, letters and words on the tablet screen as learners play with the apps (Neumann and Neumann, 2017). In particular, the apps supported children with learning letters of the alphabet, phoneme-to-grapheme conversion and phonological awareness (Whitehurst and Lonigan, 1998). Moreover, the research demonstrated learners heightened and expanded creativity and imagination while they used the ZeduPad. This is the creativity and imagination that Vygosky (1986) stresses as the crucial didactic outcome in individuals.

Thus, in my current study, I found that using the tablets to develop literacy skills among the Grade six learners was helpful to the learners especially learners from the disadvantaged schools such as those in rural Zambia.

8.4 Recommendations

In the light of these findings, a number of recommendations can be made. These recommendations can inform policy and further research initiatives which should be premised on the approaches outlined here.

8.4.1 A reflective teaching approach to be prioritized

The use of ETs by teachers should be guided by reflective teaching practice informed by research as opposed to personal theories. In Zambia, where teaching is mostly done by rote, teachers and teaching practices must take this route. The significance of such change is that it entails a new approach to teaching, one which de-emphasises transmission teaching and modal activities. Instead, the learner is viewed as capable of taking in hand their own learning. This approach will ultimately support the attainment of intellectual autonomy.

8.4.2 Implementation of ETs in Teaching and Learning across the curriculum

This study indicates that the ZEduPad tablets or any related devices should be encouraged in primary schools in Zambia. In order to achieve this, the Government of the Republic of Zambia and other state arms that aid education policy should firstly, emphasise the integration of ETs in teaching and learning across subjects in all aspects of education; and secondly, contribute financially towards the acquisition of such educational ETs for learners' and teachers' ease of access. Current access to educational technology is limited and expensive for poor and disadvantaged rural schools. Therefore, government should subsidize the purchasing of these ZEduPad tablets to open doors for unlimited epistemological access to literacy development and education as a whole in Zambian schools.

8.4.3 Actualising the e-Learning Educational Policy in Zambia

Government should immediately actualize the e-Learning policy as a framework for teaching and learning with the integration of ETs. Currently, Zambia does not have an ICT policy on education and still hides under the national ICT policy for e-Government. Zambia identified and adopted e-Government as one of the most efficient vehicles for appropriate, transparent, inclusive and participatory decision making. However, this is not the case with education and

it affects the wheels of education, especially with the advent of the Corona Virus Disease (Covid 19) which locked down most economic conveyors, not only in Zambia but worldwide.

In this regard, government can take advantage of Covid funds: it can call upon education specialists to formalize and expedite the formulation and release of the e-Learning policy as the world grapples with opening schools in the face of the second wave of Covid 19. The key policy priority should therefore be long term e-Learning policy interventions to ameliorate future education disruptions by training teachers in the use of ETs for education.

8.6 Future Research on the use of ETs in Zambian schools

In light of the results of the current study, there is a need for a longitudinal research study in order to explore the experiences of other primary schools on the role and use of emerging technologies, the ZEduPad for literacy acquisition. Given the paucity of multi-modal and semiotic resources for comprehensive literacy input in rural schools, I believe research energy should be directed at analysing the literacy acquisition levels through these multi-modal resources in rural schools across Zambia. To realize the latter, there must be a e-Policy Framework in place.

8.7 e-Policy Framework Formulation and Implementation

There is no e-Policy Framework on education to guide the implementation of e-Learning in General and Higher Education in Zambia. The lack of an e-Policy has a negative effect on the proper implementation and monitoring of e-Learning in schools. The Zambian government should consider to formulate an e-Learning Policy Framework urgently to guide the use of e-Learning in education - for both pre- and in-service teacher training including the higher education. This will give guidance to organisations like the World Vision that has assisted several schools in Zambia to acquire tablets at a lower and subsidized price. The latter will enable several schools to acquire the tablets for teaching and learning to ameriolate the low literacy levels among learners in schools.

The lack of e-Policy has led to the conceptualization of a model which could be used by teachers in Zambia and beyond in their endeavour to enhance literacy development. I consider this as a major contribution this study adds to the body of knowledge characterised by the information age. In the following section the proposed literacy model is provided.

8.8 Proposed Literacy Model

Based on the results of this study and as a major contribution this study adds to the body of knowledge regarding the use and role of emerging technologies for teaching and learning, I propose the following literacy model to address the four language skills, namely listening, writing, reading and speaking that are necessary for language learning. These skills are integrated and complement each other in literacy learning through the support of socio-culturally embedded input, affordances and facilitated by actor network systems through complex literacy interactions. The proposed model illustrates how emerging technologies could be employed to enhance children's emergent literacy to impact on their subsequent literacy skills.

The model is inspired by Krashen,'s (1982, 1985) Input Hypothesis and it comprises six components that act as comprehensible input while offering affordances (Van Lier, 2000) to enhance literacy development. According to this model the input refers to the print-based texts, multimodal texts, innovative pedagogies, technology (iPads), including teacher training and e-Policy framework. I argue that due to the cognitive sociocultural capacity of the input and through Vamakhalilo a major coined concept translated as lived experiences, every human being has the ability to acquire digital literacy skills if they are exposed to comprehensible input and adequate affordances that are drawn from the sociocultural environment or space that shapes Vamakhalilo as shown in figure 27 below.

Figure 27: Integrating technology to enhancing Second Language Literacy learning

The six components of the proposed model are briefly described below. These components emanate from the data which shows that Vamakhalilo (lived experiences) contributes to literacy development among the learners. It was influenced largely by several modes of literacies and artifacts in the socio-cultural space as indicated by the arrows in the proposed model. These literacy modes are consistent with the theories underpinning this study regarding the provision of adequate input and affordances. Despite the limitation of the Actor-Network Theory, I gained an understanding of the complexity of reality (including the complexity of classrooms) and the active role played by emerging technology in literacy

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development. The Actor-Network Theory also helped me understand how the social effects are generated between different actors in a network, and the role of emerging technologies in shaping social processes in learning. The components of the model are discussed below.

8.7.1 Print Based Texts

Traditionally, print based texts (PBTs) were at the core of literacy learning. PBTs include anything we see in writing such as books, poems, including letters. These were the major source of literacy input (Baynham and Prinsloo, 2009). While literacy has in the recent decades transformed from solely print based, PBTs remain one of the major sources of input for literacy skills acquisition, especially in socially disadvantaged schools and communities. Thus, exposing learners to print based texts provides learners with an opportunity to acquire literacy skills.

8.7.2 Multimodal Texts

While PBTs are mainly single mode, multimodal texts have more than one mode. These include not only texts but also picture and text books, comic, graphic novels and posters, where meaning is decoded through different modes that include a combination of visual (still image) written language, and spatial modes (Walsh, 2010). From this perspective, this current study shows that one other factor that enhances literacy development among learners is comprehensible input that is presented in more than one mode.

8.7.3 Technology (iPads)

This study has shown the significance of technology (ZEduPad) in enhancing literacy skills among learners. The current study shows that the touch screen features affords the presentation of texts in more than one mode (Chabinga, 2015; Lin and Nzai, 2014; Mallernee, 2017). This characteristic increases the potential for comprehensible input for literacy development.

8.7.4 Innovative Pedagogies

This current study shows that literacy development requires that teachers employ innovative pedagogical strategies which are in line with the global trends for enhanced technological skills in education. Therefore, teachers have to apply a variety of innovative pedagogies,

including e-pedagogies to enhance learners' digital literacy skills to the young learners of the 21st century. Thus, teacher development in the use of e-pedagogies has to be prioritized.

8.7.5 e-Policy Formulation, Implementation and Monitoring

One of the factors that can support the acquisition of literacy skills among learners is the deliberate formulation of an e-Policy on education in Zambia. As part of the innovative pedagogies in the 21st century, e-Policy framework in the Zambian education system can enhance the potential and acceleration of literacy skills development in Second Language Learning (Kaunda, 2019; Neumann, and Neuman, 2017). This study shows that the lack of e-Policy on education leaves the practice of e-Learning in education porous and to chance hence making it difficulty even for teacher pre and in-service training to have a common eLearning practice. The lack of e-Policy framework on educational guiding the integration of technology in education as indicated in episode 6 is evident of the lack of implementation and monitoring thereof.

8.7.6 Pre- and In-Service Teacher Training

The study shows that very few in-service teachers received proper training on the use of ZEduPads for teaching and learning. Those who received training claim that the training was basic and it was done for five days only. According to the teachers, the training was short and inadequate. Also, the in-service teachers acknowledged that they did not receive any training when they were at college regarding technology in education. As indicated above, the lack of e-Policy formulation on education seems to hinder the implementation of e-pedagogies. This was evident during the Covid 19 lockdown when the Ministry of General Education tried to do e-Learning telecasts in keeping with the Covid 19 pandemic.

8.7.7 The Sociocultural Environment or Spaces

This study recognizes that literacy skills acquisition does not take place in a vacuum. It shows that social and contextual factors play a key role in literacy acquisition. The theories underpinning this study have shown that effective literacy development is tied to the ecological stand points (Bronfenbrenner, 1979; Gibson, 1979a; van Lier, 2004) that acknowledge the relationship between the learners and their learning context. In other words, the learners make meaning of the learning content by interacting with their social environment (Van Lier, 2000). Thus, the proposed literacy model shows that context-based

factors give rise to affordances (van Lier, 2000) that could facilitate the learners' acquisition of literacy skills in the learning environment.

8.8 Limitations of the study

The focus of this study was to investigate the role and use of emerging technologies, such as the iPads for English Second language learning in three Primary schools in Northern Zambia. As some schools had disruptions in the use of ZEduPads due to transfers of participants, this study does not seek to establish a homogeneous baseline or attempt to measure 'success' or make judgements about attainment in their use. In other words, the relevant caution must be exercised when citing parts of the current study.

The data sample in this study is relatively adequate and as such it does arguably represent a cross-section of rural schools from various socio-economic backgrounds and stages of development in the use of iPads.

8.9   Conclusion

In conclusion, I believe that the deliberations in this thesis framed as '*Emerging Technologies for teaching and learning: An investigation into the role and use of iPads in Grade Six English Second Language in Northern Zambia'* have comprehensively highlighted the role of ETs in the literacy acquisition and teaching landscape in Zambian primary schools. In the course of this study, I found several potential benefits to using the emerging technologies for teaching and learning literacy. The benefits are an addition to the existing knowledge regarding literacy acquisition via emerging technologies.

The study presents a sound pedagogical framework for integrating technology as a multimodal and semiotic resource tool for comprehensive input in literacy learning within an authentic learning environment. Examples of pedagogical literacy strategies to support learning with emerging technologies have been shown to include qualitative narratives of learners' experiences with ETs.

In addition, this study has provided evidence that authentic literacy learning facilitated by emerging technologies and open access to the tablets can assist in creating self-directed learners. The ZEduPads are multi-modal semiotic learning tools with a voice-over feature that supports emergent literacy learning at primary school level. In the classroom the

participating learners proved to be highly adept at navigating several ZeduPad applications on the tablet. The ease with which they did this pointed to the implicit and explicit experience that arguably enhanced their literacy skills. As indicated, sometimes learners exhibited more knowledge of the tablet than the teachers.

However, with the current high cost of the tablet, it is difficult to investigate the benefits of using the ZeduPad for literacy teaching and learning. This governmental obstacle has made it particularly difficult for even well-wishers to purchase the tablets to assist schools with such eLearning materials.

Finally, it is the fact that emerging technologies make learning independent and collaborative in teaching and learning endeavours that enables all learners to begin – and continue – pursuing their education in a variety of stimulating ways.

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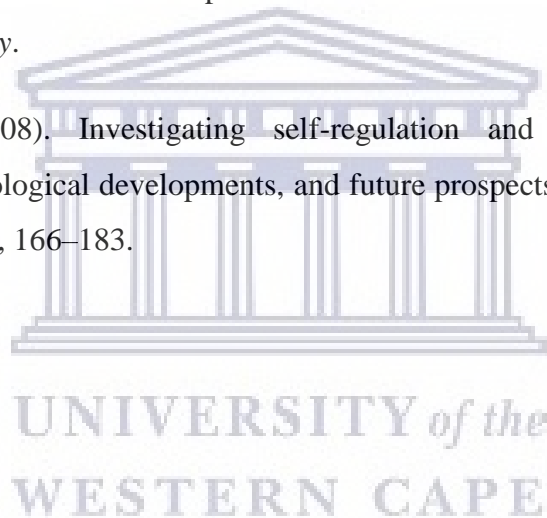
APPENDIX

Appendix A: Ethical Clearance

OFFICE OF THE DIRECTOR: RESEARCH
RESEARCH AND INNOVATION DIVISION

Private Bag X17, Bellville 7535
South Africa
T: +27 21 959 2988/2948
F: +27 21 959 3170
E: research-ethics@uwc.ac.za
www.uwc.ac.za

05 December 2016

Mr K Chabinga
Faculty of Education

Ethics Reference Number HS16/6/28

Project Title: Emerging technologies for language teaching and learning: an investigation into the role and use of iPad technology in grade 6 English Second Language in three primary schools in Western Zambia.

Approval Period: 05 December 2016 – 05 December 2017

I hereby certify that the Humanities and Social Science Research Ethics Committee of the University of the Western Cape approved the methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval. Please remember to submit a progress report in good time for annual renewal.

The Committee must be informed of any serious adverse event and/or termination of the study.

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

PROVISIONAL REC NUMBER - 130416-049

i

Appendix B1: Assent Form

University of the Western Cape

Faculty of Education, Private Bag X17, Bellville, South Africa

ASSENT FORM

TO BE COMPLETED BY YOUNG PERSON AND PARENT/GUARDIAN

PART A: TO BE COMPLETED BY THE YOUNG PERSON.

I agree to take part in the study on *Emerging Technologies for Language Teaching and Learning: An investigation into the role and use of iPad Technology in English Second Language in Three Grade 6 Primary Schools in Northern Zambia* and would like to take part in (please tick one or more of the following)

□ a group interview

□ an individual interview

I have read and understood the accompanying letter and information leaflet. I know what the

Further information about the study is contained in the enclosed letters and information leaflets for young people and parents/guardians.

Student Name: Chabinga Kelvin   **Supervisor's Name: Prof. Vuyokazi Nomlomo**

Signature: **Signature:**

Contact Number: 0627908658   **Contact Number: 021 – 959 2650/2442**

Email: 2353500@myuwc.ac.za   **Email: vnomlomo@uwc.ac.za**

Appendix B2: Consent Form

University of the Western Cape

Faculty of Education, Private Bag X17, Bellville, South Africa

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CONSENT FORM

Dear Parent/Guardian,

Title: ***Emerging Technologies for Language Teaching and Learning: An investigation into the role and use of iPad Technology in English Second Language in Three Grade 6 Primary Schools in Northern Zambia***

My name is **Chabinga Kelvin** a PhD student of Language and Literacy Studies in the Faculty of education. This letter request invites your child to participate in a research study being conducted by at her/his school as well as seat in his/her class during lessons. The purpose of the research is to study how technology use can enhance language and literacy skills or how technology affects what primary school learners learn. The observation and interview sessions may be tape-ecorded or video recorded.

During the group interview session, your child will answer a series of questions about their experiences with the use of iPads for learning. There are no known risks associated with this research other than the potential for mild boredom or fatigue. There are also no known

benefits other than the knowledge gained from having participated. The interviews take no longer than 30 minutes.

Your child's participation is voluntary. He/she may choose not to participate in this research study. If he/she agrees to participate, he/she can withdraw from the study at any time. Your child's privacy will be protected. His/her name will be recorded only for consent purposes. All data will be identified only by a subject number. Any materials containing his/her name (e.g., consent forms) will be kept in a separate locked file. Any record linking your child's name to a particular subject number will be destroyed once the study is complete. His/her identity will not be revealed in any publication that may result from this study. If you have any questions you can also contact my supervisor or me on the following contact details.

Student Name: Chabinga Kelvin   **Supervisor's Name: Prof. Vuyokazi Nomlomo**

Signature: **Signature:**

Contact Number: 0627908658   **Contact Number: 021 – 959 2650/2442**

Email: 2353500@myuwc.ac.za   **Email: vnomlomo@uwc.ac.za**

I have read this consent form and know that I may ask questions now and any time. I will also be given a copy of the consent form for my records. I consent for my child to participate in the research described above.

Print the name of the child: _____

Date: _____   Signed:_____

(Parent/Guardian of participant)

Appendix C: Introductory Letter to one of the schools

All correspondence to be addressed to
Telephone: 245012

In reply please Quote
No. ....

Republic of Zambia

MINISTRY OF GENERAL EDUCATION

MUNGWI DISTRICT EDUCATION BOARD
P O BOX 48
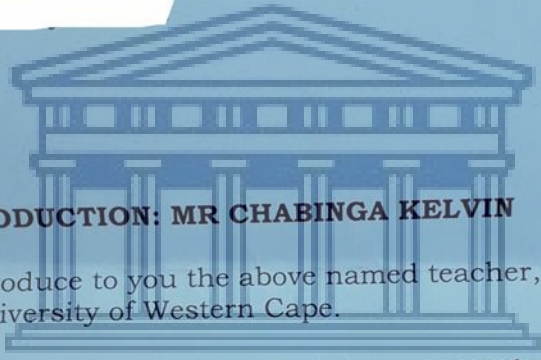MUNGWI

13th September, 2017.
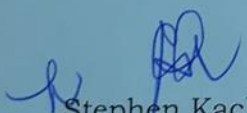
The Head teacher,

MUNGWI.

Dear Sir,

RE: STAFF INTRODUCTION: MR CHABINGA KELVIN

This serves to introduce to you the above named teacher, who is a PHD Student at the University of Western Cape.

He has come to your institution to undertake a research in Emerging Technologies for Teaching and Learning.

Kindly assist him in any way possible.

Stephen Kachiliko
District Education Board Secretary
MUNGWI DISTRICT.

REPUBLIC OF ZAMBIA
MINISTRY OF GENERAL EDUCATION
MUNGWI DISTRICT EDUCATION BOARD

1 3 SEP 2017

EDUCATION STANDARDS OFFICER
GENERAL INSPECTION (ESO GI)
P.O. BOX 48, MUNGWI

Appendix D: Teacher Interview Schedule

University of the Western Cape

Department of Language and Literacy

Interview Schedule {Teacher}

1. How many years have you taught English as a subject?
2. Up to what level did you do English at college as a subject?
3. How many learners do you teach in your class?
4. What is the level of your learner's language proficiency?
5. What is your understanding of literacy and how do you understand literacy in the digital age?
6. For how long have you been using ZEduPads for teaching and learning especially English?
7. How confident are you at using the ZEduPads for teaching and learning?
8. Do you think the ZEduPads have changed the way you teach? In what ways?
9. What methods, strategies do you use when using ZEduPads and which ones which ones do you think are effective?
10. How often do you use the ZEduPads for English in a week or month?
11. What specific activities or tasks do you give learners after your lesson delivery in English lesson?
12. What sort of training did you undergo before using the ZEduPads and do you think the training was adequate?
13. What further support do you receive in using the ZEduPads?
14. What sort of challenges do you face for both teachers and learners while using ZEduPads for teaching and learning?
15. In your own opinion, do you think the ZEduPads have enhanced literacy skills among learners?
16. What is the attitude of learners while using ZEduPads?
17. Is there any ICT policy for education that guides the use of technology in schools?

Appendix E: Learner Intrview Schedule

University of the Western Cape

Department of Language and Literacy

Interview Schedule {Learners}

1. What digital devices did you have at home before you started to use ZEduPads (iPads) in school?
2. How often do you have access to these ZEduPads (iPads) in school?
3. What do you use these ZEduPads for while in class?
4. What sort of activities do you use ZEduPads for while learning English?
5. How many times do you use ZEduPads for learning English?
6. Do you think ZEduPads enhances your skills of reading, writing, listening and speaking? Explain.
7. What challenges do you experience while using the ZEduPads?
8. In what ways do you think the ZEduPad has or has not enhanced your reading skills?
9. What else would you say about the use and role of ZEduPads in your learning?

Appendix F: Observation Schedule

University of the Western Cape
Observation Schedule 4: Observing Teacher and Learner Activities

School Name:
Date of observation:
Lesson observed:
Teacher Observed:
Observed By:
Purpose of observation:

Time	Teacher Activities	Learner Activities