The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy

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A thesis submitted in partial fulfillment of the requirements for the degree of

Philosophiae Doctor in
Augmentative and Alternative Communication

in the Centre for Augmentative and Alternative Communication

UNIVERSITY OF PRETORIA
FACULTY OF HUMANITIES

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May 2020

Acknowledgements

Firstly, all glory to the Almighty God through whom all things are possible! Thank you for never leaving my side through this journey. Great is thy faithfulness.

To my supervisor, Prof. Shakila Dada, for your professional and accurate guidance; and patience through the bends and turns. Your encouragement and continued belief in me have made this journey a success.

To my co-supervisor, Prof Ralf Schlosser, for your critical but always helpful feedback. Your inputs have added value to this research study.

To my father, Mr. Boniface,"Babaye" Banda. The words of affirmation you constantly spoke into my life have given me a strong identity and the persistence to never give up on my dreams. I dedicate this thesis to you, as you continue to rest in peace.

To my mom, MaGumede, and my three sisters Gugu, Thando & Thokozani. Thank you for bearing with my minimal participation in family gatherings, due to commitments to the PhD. And for not losing faith in me. I love you ladies.

To the Mtati sisters, Coceka and Cebisa for hosting and transporting me when I needed to be in Gauteng for the PhD. Thank you for the care, hospitality and support. May God richly bless you.

To my fellow PhD colleagues. Thank you for all your insightful inputs to my study during online discussions and onsite weeks. A special thanks to Khetsiwe for the chats and comforting words, Maria, for the words of wisdom and Anushka for the amount of work and attention you have put in me as your friend and this PhD journey.

To my research assistants Mam Zodwa Mgandela and Mpumie Ngcobo. Thank you for being pillars of strength through one the toughest stages of my research. May we keep the sharing the passion for developing our communities.

To my statisticians Dr Boikhutso Tlou and Dr Anesu Kuhudzai. Thank you for not only providing impeccable statistical services but for also giving me sound advice about life.

A special thank you to my editors Mandy Collins and Isabel Classen, for you dedicated and meticulous editing.

My utmost gratitude goes to the community-based organizations (CBO's) and the health facilities that took part in my research. Thank you to the CBO Coordinators who believed in the value of my study. To the facility staff at the eThekwini clinics, seeing you serve your communities and put their health first was an experience the research team will never forget.

Thank you to my mentors Prof Grace Kunou and Prof Siphamandla Zondi for making the PhD journey intrinsic and for always reminding the mentees of their contribution to the field of Social Sciences.

I would like to acknowledge the following contributions which made this research study possible:
The University of Pretoria for the Research Support Bursary and the Postgraduate Bursary for the financial support.
The National Institute for Humanities and Social Sciences Scholarship
The Medical Research Council for the Research Development Grant

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Abstract

Low literacy levels have been argued to partially contribute to poor health literacy and poor health outcomes. Low health literacy refers to the inability to apply health information in pursuit of good health. While several strategies have been used to assist persons with low literacy to understand health information, these strategies have been focused primarily on improving medication taking in persons with low literacy. There is a paucity of research on the effects of these strategies on understanding chronic illness and self-management of these illnesses. This study aimed to determine the effects of a specific strategy, viz. visual aids, on the understanding of HIV health information in persons with low literacy. The study encompassed two tasks – the experimental and the iconicity tasks. The experimental task utilised a multi-group pre-test-post-test design comprising 90 participants who were divided into three groups. Group 1 received the HIV health education programme of the National Department of Health (NDoH) verbally and with visual aids (Intervention 1), Group 2 received the same programme verbally only (Intervention 2), and Group 3 served as the control group and did not receive the programme. Within-group analysis found statistically significant differences in pre-test and post-test scores of Groups 1 and 2 ($p<0.05$) and not for group 3. Between-group analysis found no statistically significant difference between Group 1 and Group 2 in terms of their understanding of HIV health information. There were, however, statistically significant differences between Groups 2 and 3 ($p<0.001$) and between Groups 1 and 3 ($p<0.001$). The iconicity task (N=39) adopted a survey related to the transparency and translucency of the visual aids used in the NDoH's health education programme. It was apparent that none of the visual aids (0/19) used in this health education programme met the International Organization for Standardization score for transparency, while 13 of the 19 visual aids met the recommended score for translucency. It was concluded that the NDoH's health education programme provided to both Groups 1 and 2 influenced the participants' understanding of health information. However, the expected superior effect associated with the addition of visual aids was not evident in this study. This may be attributed to the inadequate transparency scores for the visual aids in the NDOH's health education programme. Further studies to investigate the effects of visual aids with higher transparency values are recommended, as well as efficacy studies that will use visual aids developed with appropriate guidelines for persons with low literacy.

Keywords: comprehension, low literacy, health literacy, health education, health information, visual aids.

CHAPTER 1
PROBLEM STATEMENT AND RATIONALE

1.1. Introduction

This chapter presents the problem statement and the purpose of the research. Furthermore, frequently used terms are defined, and abbreviations explained. The chapter concludes with an outline of each of the seven chapters of the thesis.

1.2. Problem statement and rationale

Millions of adults around the world have low literacy levels (Ryan et al., 2014; UNESCO Institute for Statistics, 2014). A clear majority of persons with low literacy live in Lower and Middle-Income countries (LMIC's), particularly in sub-Saharan Africa, which accounts for 24% of all persons with low literacy (UNESCO Institute for Statistics, 2014). Low literacy is understood as the inability to read, write or use numbers effectively and with sufficient proficiency to function in society or achieve one's goals (Easton, Entwistle, & Williams, 2010; Pignone, DeWalt, Sheridan, Berkman and Lohr, 2005). Literacy is an important skill that is required to manage health care settings, as it is argued that together with education, literacy is a key determinant of health (Kickbusch, 2001; Neille & Penn, 2015).

Low literacy levels contribute to the great burden of disease (Eichler, Wieser, & Brügger, 2009; Smith, Tang & Nutbeam, 2006) found among persons with low literacy (Al Sayah, Majumdar, Williams, Robertson, & Johnson, 2010) or low reading levels (Zellmer, Zimdars, Parker & Safdar, 2015). South Africa carries a quadruple burden of chronic diseases, which refers to i) maternal, new-born, and child health illnesses, ii) human immunodeficiency virus (HIV) and tuberculosis (TB), iii) non-communicable diseases (such as cancers, high blood pressure, diabetes), and iv) the effect of violence and injury in the population (Kickbusch, 2001; Kathard & Pillay, 2013). This burden puts pressure on public health facilities which are the primary means of health care for many people in the country. Most of these users are black Africans of compromised socioeconomic status and persons with lower literacy levels (Coovadia, Jewkes, Barron, Sanders, & McIntyre, 2009; van den Berg, 2016). It is therefore crucial for health care professionals to be aware of the possible impact that low literacy and poor health literacy might have on those who utilise the public health facilities (Kickbusch, 2001).

Low literacy often leads to poor health literacy (Negarandeh, Mahmoodi, Noktehdan, Heshmat & Shakibazadeh, 2012; Williams, Muir & Rosdahl, 2016). Health literacy is a form of literacy that is seen as a critical determinant of social, economic, and health development (Kickbusch, 2001). Thus, health literacy has been defined as a set of cognitive and social skills that determine one's ability and motivation to seek, understand and use the information to promote one's health and well-being (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011).

Poor health literacy inevitably results in a variety of poor health outcomes (Ryan et al., 2014; Wu et al., 2011) such as lower use of health care preventative services (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011; Peterson et al., 2011), increased needs and costs for hospitalisation (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011; Boyle et al., 2017) lower treatment adherence (Keller, Wright, & Pace, 2008), poor understanding of health information (Malloy-Weir & Cooper, 2017; Nouri & Rudd, 2015), or poor self-management of chronic conditions such as HIV (Dowse, Ramela, Barford, & Brown, 2010). These poor health outcomes render health literacy an important consideration for health care settings.

It is argued that current health care systems are designed in favour of patients who possess adequate literacy skills (Coovadia et al., 2009) and who speak the languages spoken by the health professionals (Lambert & Keogh, 2014, von Wuhlisch & Pascoe, 2011; Schubbe et al., 2018). This is despite the fact that patient participation in health care is seen as a critical determinant of successful chronic disease management (Ishikawa & Yano, 2008). However, when patients have low literacy and are not able to speak the language of the health professionals, are vulnerable (Mophosho, 2018; van den Berg, 2016). The challenge for these patients is to access health information that they can understand and make use of. Often, health care professionals assume that patients have understood the health education received and will carry out the health instructions and cultivate the necessary behavior at home (Hunter-Adams & Rother, 2017; von Wuhlisch & Pascoe, 2011). The current study argues that this assumption requires further interrogation.

Furthermore, health education programmes targeting persons with low literacy are provided primarily in written or spoken format, for instance dosage instructions on medicine labels or inserts (Schubbe et al., 2018; Webb et al., 2008). Research shows that the manner in which health education is delivered is key to improving comprehension of health information among persons with low literacy. These studies have revealed that different strategies have different effects on health outcomes in persons with low literacy. For example, interventions including more than one form of input, such as simplified readability or reduced complexity of written materials, videos and verbal inputs (Williams et al., 2016) have been found to have a positive effect on self-management and self-efficacy (Sheridan et al., 2011). The studies also stress the effectiveness of health education that is provided by the health care professional (Kim & Lee, 2016; Lee, Lee, Kim, & Kang, 2012) and argue that adding visual aids to text in health education materials can improve the understanding of health information in persons with low literacy (Houts, Doak, Doak & Loscalzo, 2006; Park & Zuniga, 2016).

In South Africa, HIV health education programmes have been rolled out in an effort to address the scourge of HIV in the country and to support one of the largest antiretroviral programmes in the world (Dowse, Ramela, Barford, & Browne, 2011; Naidoo et al., 2017). The South African National Department of Health (NDoH) developed a health education programme based on a previous programme called integrated access to care and treatment (I-ACT) which was developed for persons living with HIV (Integrated Access to Care and Treatment, 2013; National Department of Health: South Africa, 2016). The current NDoH health education programme aims to improve clinical outcomes and support adherence for all patients on chronic treatment (National Department of Health: South Africa, 2016).

This programme comes in the form of a flipchart that is used by a health care professional, community health worker or HIV counsellor to provide health education in a one-on-one format, using spoken language (National Department of Health South Africa, 2016). The programme covers chronic illnesses such as diabetes, hypertension, tuberculosis (TB) and HIV, and it includes both text and visual aids. Unfortunately, not much has been documented about how it was developed or how the visual aids were selected. Furthermore, since no known studies have considered the effectiveness of the NDoH's health education programme for persons with low literacy, the researcher used this NDoH programme to appraise the degree to which the use of visual aids was able to facilitate the understanding of HIV health information among persons with low literacy.

1.3. Terminology

The following terms are used frequently in this study and are therefore defined in detail.

1.3.1 Augmentative and Alternative Communication

Augmentive and alternative communication (AAC) is a field of clinical practice that aims to enhance communicative competence for persons with little or no functional speech (LNFS) (Lloyd, Fuller, & Arvidson, 1997) by replacing or augmenting natural speech and/or handwriting. AAC includes aided approaches (such as the use of alphabet or picture communication boards, speech-generating devices); as well as unaided approaches (such as the use of gestures and signs from sign language). A broad range of unaided and aided methods are used in AAC, and graphic symbols form a very important component of aided AAC systems (Basson & Alant, 2005; Fuller & Lloyd, 1997; Fuller, Lloyd, & Stratton, 1997). Selecting graphic symbols (also referred to as visual aids in this study) are one of the most important considerations when implementing AAC.

One AAC strategy used in this study is 'augmented input', which refers to the use of spoken and written words to enhance the comprehension of spoken communication messages. Although these are typically used for individuals who are unable to speak (Wood et al., 2009), in the current study, augmented input was used during the experimental task to enhance participants' comprehension of the NDoH's health education programme.

1.3.2 Comprehension

Comprehension refers to the process of understanding a language (Lloyd et al., 1997). This understanding is demonstrated when the listener, an use the content to make meaning of the input of the speaker (Long, 1983). In this study, comprehension is synonymous with the understanding of health information and entails processing health information and the ability to recall (Houts et al., 2006) the information at a later stage (Carstens & Snyman, 2001).

1.3.3 Dependent variable

A dependent variable is defined as a variable whose value or effect depends on that of the independent variable, i.e., the consequence (Field, 2013; McMillan & Schumacher, 2011). In this study, the NDOH's health education programme – specifically the HIV section – was the dependent variable that involved participants' understanding of HIV health information. During the experimental task, participants' ability to respond accurately to questions of the pre-test post-test questionnaire was evaluated. The score obtained was therefore an indicator of the understanding of HIV health information among persons with low literacy.

1.3.4 Health care professional

The term health care professional will be used in this study to refer to any health care personnel, providers or worker who provides a variety of health services (Republic of South Africa, 2004) to persons within the private or public health sectors (Coovadia et al., 2009; Hall, Ford-Ngomane, & Barron, 2005). These services include those rendered by doctors, nurses, allied health professionals, pharmacists, health scientists and counsellors (Mophosho, 2018; Republic of South Africa, 2004;van den Berg, 2016). (Republic of South Africa, 2004)(Republic of South Africa, 2004)(Republic of South Africa, 2004)(Republic of South Africa, 2004)(Republic of South Africa, 2004).

1.3.5 Health education

The World Health Organization (WHO) defines health education as a form of messaging for learning that aims to increase individuals' and communities' knowledge and influence their attitudes (WHO, n.d.). Health education is provided to help people to promote, improve and control their health; hence it is also known as health promotion (World Health Organization Western Pacific Region, 2017). The health education programme used in this study will be the National Department of Health education programme (NDoH, 2016)

1.3.6. Health information

Information that enables one to understand, engage and manage their health condition (Ishikawa & Yano, 2008; Zukoski, Thorburn & Stroud, 2011). This information can either be obtained through written health education materials (Mwingira & Dowse, 2014; van Beusekom et al., 2018) or from a health care providers (Seth C. Kalichman, Cherry, & Cain, 2005; Kim & Lee, 2016).

1.3.7 Health literacy

Health literacy refers to a set of cognitive and social skills that determine one's ability and motivation to seek, understand and use information to promote one's own health and well-being (Ishikawa & Yano, 2008). Low health literacy refers to an inability to follow medical guidance or make the necessary changes to improve one's health (Lambert & Keogh, 2014).

1.3.8 Iconicity

Iconicity is one of the considerations mainly used to describe symbols in the field of AAC (Fuller & Lloyd, 1997; Evans, Bowick, Johnson, & Blenkhorn, 2006). The term refers to any type of association formed by a viewer to link a symbol (visual aid) and its referent (the intended idea) (Dada, Huguet, & Bornman, 2013; Evans et al., 2006). Iconicity exists on a continuum, with transparency at one end and opaqueness at the other (Dada et al., 2013; Haupt & Alant, 2002). Iconicity was utilised in this study to evaluate the iconicity of the visual aids used in the NDoH's health education programme.

A visual aid is considered transparent when there is a strong association between the visual aid and its referent, and when the visual aid is highly suggestive of its referent – thus, the meaning can be easily understood without additional cues (Blischak, Loncke & Waller ,1997). In some studies, the transparency of a symbol (visual aid) is also known as its guessability. According to the International Organization for Standardization (ISO), a visual aid is transparent if it is guessed correctly by at least 67% of participants (ISO, 2014). While the American National Standards Institute (ANSI) requires at least 85% comprehension, the ISO standard of 67% correct responses was used in this study.

A symbol (visual aid) is said to be translucent when the perceived relationship between the symbol and its referent is not readily guessable but can be recognised once its meaning is revealed (Bornman, Alant, & Du Preez, 2009; Dada et al., 2013). In line with the ISO standards, Bethernet et al. (2016) suggest that visual aids (symbols) that receive translucency scores of 67% or above should be deemed as translucent. Therefore, in this study the visual aid was deemed to be translucent whenever the percentage of participants who said that it looked "a lot" like the intended idea was 67% or higher. When there is no

apparent relationship between the symbol and its referent, the symbol is considered to be opaque (Dada et al., 2013; Huguet, 2012).

1.3.9 Independent variable

An independent variable is a variable that is theoretically independent of all other variables in the population of interest (Bors, 2018), and it is defined as the variable that is manipulated by the researcher (McMillan & Schumacher, 2011). In an experimental task such as used in this study, the independent variable is the intervention given to the participants (Bors, 2018), in other words, the NDoH's health education programme (NDoH, 2016). This programme was developed by the NDoH with the aim of enhancing access to health care services, supporting adherence to chronic treatment, and improving clinical outcomes (NDoH, 2016). The programme also comes in the form of a flipchart, which was used for the intervention made in this study. The "Education on HIV and ART" section of the programme was utilised without alteration during the experimental task. The reason for using this section was due to the high prevalence of HIV in South Africa(Kharsany & Karim, 2016; Shisana et al., 2014) and the emphasis that the NDoH places on adherence to treatment for persons living with HIV (NDoH, 2016).

1.3.10 Literacy

Literacy is traditionally understood as the ability to read and write (Gee, 1998). It is understood that literacy allows a person the ability to acquire certain knowledge or understanding (Gee, 1998) and it is shaped by factors such as culture, identity, power, and the prevailing sociocultural contexts (Perry, 2012). Low literacy is defined as the inability to write or use numbers effectively (Pignone et al., 2005) and with insufficient proficiency to achieve one's goals (DeWalt al., 2004; Easton et al., 2010). In the present study, a person with low literacy was seen as a person who had less than seven years of formal schooling, in other words who had not passed Grade 7 (Chuang, Lin, Wang, & Cham, 2010; Richler et al.,2012)

1.3.11 Visual aids

Visual aids refer to any pictorial, photographic, standardised graphic symbols (Katz et al., 2006) and line drawings that can facilitate the establishment of joint attention or understanding of a particular shared concept (Nunes, 2008; Staunton, 2015). In this study visual aids refer to the images used in the NDoH HIV health education materials.

1.4. Abbreviations

AAC	:	Augmentative and Alternative Communication
ANSI	:	American National Standards Institute
ART	:	Antiretroviral Treatment
ARV	:	Antiretroviral
CBO	:	Community-Based Organisation
CHW	:	Community Health Worker
CTML	:	Cognitive Theory of Multimedia Learning
DCT	:	Dual Coding Theory
DV	:	Dependent variable
HIV	:	Human Immunodeficiency Virus
I-ACT	:	Integrated Access to Care and Treatment
ISO	:	International Organization for Standardization
IV	:	Independent variable
KZN	:	KwaZulu-Natal
LMICs	:	Lower and Middle-Income Countries
NDoH	:	National Department of Health
NGO	:	Non-governmental organisation
PHC	:	Primary Health Care
SPSS	:	Statistical Package for the Social Sciences

1.5. Outline of chapters

The following section provides a brief overview of each chapter of the thesis.

Chapter 1 of this study presents the problem statement and rationale. Chapter 1 also includes the definitions for frequently used terms and an explanation of abbreviations used. In addition, an outline for the chapters in the thesis is provided.

Chapter 2 provides a review of the literature with regard to persons with low levels of literacy within health care settings. A systematic search of reviews on persons with low literacy and low health literacy is discussed with the aim to summarise the evidence from intervention strategies used on such persons. Thereafter, a synthesis is outlined of the findings that emerged from a scoping review on interventions that used visual aids in health education programmes for persons with low literacy. The synthesis of findings outlines participants, study designs, methods, the development and type of visual aids, as well as the aims and findings of the studies. Finally, some theories of information processing are discussed, specifically dual coding theory and cognitive theory of multimedia learning, in order to provide a framework for the study.

Chapter 3 deals with the pre-experimental phase of the study. The chapter outlines the development of the pre-test post-test questionnaire, the expert panel review, as well as the translation of the materials. The training process of the research assistants is discussed and recommendations for the main study from the pilot study are outlined.

In Chapter 4, the experimental phase of the study is described. This chapter also provides an overview of the methodology used for both the experimental and iconicity tasks in this phase. The main and sub-aims of the study, the research design, research setting, and participant selection criteria are also shared. Then the research sites, recruitment procedures and materials for both the experimental and iconicity tasks are outlined. The general data collection, reliability and data analysis procedures for each task are also discussed.

Chapter 5 describes the results of the experimental and iconicity tasks carried out in the experimental phase. First, the experimental task results are discussed based on hypotheses that address the study's sub-aims. This includes assessing each of the three experimental

groups in terms of their performance on the pre-test post-test questionnaire and then comparing the performances within and between the three groups. The results of the iconicity task are then presented in terms of the transparency and translucency of the visual aids used in the NDoH's health education programme.

Chapter 6 discusses the results as presented in Chapter 5. The findings of the experimental task are discussed in accordance with how hypotheses conclusions inform the study's sub-aims. Possible reasons for the results are proposed and relevant literature is cited to support these explanations. The results of the iconicity task are also discussed, together with possible reasons for the findings on the transparency and translucency of the visual aids used in the NDoH's health education programme. The discussion is used to pave the way for possible conclusions.

Chapter 7 summarises the findings of the study, states their clinical implications and offers recommendations for future research. This is followed by a critical evaluation of the strengths and limitations of the study.

CHAPTER 2
LITERATURE REVIEW

2.1. Introduction

This chapter offers a critical review of the literature pertaining to the current health education strategies used in programmes for persons with low literacy. The chapter begins with a synthesis of systematic reviews dealing with low health literacy with a view to summarising the impact of low literacy on health literacy. Next, the chapter discusses a scoping review of interventions that used visual aids in health education programmes for persons with low literacy. The chapter ends with a discussion of the theories of information processing, and the role of visual aids in the learning and understanding of health information in persons with low literacy.

2.2. Low literacy in health care

In South Africa, 13.7% of the population either have no formal schooling or have a level of education lower than Grade 7 (Statistics South Africa, 2017a). Despite an increase in the number of children aged five years or more who are enrolled in schools (Grades 1-12) (Statistics SA, 2016; 2017b), the number of persons between the ages of seven and fifteen, who remain enrolled and get to complete primary school tends to drop rapidly (Statistics SA, 2017b). In this study, low literacy is understood as when a person has not completed more than seven years of formal schooling, i.e. lower than or equal to Grade 7 (Aitchison & Harley, 2006; Carstens, 2007).

Low literacy leads to poor health literacy, which is the inability to understand and take action from health information received (Lambert & Keogh, 2014; Nouri & Rudd, 2015). Since the majority of persons with low literacy are utilisers of the public health system in South Africa, Coovadia et al. (2009) assert that a dual burden exists where the system caters for persons with low literacy who also have low health literacy. Since health literacy is a strong predictor of health outcomes such as adherence to long-term therapies (Grebler, Eaton, Cruess, Detorio, & Angela, 2014; Mwingira & Dowse, 2014), the dual burden indicates the need for health education programmes that are specialised for persons with low literacy.

Furthermore, although low health literacy is an important indicator of self-care, it can be argued that low health literacy should not only be attributed to low literacy levels (Al Sayah et al., 2010). A person may have high functional literacy and still have low health literacy (Easton et al., 2010), so the levels of one's health literacy may vary depending on the situation. For example, when confronted with new and complex health information (about a disease and important diet or nutrition information), most people experience health literacy limitations despite a high literacy level (Houts et al., 2006). This complexity might be the reason why the NDoH developed the current guidelines for linkage to care, adherence and retention to care, based on I-ACT (National Department of Health: South Africa, 2016). Both I-ACT and NDoH's health education programme focus mainly on empowering persons who have been newly diagnosed with HIV with information that they need to know on the disease and treatment (James et al., 2018; National Department of Health: South Africa, 2016). As such, a recent study found that young people (aged 12-24 years) who had undergone I-ACT programme reported that the programme supported their health needs and promoted engagement with health care professionals and their peers (James et al., 2018).

Concerns about health literacy are escalating, considering that the suitability of most current health education materials for the end user is being questioned (Zellmer et al., 2015). Many of the current health education materials such as pamphlets, take-home leaflets, medicine instructions or labels are designed by health professionals and researchers (Park & Zuniga, 2016), which often means that these materials are not suitable for persons with low literacy (Williams et al., 2016).

In order to address the impact of low literacy on health literacy, guidelines have been proposed for the readability of health materials for persons with low literacy (Friedman, Cosby, Boyko, Hatton-Bauer, & Turnbull, 2010). These guidelines recommend that health education materials should have a readability level that suits readers with limited years of schooling (Badarudeen & Sabharwal, 2010; Brown, Skinner, Ashley, Reed, & Dixon, 2016). However, it has also been noted that reducing the difficulty level and enhancing the readability of materials alone do not have a significant effect on health knowledge (Brown et al., 2016). Hence, together with enhanced readability, it has been suggested that interventions for persons with low literacy should utilise alternative methods such as visual aids (Houts et al., 2006; Pignone et al., 2005). Visual aids are defined as a range of simple black-and-white

or colour pictograms, pictures, drawings, or photographs (Park & Zuniga, 2016; van Beusekom et al., 2018).

2.3. A synthesis of reviews on persons with low literacy or low health literacy

Due to the strong correlation between low literacy and low health literacy, a systematic search was conducted to synthesise the evidence from reviews conducted on persons with low literacy and low health literacy. The search terms used for the systematic search were selected from other studies on persons with low literacy and low health literacy levels. Synonym functions and the MeSH (Medical Subject Headings) terms of databases were also used after consultation with subject librarians. The search terms used in the current study are outlined in Table 2.1.

Table 2.1

Search terms – reviews on persons with low literacy and low health literacy

Component	**MeSH**	**Non-MeSH**
Literacy	Achievement OR Education Status OR Education OR Literacy OR Health Literacy **AND**	Low Literacy OR Literac* OR Illit* OR Limited Literacy OR Functional Literacy OR Easy Read OR Readability OR Health Literacy AND
Reviews	Systematic Review OR Scoping Review OR Narrative Review OR Meta-Analysis	Systematic Review OR Scoping Review OR Narrative Review OR Meta-Analysis

The inclusion and exclusion criteria used in the systematic search are outlined in the table below.

Table 2.2

Inclusion and exclusion criteria – reviews on low literacy and health literacy

Criterion	**Include**	**Exclude**
Exposure	Health education/literacy programmes/intervention aiming to assess, improve health literacy or outcomes Reduced readability for persons with low literacy	Programmes designed for health care professionals, medical practitioners/ students who interact with persons with low literacy
Publication type	Systematic, scoping, or narrative review, meta-analysis	Literature review

The six databases that were searched included Africa Wide Information, Education Resources Information Centre (ERIC), PsychInfo, Cumulative Index to Nursing and Allied Health Literature (CINAHL), MEDLINE, PubMed. The search was conducted in October 2017 and updated in February 2018.

Figure 2.1 shows the results obtained from the search and the process followed in selecting records that met the selection criteria. The set of search terms rendered 678 journal articles from which 34 duplicates were removed. The remaining 644 journal articles were all included in the screening process, at the title and abstract level, using the criteria stipulated in Table 2.2. A total of 598 reviews were excluded and a total of 46 full-text reviews were then assessed to be eligible for full-text screening. Of these, a total of 33 journal articles were excluded as they did not focus on persons with low literacy or health education programmes or interventions. Finally, 14 were included in the review report as outlined in Figure 2.1. The studies' summaries are found in Appendix A.

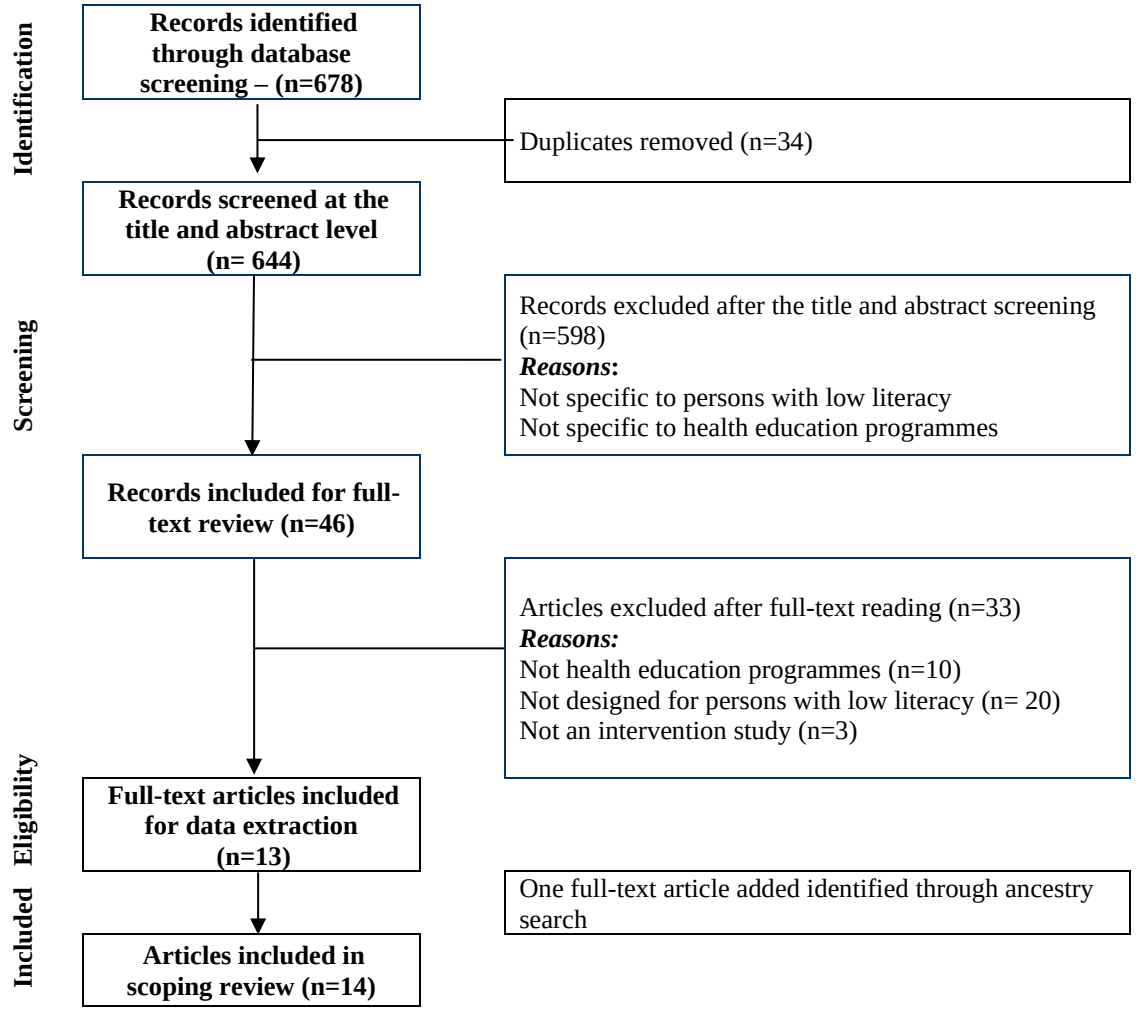


Figure 2.1: PRISMA flow Diagram of searches on Systematic reviews on low literacy levels and low health literacy (Moher, Liberati, Tetzlaff, Altman, & Group, 2009)

2.3.1. Defining low literacy and low health literacy

Literacy is a key construct in this study since it is a universal skill that is used by everyone in the same way (Rumsey, 2018). Moreover, literacy is an important skill that allows one the ability to acquire knowledge or understanding (Gee, 1998). Therefore, in this study it was deemed important to clearly define the two types of literacy, which were the focus of this systematic search.

Regarding low literacy, only two of the 14 reviews provided a definition for this phenomenon. In one review, low literacy was defined as the inability to read, write or use numbers effectively (Pignone et al., 2005, p. 185). This definition was expanded by Easton et al. (2010) who stated that this inability was synonymous with functional illiteracy, which is the "inability to read, write and speak, and to use mathematics at a level necessary to function at work and in society in general" (Easton et al., 2010).

Health literacy, on the other hand, was referred to as the cognitive and social skills (Al Sayah, Fatima Majumdar, Williams, Robertson, & Johnson, 2012) that determine an individual's ability to gain, understand or evaluate health information (Delgado & Ruppar, 2017; Park & Zuniga, 2016; Wali, Hudani, Wali, Mercer, & Grindrod, 2016) and to use health information to promote good health (Taylor, Fraser, Dudley, Oniscu, & Tomson, 2017; Williams et al., 2016). These definitions further emphasise the fact that health literacy is "a set of skills needed to function in the health care environment" (Al Sayah et al., 2012, p. 444). It was apparent in these reviews that the terms low literacy and low health literacy were used interchangeably.

Furthermore, some reviews also referred to measures for health literacy as a proxy for literacy levels (DeWalt, Berkman, et al., 2004). Health literacy measures used in the reviews had varied focus. For example, the Rapid Estimate of Adult Literacy in Medicine (REALM) focuses on scoring word recognition, the Test of Functional Health Literacy in Adults (TOFHLA) and its shortened version (s-TOFHLA) focus on reading comprehension and numeracy skills (Keller et al., 2008), while other tests like the Wide Range Achievement Test (WRAT) and Newest Vital Sign (NVS) have a major focus on numeracy (Keller et al., 2008). These health literacy measures therefore focus on reading comprehension and numeracy test scores which translated to participants' level of education i.e. the REALM, which depends on participants reading a list of 66 words out loud in English and Spanish (Pander Maat, Essink-Bot, Leenaars, & Fransen, 2014).

2.3.2. Synthesis of findings that emerged from the systematic reviews (N=14)

The systematic reviews appeared to have two distinct foci: studies that focused on exploring the relationship between literacy and health outcomes (n=7), and those that looked at the effect of intervention strategies on improving health outcomes (n=7).

2.3.2.1. Systematic reviews on the relationship between low literacy, health literacy, and health outcomes

In their review, DeWalt, Berkman et al. (2004) found that 16 studies reported a positive and significant relationship between reading ability and the use of health care knowledge. Similarly, Malloy-Weir and Cooper (2017) found a positive relationship between reading ability and understanding of nutritional label information. Another review by Berkman et al., (2011) reported that low health literacy was associated with poor ability to understand or follow medical advice, and poor health outcomes. The positive and significant relationship between reading ability, health literacy, and improved health outcomes implied that some of the health education materials used in these reviews could afford persons with low literacy the ability to understand health information (DeWalt, Berkam, et al., 2004).

An review by Pignone et al. (2005) that targeted behavior change, found that the intervention had no effect on medication adherence and use of preventative care services. This was similar to the findings in the review by DeWalt, Berkman et al., (2004), which indicated a non-significant effect on health literacy adherence and diabetes care. One of the reasons for this lack of an effect could be the fact that most interventions for persons with low literacy had focused on medicine-taking instructions or labels (Dowse & Ehlers, 2005) and were therefore passive in nature, requiring no action from the patient (Wali et al., 2016).

Research suggests that interventions targeting health literacy outcomes related to chronic illnesses such as diabetes and HIV need a more interactive strategy (Dyrehave et al., 2016; Al Sayah et al., 2012). Such interventions, which foster understanding, are critical for a context like South Africa where diseases like HIV require education on health-promoting and risk-reducing behaviors (Audet, Salato, Vermund & Amico, 2017). Intervention strategies will be discussed in the next section, followed by a look at the systematic reviews that focused on the effect of intervention strategies on improving health outcomes.

2.3.2.2. The effect of intervention strategies on improving health outcomes

A total of seven reviews determined the effectiveness of intervention strategies that had been designed to improve health outcomes for persons with low literacy. The authors of these reviews suggested strategies such as adjusting the layout of the text and illustrations in a way that would simplify it for targeted readers to understand the message (Sutherland & Isherwood, 2016). Hence, they generally agreed that health education materials for persons

with low literacy should read at 6th grade level (Schubbe et al., 2018; Williams, Muir, & Rosdahl, 2016). One review highlighted the need to reduce the Flesch-Kincaid readability rating of health education materials, where the lowering of readability level from the tenth to the sixth grade was found to increase the suitability of the materials for persons with low literacy (Williams et al., 2016).

Among the reviews looking at intervention strategies there were also those that categorised the effect of different types of interventions in order to assess which were most effective and why (n=4). In the review by Wali et al. (2016), interventions for improving knowledge about medication and adherence were categorised as six forms, namely i) written; ii) verbal; iii) visual supports; iv) medicine bottle labels; v) reminder systems; and vi) educational programmes and services. It was noted that the most effective interventions were those that included visual aids to enforce written information (Wali et al., 2016).

Similarly, Kim and Lee (2016) synthesised the findings of thirteen studies related to four interventions for persons with diabetes and low literacy. Their review concluded that the three most effective interventions were "written communication" (easy-to-read patient education materials) for improving cognitive and psychological outcomes such as health knowledge, "spoken communication" (conversations between patients and the health care professional) for discussing experiences with illness, and "empowerment" (delivered verbally by a trained health care professional) for improved self-care and self-management behavior (Kim & Lee, 2016). The effectiveness of empowerment interventions highlighted the effective strategy of the involvement of the health care professional in emphasizing health education.

To further denote the effects of different types of interventions, (Sheridan et al., 2011) described mixed interventions as those utilising simplified written materials, pamphlets, comparison charts, video tutorials, oral overviews, and simplified consent forms. Mixed interventions had a positive effect on self-management, health knowledge, and self-efficacy (Sheridan et al., 2011), and they were more inclined to influence behavior change. The authors (Sheridan et al., 2011) attributed this positive effect to the presence of visual aids and the lower readability level of the consent forms used, both of which are strategies that were considered useful in this study (Sutherland & Isherwood, 2016).

The findings on the effectiveness of visual aids were further supported by the findings of Park and Zuniga (2016), who evaluated the effect of picture-based health education materials for persons with low literacy. They stated that in ten out of eleven studies a positive effect was reported on the management of heart failure, understanding of health education materials, and recall of medication instructions (Park & Zuniga, 2016). The review by Park and Zuniga (2016) has been echoed by other reviews that assess the characteristics and effectiveness of visual aids for health information on patient and consumer health behaviors and outcomes among individuals with low literacy and low health literacy (Schubbe et al., 2018).

Interventions targeting behavior change that were deemed effective were those that attempted to involve the patient to promote adherence behavior (Wali et al., 2016). A review by Lee and others (2012) aimed to identify effective intervention strategies to improve health outcomes in patients with cardiovascular disease and low literacy skills. This review emphasised that tailored counseling, which involved individuals discussing their health with a health care practitioner, was an effective strategy for the improvement of behavior change in low literacy patients with cardiovascular disease. The success of this intervention strategy was attributed to its ability to give both the health care professional and patient the opportunity to engage, and to enhance the latter's understanding of health information.

The findings from the above systematic search highlight the positive effects of the reduced readability level of materials (Williams et al., 2016), the use of visual aids (Park & Zuniga, 2016; Wali et al., 2016) and the inclusion of health care professionals in providing verbal health education (Lee, Kang, Lee, & Hyun, 2009; Sheridan et al., 2011). These factors had the best effects on health education programme outcomes for persons with low literacy or low health literacy. Following this, the researcher wanted to specifically map out the types of interventions that had used visual aids for persons with low literacy. This was done through a scoping review, which is suitable for summarising what was already known about the topic and the directions in which literature was pointing (Grant & Booth, 2009; Schlosser, Wendt, & Sigafoos, 2007)

2.4. Visual aids in health education programmes for persons with low literacy

While Park and Zuniga (2016) completed an integrated review on the effectiveness of using picture-based health education materials for people with low health literacy, their

review did not provide a comprehensive summary of all such interventions. Another shortcoming of their review related to the incompleteness of the search terms used (they did not include the broader term "visual aids") and the surprising fact that the majority of the studies reported on were from the United States (Park & Zuniga, 2016). This implies that the report could have excluded papers from Low Middle Income Countries (LMICs), which are known to have higher populations of persons with low literacy.

The scoping review by Mbanda, Dada, Bastable, Gimbler-Berglund and Schlosser (submitted) aimed at examining the extent, nature, and range of interventions that used visual aids in health education programmes for persons with low literacy and specifically included studies from LMICs. Selection of the studies followed the framework of Arksey and O'Malley (2005), which included i) identifying the research question, ii) identifying the relevant studies, iii) selecting the studies to report on, iv) charting and collating the data, and then finally, v) synthesising and reporting the results.

2.4.1. Identifying the relevant studies

The search terms and selection criteria that were used to identify relevant studies are discussed in more detail below.

2.4.1.1. Search terms

The search terms used in this scoping review were selected in consultation with subject librarians at the University of Pretoria. Both the thesaurus synonyms functions and MeSH terms for databases were utilised in refining the terms. The search terms were outlined as *population*, *intervention*, and *outcome* to allow the inclusion of a variety of the desired studies and avoid premature elimination of studies. Table 2.3 indicates the search terms used in this review.

Table 2.3

Search terms for interventions using visual aids in health education for persons with low literacy

Criteria	Component	MeSH	Non-MeSH
Population	persons with low literacy	Education status OR achievement **AND**	low literacy OR literac* OR illit* OR limited literacy OR functional literacy OR non-literate AND
Intervention	visual aids	Audio-visual aids OR Art **AND**	visual aid* OR pict* OR graphic symbol* OR photogra* OR image OR animat* OR communication support OR visualisation OR cartoon OR illustration AND
Outcome	health education	Health literacy	health OR health literacy OR health education OR health information OR HIV education OR AIDS education OR cancer education OR diabetes education

An electronic search was conducted on the six databases namely Africa Wide Information, Education Resources Information Centre (ERIC), PsychInfo, Cumulative Index to Nursing and Allied Health Literature (CINAHL), MEDLINE, PubMed. The number of databases searched met the recommended minimum number of databases for a systematic review (Schlosser, Wendt, & Sigafoos, 2007). These databases were selected due to their frequent use in prior systematic reviews and the need to encompass databases that include research from LMICs. The search was conducted in March 2018. The selection process was carried out on Covidence, a web-based software application tool that enables efficient production of systematic reviews (Veritas Health Innovation, n.d; May, Dada, Murray, & May, 2019). The systematic selection process outlined will be reported in Figure 2.3.

2.4.2. Study selection

To initiate a streamlined study selection process, electronic studies were exported to Covidence via an emailed Research Information Systems (RIS) link. Once the duplicates were removed using Covidence, the screening of studies commenced at title and abstract level, using pre-defined criteria outlined in Table 2.4. Two independent reviewers (the researcher and the main supervisor) applied the criteria at abstract, title and full-text level. Initial agreement or disagreements were auto-calculated by the system as each independent reviewer had their own account and login details linked to the review. In the and consensus (100% agreement) was reached regarding the final inclusion and exclusion of full-text articles to be reviewed.

Table 2.4

Inclusion and exclusion criteria – Interventions using visual aids in health education programmes for persons with low literacy

Criteria	Inclusion	Exclusion
Age	Persons over the age of 18 (Statistics South Africa, 2015)	Participants under the age of 18
Population	Participants with inadequate, marginal, functional illiteracy, or low health literacy	Literate adults
Intervention	Visual aids (any pictorial or photographic symbol or system that can facilitate the establishment of joint attention or understanding of a particular shared concept (Nunes, 2008). Visual aids included a range of simple black-and-white or colour pictograms, pictures, drawings, or photographs (Park & Zuniga, 2016; van Beusekom et al., 2018).	Visual aids/images used for diagnostics and screening, e.g. X-rays Scans Readability, reading level assessments, video conferencing, audiotaped sessions, theatre, poetry, dance
Outcome	Health education programmes or interventions aiming to assess and improve health information, the understanding/comprehension/recall of health information or the clinical outcome for persons with low literacy	Health campaigns (large gatherings or outreach programmes that address a health issue or topic such as teenage pregnancy, smoking, cancer, etc. through awareness talks or community dialogues Television, radio, billboard or social network adverts Billboards
Design	Qualitative, quantitative or mixed methods	Systematic/scoping/literature/narrative reviews
Publication type	English Peer-reviewed studies	Non-English articles Grey literature
Year of publication	From 2001 – 2018	

2.4.3. Charting and collating the data

Data was extracted according to the aims of the review – i.e. to summarise and synthesise data extracted – into a predetermined form covering author, title, country, population, aims and design, visual aids, visual aid development, low-literacy definition and assessment, health-literacy definition and assessment, measurement of consent, targeted outcomes and results.

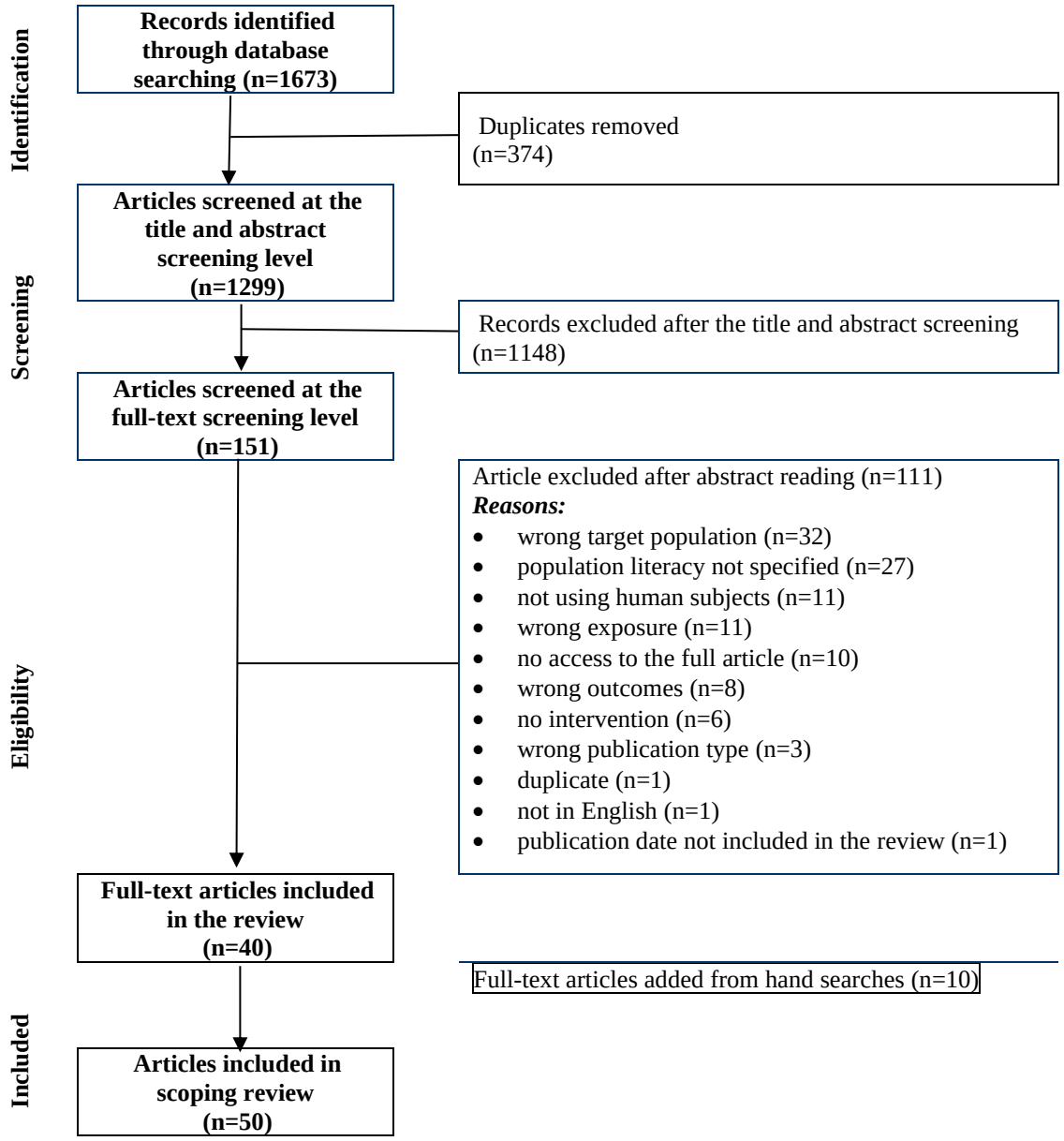


Figure 2.2. PRISMA flow diagram: Studies using visual aids for health education for persons with low literacy levels

Adapted from (Moher et al., 2009)

Figure 2.3 describes the number of studies that were initially identified through database searches. The initial search rendered 1673 records. After duplicates were removed, 1299 studies remained for screening. Screening of these 1299 articles at the title and abstract level commenced. The exclusion of 1148 records resulted in 151 articles being screened at full-text review level. A total of 111 were again excluded, resulting in 40 articles being included in the review. An additional 10 articles that were identified and included through ancestry and hand searches resulted in a total of 50 studies in the review. A summary of the findings from the 50 studies included in the study is found in Appendix B. A synthesis of these findings is discussed next.

2.4.4. A synthesis of the scoping review results

The majority (n=36) of the studies in the review were from in high-income countries, with only 14 from LMICs (The World Bank, 2019). This was an increase in the number of studies from other countries other than the US; when compared to the Park and Zuniga (2016) review which only had one study from South Taiwan and three from South Africa (LMIC).

2.4.4.1. Population

Participants' ages in these studies ranged between 18 and 91 years, with many studies including persons 60 years and above (n=31). Interestingly, participants' low literacy levels were only defined in five studies (Carstens, Maes, & Gangla-Birir, 2006; Chuang, Lin, Wang & Cham, 2010; Gerber et al., 2005; Kripalani et al., 2008; Meppelink, Weert, Haven, & Smit, 2015). The most frequently used criterion for low literacy was the level of education or number of schooling years completed.

Participants' levels of education ranged from 0-11 years of education because some studies included participants with high literacy levels or professionals as control or comparison groups. The participant descriptions in the studies did not differentiate between them based on age.

2.4.4.2. Study design and sampling

Twenty studies did not specify the research design. However, the number of randomised controlled trials (RCTs) (n=13) was encouraging since this type of design is associated with a highly reliable argument for the causal effect of the independent variable on

the dependent variable, through its ability to control for extraneous variables (Dowse, Barford, & Browne, 2014; Kalichman et al., 2013). The most frequently used types of sampling techniques though were convenience and purposeful sampling, and this indicated the deliberate nature of the studies to include persons with low levels of literacy. Purposive sampling was also used to select participants in the current study.

2.4.4.3. The aims of the studies reviewed

The reviewed studies focused on the development, design and evaluation of visual aids (n=30), preference of visual aids between persons with different literacy levels (n=6), the comparative effects of using both text and visual aids versus text-only interventions (n=10) and the acceptability of visual aids (opinion regarding the ability to convey the intended message) (n=4). The variety in aims produced findings that gave insight for future direction in the development and execution of visual aid interventions for persons with low literacy. These recommendations are outlined in Chapter 7.

2.4.4.4. Development and types of visual aids

A description of the visual aids used in the interventions was provided in 41 of the studies (see Appendix B). Visual aids were primarily pictograms, i.e. black-and-white illustrations or line drawings usually used in pharmaceutical or prescription labels (Kheir et al., 2013). Other visual aids included animated videos, computerised or art images, fotonovella and various forms of multimedia such as presentations with various forms of visual aids. More than half of the studies did not provide details of how stakeholders were involved in the development of visual aids. In the studies that provided details of stakeholder engagement, this was done primarily through interviews (Berthenet, Vaillancourt, & Pouliot, 2016; Yong et al., 2018) and focus groups (Dowse et al., 2010; Kandula et al., 2009). The involvement of stakeholders in the development of visual aids is seen as key in enhancing the effectiveness of health education programmes for persons with low literacy (Roberts, Evans, Blenkhorn, & Partridge, 2010).

The studies on the design of visual aids investigated the role of attributes such as abstractness and visual aids relating to human anatomy for persons with low literacy. When Hwang, Tram and Knarr (2005) assessed the effect of adding visual aids on comprehension of medication instruction labels, they found that even commonly used medical illustrations could be ambiguous and misleading. The ambiguity could be related to the fact that study

participants with both high and low literacy struggled to recognise abstract images such as non-human and abstract objects, and this was worse for persons with low literacy than for their more literate counterparts (Carstens et al., 2006). Furthermore, both persons with low and high literacy recognised visual aids that depicted HIV information that was more familiar to an embodied experience than information that was represented as an isolated or unfamiliar object (Carstens et al., 2006).

Persons with low literacy struggled to comprehend illustrations of certain organs such as the stomach when they did not have knowledge of human anatomy (Hwang, Tram, & Knarr, 2005). On the other hand, persons with low literacy recognised visual aids representing HIV/AIDS information within a human body, much more easily than persons with high literacy (Carstens et al., 2006). Also, van Beusekom et al et al.,2015) found that pictographs of isolated organs (such as intestines, lungs and kidneys) were preferred and considered clearer to persons with low literacy when compared to pictographs depicting health information within the human body. In general, persons with low literacy were found to prefer visual aids depicting objects with which they were familiar (Bacardi-Gascon, Jimenez-Cruz, & Jones, 2002; Dowse et al., 2010).

Persons with low literacy often preferred pictograms depicting simple actions, but this depended on the type of information depicted and the concrete or abstract nature of the pictograph itself (Chuang, Lin, Wang, & Cham, 2010; Webb et al., 2008). This finding is similar to those of earlier reviews, which indicated that cartoons and matchstick line drawings were best for persons with low literacy levels, due to their simple layout. Complex illustrations might draw attention to irrelevant details (Delp & Jones, 1996; Houts et al., 2006). Videos were also seen to strengthen participants' decision making by decreasing their uncertainty regarding preferences in health care – especially for those with limited literacy (Volandes, Barry, Chang, & Paasche-orlow, 2014).

When exploring the acceptability of visual aids, Dowse and Ehlers (2001) compared pharmaceutical pictograms developed locally (in South Africa) with the set from the United States (US). They found that persons with low literacy better understood the medical instruction from the local set than from the US set (Dowse & Ehlers, 2001). Similarly, Poureslami et al. (2012) found that culturally appropriate visual aids had the ability to increase the knowledge and understanding of health information in persons with low literacy.

Both these studies reiterate the importance of cultural acceptability of visual aids as a way to increase their effectiveness (Ma, 2016), as well as to improve the ability of persons with low literacy to recall and understand information, while reducing ambiguity of health messeges (Katz, Kripalani, & Weiss, 2006).

When Roberts et al. (2010) used a pictorial asthma action plan, they found that the majority of participants could guess the meaning (guessability) of the pictograms and that most pictograms were deemed to represent their intended image well, once the meaning was revealed (translucency). This was gathered from the participants' ability to adequately recount the appropriate actions using the pictorial plan. Moreover, Berthenet et al. (2016) found significant differences in translucency scores among lower and higher educated participants. These findings further support the aims of the iconicity task of this study, which also assessed the transparency and translucency of the visual aids used in the NDoH's health education programme (see Section 2.5).

Some studies aimed to determine the differences in the effect of visual aids on a health outcome and to see which visual aids were more appealing to people with different educational backgrounds. For instance, Chuang et al. (2010) compared the different views regarding dimensions of preference and comprehension of pictographs of medical staff and persons with low literacy. They discovered significant differences in preference between persons with low literacy and medical staff, and different visual aids were considered appealing for the depiction of different pieces of health information. However, another study (Webb et al., 2008) found that participants of all literacy levels sought actionable language in the most simple and concise manner to communicate health information.

Nonetheless, (Bacardi-Gascon et al., 2002) found that both persons with lower (less than 10 years of formal schooling) and higher literacy (more than 10 years of formal education) were more inclined towards a nutrition image depicted in an apple rather than in a pyramid. Differences in preference for visual aids between persons of different literacy levels are important since the needs of persons with low literacy have largely been overlooked or concealed by the views of persons with higher literacy. According to Mbuagbaw and Ndongmanji (2012), the involvement of persons with low literacy is strongly suggested as a remedial action.

2.4.4.5 The effects of the visual aids on targeted outcomes

Some studies highlight the effects of visual aids on specific outcomes, including enhanced comprehension, adherence to medication instructions and improved health literacy (Dowse et al., 2014; Dowse, Ramela, & Browne, 2011). Choi (2013; 2015) investigated the acceptability and comprehension of discharge instructions and found that pictograms were quite effective for comprehension and recall of health information among persons with low literacy. This success was attributed to the ability of pictograms to depict complex information in a form that is easily understood by persons with low literacy (Choi, 2012). Pictograms were consequently deemed the best type of visual aid for the comprehension of health information by persons with low literacy (Park & Zuniga, 2016).

In the study by Kalichman et al. (2013), which examined a pictograph-guided adherence skills building counseling intervention for limited literacy adults living with HIV, pictogram adherence counseling mitigated for the presence of lower literacy levels. However, this was for participants with marginal literacy (85-90% comprehension) who showed greater benefit from the pictogram-guided counseling than from general health improvement counseling. In contrast, lower literacy participants (≤85% comprehension) demonstrated greater adherence to the general health improvement counseling offered than those who received pictograph-guided and standard adherence counseling. However, lower literacy participants in the pictograph-guided and standard counseling conditions used more adherence strategies than those in the health improvement condition (Kalichman et al., 2013). Similar findings were made in studies that reported improvement in participant health knowledge from nurse-delivered interventions using visual aids (Gupta, 2009; Huggins & Phillips, 1998).

Dowse et al. (2011) and Kalichman et al. (2013) concluded that patients with low literacy benefited from interventions that used visual aids health education that was particularly implemented by trained health care professionals. Their findings support earlier research that suggests tailored counseling and empowerment as effective strategies for behavior change outcomes (Lee et al., 2009). The effects on targeted health outcomes were measured using mostly interviews (n=25) and questionnaires (n=9), both of which are methods that were employed in the experimental task of the research study in hand. This is because interviews have a higher response rate with non-readers or persons with low literacy.

2.4.4.6 Comparison of visual aids, text and verbal instructions

The studies (Dowse et al., 2011; Kheir et al., 2013; Meppelink & Bol, 2015) that compared interventions using both visual aids and text with text-only education programmes found that participants who received discharge instructions comprising both text and visual aids were more satisfied with these than those who received standard discharge (text-only) instructions. Similarly, Dowse et al. (2011) found that participants who received pictogram-enhanced instructions recalled and understood more HIV/AIDS health information than those who received text-only instructions. This is in line with reviews that advocate for the combined use of text and visual aid interventions (Friedman et al., 2010).

Kheir et al. (2013) also found that medicine labels consisting of pictograms accompanied by verbal instructions achieved superior comprehension of instructions compared to text-only labels. Meppelink and Bol (2015) agree and highlight that for people with limited health literacy, attention to the pictographic illustrations during these interventions was what positively reinforced their attention to the health information they were presented with (Nelson & Reed, 1976). Despite this finding, other research has found that pictograms can over-simplify or distort information, leading to some confusion (Carstens, 2007).

The findings from the scoping review above elucidated that most studies focused on the development and design of visual aids and evaluated the effectiveness of visual aid interventions. They also highlighted the need for interventions using visual aids to be expanded beyond medicine-taking instructions. The focus in some studies on cultural acceptability of the visual aids was encouraging, as this is in line with the sub-aims of the current study and with research that promotes the involvement of the target audience in the development and evaluation of the visual aids as a means to maximise their effectiveness for various health outcomes. Moreover, the proposition to combine text, visual aids and auditory information is attributed to theories of information processing.

Theories of information processing explain the cognitive skills and tasks required for problem solving (Simon, 1987). These theories focus on the idea that humans do not merely take in the information received from the environment, but rather, they respond to and process the information (Baddeley, 1983; Mayer, 2001). Theories of information processing have often been used to explain adult learning (Mayer, 2001). Some of these theories that are

discussed next include the unimodal learning theory (Gellevij, Meij, Jong, & Pieters, 2002), Mayer's cognitive theory of multimedia learning (Mayer, 2001) and Paivio's (1969) dual coding theory. The latter two theories are associated with the dual mechanism that explains the processing of text messages that are augmented by visual aids and auditory input. Baddeley's (1983) working memory model will also be discussed to highlight the exact processes that facilitate the formation of short- and long-term memory.

2.5. Theories of processing health information containing visual aids

The unimodal learning theory proposes that learning takes place through only one medium, usually text (Gellevij et al., 2002). This is in contrast to Mayer's cognitive theory of multimedia learning that opposes the unimodal assumption, namely that humans process from one form of input, and puts forth that people learn better from a combination of verbal and non-verbal inputs (Mayer, 2001).

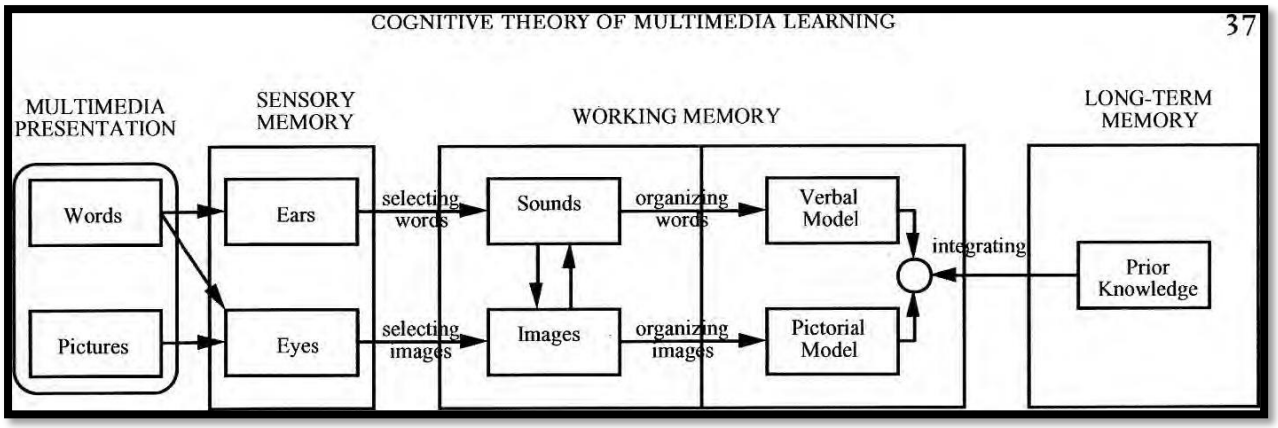


Figure 2.3: **Mayer's Cognitive Theory of Multimedia Learning**

Source: Mayer (2001, p. 37)

Mayer's cognitive theory of multimedia learning (CTML) (depicted in Figure 2.3) identifies dual channels of human information processing, namely verbal and non-verbal inputs. These channels are two modalities that process words and pictures respectively. According to Mayer (2001), active learning involves a co-ordinated set of cognitive processes that take place in working memory. Further integration of processed information from working memory, together with one's prior knowledge, leads to the formation of long-term memory. It is this long-term memory that is used to infer understanding in this study. Although it is acknowledged that remembering information may not mean that someone

understands the message, what is being implied through Mayer's (2001) CTML is that visual aids help the message to be retained long enough to be integrated with one's own knowledge. This increases the chances that the message makes sense to the person receiving the information.

Similarly, the dual coding theory emphasises that the verbal and the non-verbal inputs from the two modalities are processed separately (Paivio, 1969, 1980, 1986). The verbal modality processes 'logogens', which are usually delivered using speech words, i.e., they are auditory and articulatory (Clark & Paivio, 1991; Paivio, 1986). The non-verbal modality processes 'imagens', which are images and text (Paivio, 1986). The non-verbal inputs are important for this study, since it is suggested that a single mental image can evoke various meanings (Clark & Paivio, 1991).

Indeed, the dual and simultaneous processing from verbal and non-verbal inputs may enable persons with low literacy to map (Wood et al., 2009) and associate (Clark & Paivio, 1991) spoken health information to visual aids that are being pointed to. This strategy of simultaneously pointing to graphic symbols (visual) and speaking (auditory) is referred to as augmented input and is widely used in the field of augmentative and alternative communication (AAC) (Allen, Schlosser, Brock, & Shane, 2017; O'Neill, Light, & Pope, 2018). This same strategy was used during the provision of spoken health education information during the experimental task in this study.

The underpinnings of Mayer's (2001) cognitive theory, dual coding theory and augmented input were appropriate for aligning the health education programme in this study. However, neither of the theories (CTML and dual coding theory) explain the processes of working memory. They refer to the structures of processing but not to the functionality of the processes themselves. Baddeley (1983; 1992) describes the functional processes as working memory, which is a widely accepted model for understanding the cognitive performance of tasks such as reading, problem solving or learning (Baddeley, 1983; 1992; 2000).

Working memory comprises three sections (see Figure 2.4). The first section is the 'central executive' section, which is the core of the system and responsible for coordinating information of the two sub-systems. The two sub-systems are the 'visuospatial scratchpad', responsible for non-verbal representations, and the 'articulatory loop', responsible for verbal

representations (Baddeley, 1983). Baddeley posits that when verbal inputs (sounds) are integrated with old words in the articulatory loop, this creates short-term memory. Then, when images are integrated within the 'visuospatial scratchpad, selected parts of the image are processed' to form and organise the presentation of the image (Mayer, 2001).

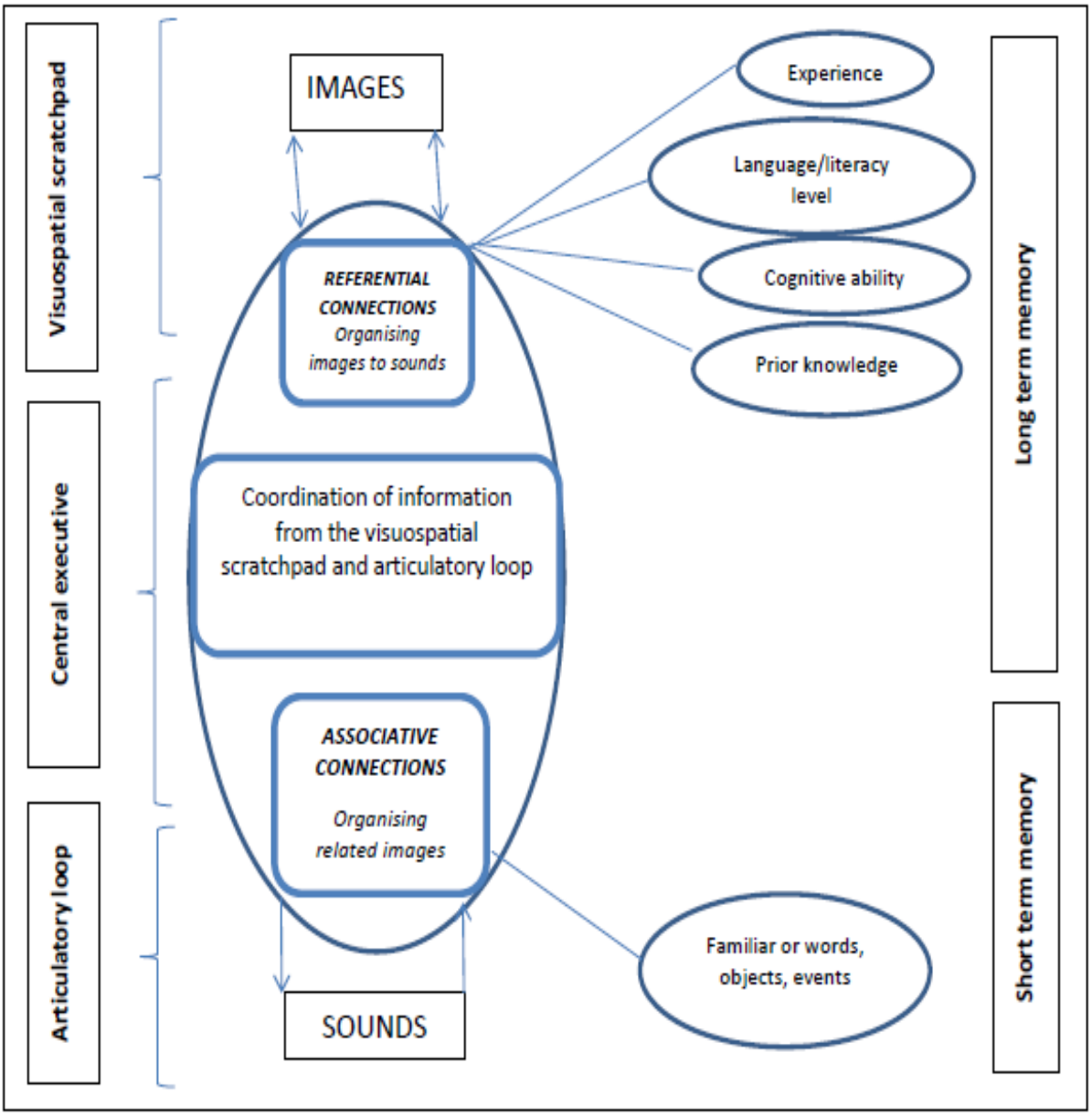


Figure 2.4. Working memory model adapted from Baddeley (1983, p. 315; 1992, p.557)

Furthermore, processing in working memory is facilitated by the integration of certain connections in the central executive (Baddeley, 1983). Here, 'referential connections' allow the receiver of the image (i.e. person with low literacy) to name the images of information that are presented (Clark & Paivio, 1991; Paivio, 1969). Referential connections depend on

the person's ability to interpret the 'symbolic' meaning of the image presented before them. This process relies mainly on the person's experience or knowledge, plus their language, literacy level and cognitive ability, to articulate the meaning of the visual aid (Dada et al., 2013).

Working memory, however, is said to have limited capacity in terms of how much input can be cognised at any given point in time (Baddeley, 1983; Mayer & Moreno, 2003). Processing capacity varies from individual to individual and increases as a person engages in learning activities. Persons with low literacy have limited processing capacity due to the limited number of years spent at school (Matsuyama et al., 2011; Park & Zuniga, 2016). Mayer warns instructional message designers against 'cognitive overload' (Mayer & Moreno, 2003), and advises that persons with low literacy should not be presented with too much information at a given time. Cognitive overload occurs when the amount of inputs exceeds the processing capacity of the individual's working memory (Mayer, 2001). Therefore, when a person with low literacy reaches cognitive overload, they are unlikely to learn anything (Mayer & Moreno, 2003). In these instances, the person may lose all information or remember much less than the desired amount of information when it is time for recall (Mayer & Monero, 2003). It has not been determined, however, how to measure cognitive load during learning (Mayer, 2001) – that is, how much is 'too much' and how this varies from person to person. Similarly, during the experimental task of this study, it was not feasible to determine how much information would cause overload for the participants because the content of the NDoH's health education programme was deemed to be at a suitable readability level.

In addition to processing, when storing non-verbal inputs in the 'visuospatial scratchpad', persons with low literacy take advantage of a phenomenon called the 'pictorial superiority effect' (Nelson, Reed, & Walling, 1976). This allows visual aids to augment the spoken health message by attributing greater brain activation in the 'visuospatial scratchpad' and in turn facilitates their learning through recall of the image (Houts et al., 2006; Mayer, 2001). The 'pictorial superiority complex' exists because some pictorial (non-verbal) inputs hold a more effective symbolic meaning than their associated labels (verbal inputs) (Nelson et al., 1976). Hence, for the 'associative connections' that take place in the central executive, visual aids within the same or different modalities are linked. The integration within associative connections enhances the analogical power of visual aids and enables persons

with low literacy to organise related words and related images, and to connect them to each other (Clark & Paivio, 1991; Hoogwegt, Maes, & Van Wijk, 2009b).

As mentioned by Mayer (2001), prior knowledge, which refers to familiarity with concepts, is key in the formation of long-term memory. Prior knowledge is linked to persons' life experiences and the cultural context in which they have been brought up (Mayer, 2001; Mayer & Monero, 2003). Thus, for persons from different cultures, different types of images may be required due to the possibility of varying levels of symbolic meaning attached to the images. The variability of symbolic meaning is important in a diverse context such as South Africa. So, in this study, the concept of the cultural appropriateness of visual aids was assessed through the iconicity task, which sought stakeholders' perspectives on the transparency and translucency of the visual aids used in the NDoH's HIV health education programme.

Iconicity, a term widely used in the field of AAC, refers to a perceived association between the symbol (visual aid) and its referent (Beukelman & Mirenda, 2013; Dada et al., 2013). This perceived relationship exists on a continuum, with transparency at one end and opaqueness at the other. It was necessary to elucidate the iconicity of visual aids in this study to evaluate their potential to provide symbolic meaning to the target audience. A visual aid (symbol) is considered transparent when the association is highly suggestive of its referent and therefore the meaning can be easily understood without additional cues. A visual aid is considered translucent when there is no apparent relationship between the visual aid and its referent (Fuller & Lloyd, 1997; Bornman et al., 2009), but the meaning of the symbol can be understood once the meaning is revealed. Opaqueness is when there is no relationship between the visual aid and its referent. In this case, the visual aid is considered opaque (Dada et al., 2013; Huguet, 2012).

The importance of transparency and translucency of visual aids was highlighted in Section 2.4 where Berthenet et al. (2016) found significant differences in translucency between lower and higher educated participants. Thus, they recommend that the International Organization for Standardization (ISO) standard be used when rating the transparency and translucency of visual aids. These standards set a 67% recognition score for the visual aids to be considered valid (Berthenet et al., 2016). Since studies that follow the ISO standards might

be able to minimise the use of 'opaque' visual aids and increase the iconicity of visual aids. The ISO standards were used during the iconicity task in this study.

2.6. Conclusion

This chapter offered a critical review of the literature on low literacy and low health literacy. The chapter also offered a synthesis of findings from a scoping review on interventions using visual aids in health education programmes for persons with low literacy. The findings of the review included the aims, methods, and findings in relation to the targeted outcomes. Chapter 2 concluded by referring to the underpinnings of a number of theories of information processing. These theories were shared as a means to explain the processes that take place when persons with low literacy are presented with multimedia health messages. Multimedia messages contain text, visual aids, and spoken inputs. The understanding gained from these theories served to substantiate the method that was used during the experimental phase of the study in hand.

CHAPTER 3
PRE-EXPERIMENTAL PHASE

3.1. Introduction

This chapter discusses the pre-experimental phase of the study, which entailed the phases in the development of the pre-test post-test questionnaire. This is followed by a description of the translation of the materials and the training process of the research assistants. Finally, details of the aims and findings of the pilot study are described and recommendations for the experimental phase are discussed.

3.2. The pre-experimental phase

The pre-experimental phase, which consisted mainly of the development and translation of materials used in this study, is summarised in Figure 3.1.

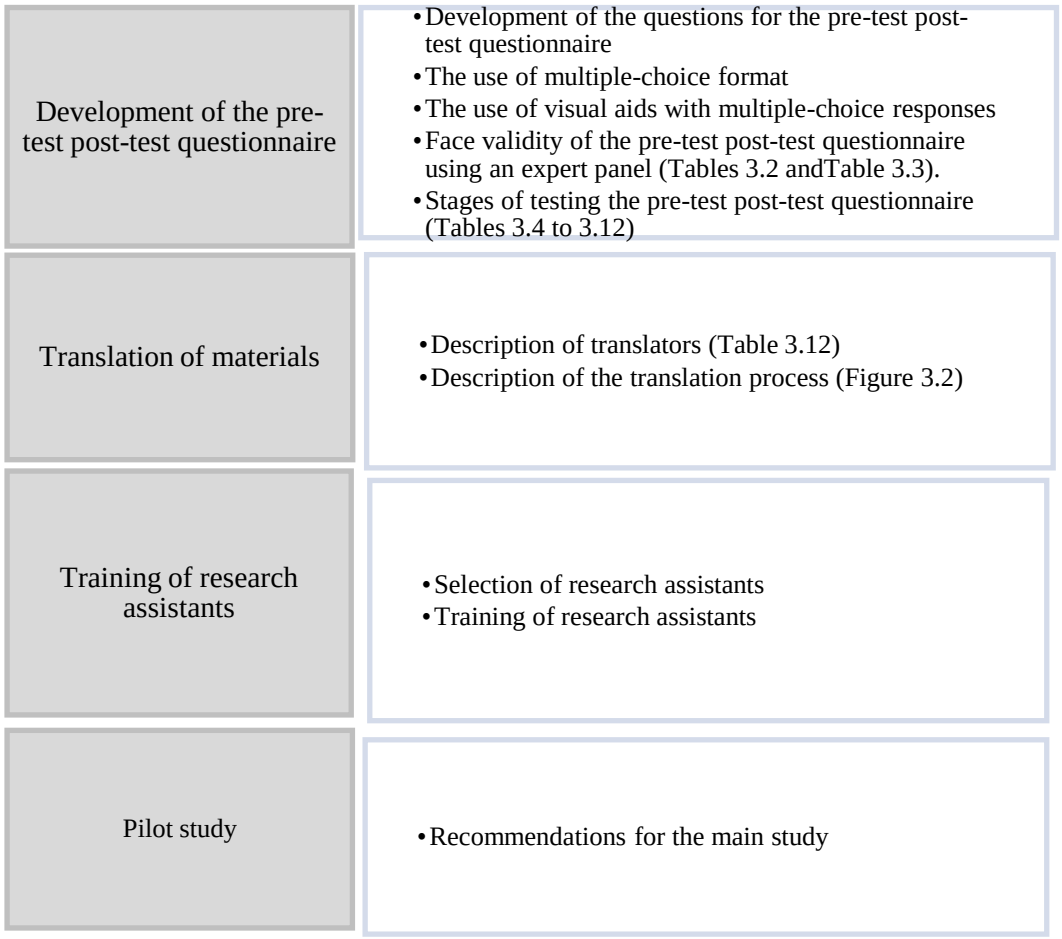


Figure 3.1. Schematic overview of the pre-experimental phase

3.3. Development of the pre-test post-test questionnaire

A tool called the Brief Estimate of Health Knowledge and Action (BEHKA)-HIV Version to assess HIV treatment knowledge was developed in 2001 (Osborn, Davis, Bailey & Wolf, 2010). Since this tool was mainly based on the previous health literacy measures mentioned in Section 2.3.1 (in particular the REALM), it was not deemed appropriate for this study. In addition, the main aim of the BEHKA was not to understand living with a chronic disease but to measure HIV treatment adherence only (Osborn et al., 2010). The treatment questions in the BEHKA tool are based on outdated treatment guidelines that are no longer applicable to the current ones used by the National Department of Health (2016). Hence the pre-test post-test questionnaire that was developed for this study utilised only two of the items from the BEHKA (Questions 1a and 2a – see Appendix C). Five of the questions in the pre-test post-test were derived from these two items.

The rest of the items in the pre-test post-test questionnnaire developed for this study were aligned to the nine topics of the NDoH's health education programme (Appendix D). The questions were designed to cover information on managing illness and living with HIV (NDoH, 2016) and dealt with important information that would be useful even for persons newly diagnosed with HIV ("Integrated Access to Care and Treatment," 2013).

The development of the pre-test post-test questionnaire occurred in a series of phases. The first phase was the development of the questionnaire in a multiple-choice format, followed by an expert panel review of the original version and four stages of testing it with potential participants to refine and clarify the questions. The aim of these stages was to ensure clarity and consensus on the words and terms used, and to confirm the appropriateness of the questionnaire for measuring the understanding of HIV health information in persons with low literacy (Fink, 2003).

Unlike in previous measures (Osborn et al., 2010), more questions than had been anticipated to be necessary were posed (Artino, La Rochelle, Dezee, & Gehlbach, 2014). The number of questions was increased to also accommodate the likelihood that some of them would be changed or eliminated at the final phase (Artino et al., 2014; Gehlbach & Brinkworth, 2011). Therefore, the initial version of the pre-test post-test questionnaire had 24 questions (see Appendices E1, E2, F1, and F2). The questions in the pre-test post-test

questionnaire were also written in clear and simple language (Artino et al., 2014), and each question addressed only one idea (Brislin, 1986).

3.3.1. The use of the multiple-choice format

Once the questions had been developed, the decision to use a multiple-choice format was taken (Cremers, Welbie, Kranenborg, & Wittink, 2017). This was due to the expectation that persons with low literacy might not be able to respond to open-ended questions, in anticipation that their responses might be deemed not worthy or 'smart' enough (Cremers et al., 2017). The initial pre-test post-test questionnaire had five multiple-choice options for each question. These were four actual options, with the last option being, "I am not sure of the answer" (Appendices E1 and E2). However, as the participants found the five-item choices difficult to understand, the questionnaire was later revised to offer only four multiple-choice options (i.e., three options and the last one being, "I am not sure of the answer") (see Appendices F1 and F2).

3.3.2. The use of visual aids with the multiple-choice options in a booklet

Reynolds-Keefer and Johnson (2011), as well as Cremers et al. (2017), suggest that pairing text with visual aids may promote the elicitation of meaningful responses by using Likert scales. While these studies were mainly aimed at assisting children with responding, some studies found the use of this type of Likert scale also useful with adults with low literacy (Mantri-Langeveldt, 2019; Reynolds-Keefer & Johnson, 2011). Visual aids were paired with each multiple-choice response on the pre-test post-test questionnaire to provide a visual and memory support that would facilitate the understanding of the questions. The visual aids or Bildstod™ symbols were selected from a library of Bildstod™ symbols that is freely available from www.bildstod.se. Bildstod™ symbols are developed and shared by Swedish researchers and comprise a variety of graphic symbols (visual aids) used for communication, specifically in health care settings. Appropriate Bildstod™ symbols were searched by the researcher using terms related to health information such as "blood", "injection", "vomit", and everyday actions like "sit", "eat", etc. (Carstens, 2007; Ma, 2016). These terms were used to search for symbols related to the items on the pre-test post-test questionnaire. The Bildstod™ symbols were selected based on their perceived ability to illustrate the idea in each of the items. The Bildstod™ symbols used were black and white, 4cm by 4cm in size. Each symbol was placed under a multiple-choice option.

A participant response booklet (with the same multiple-choice visual aids as those in the multiple choice pretest-post-test questionnaire) was developed to assist participants to respond to the questions in the pre-test post-test questionnaire. The Bildstod™ symbols on the response booklet were 5cm by 5cm in size, and the booklet came in the format of a black A4-flip booklet. During stages one, two and three of the development phases, the multiple-choice options were paired with visual aids (Reynolds-Keefer & Johnson, 2011).

3.3.3. Face validity of the pre-test post-test questionnaire

Validity refers to a measure of how much a measurement appropriately measures what it is meant to measure (McMillan & Schumacher, 2011; Yasir, 2016). In this study, validity was sought to determine whether the individual items of the pre-test post-test questionnaire were relevant for measuring the understanding of HIV information covered in the NDoH's health education programme (Waltz, Strickland, & Lenz, 2010). Face validity was determined to minimise ambiguity and to ensure that items were clear enough to elicit the intended responses from the participants (Welman, Kruger, & Mitchell, 2005). This step of the development was conducted prior to the pilot study. It was deemed an important step, particularly since prospective participants were persons with low literacy for whom understanding items in research tools could pose a challenge (Cremers et al., 2017; Reynolds-Keefer & Johnson, 2011).

Face validity was determined through an expert panel review. Three experts were selected to serve as panel members based on their extensive experience in working in HIV education (specifically the implementation of the NDoH's health education programme in KwaZulu-Natal) and their competence in spoken and written isiZulu. Informed consent was obtained from all expert panel members (Appendix G). Table 3.1 provides more detail on the expert panel members.

Table 3.1

Expert panel descriptions

Expert	Profession	Training	Age (yrs.)	Number of years working in HIV education	Gender
Expert 1	HIV Programme Co-ordinator	BA Social Work	28	3	Male
Expert 2	Professional Nurse	National Diploma in Nursing	38	10	Female
Expert 3	Professional Nurse	National Diploma in Nursing	55	32	Female

The expert panel feedback that was used to inform the reviewing of the pre-test post-test questionnaire is summarised in Table 3.2.

Table 3.2

Results from expert panel reviewers: Regarding the pre-test post-test questionnaire in a multiple-choice format

Aim	Questions	Results & Comments	Recommendations/Modifications suggested
The appropriateness of topics covered by the questions, in measuring understanding of HIV health information (Fink, 2003), using Appendix E2	1. Do the questions cover important content relevant to education on HIV and ART section of the NDoH's health education programme?	The panellists felt that the following questions covered important aspects of the structure of the virus and understanding of the transmission of HIV: • Question 1 - What is HIV? • Question 2 - What are CD4 cells? • Question 21 - What is the immune system? This information was deemed important because it was likely that for many potential participants it would be new information they had not heard before, e.g. a description of how the virus works/enters the body (Houts et al., 2006; "Integrated Access to Care and Treatment," 2013). The panellists also felt that the following questions covered important information about the disease: • Question 4 - Why do we take viral load blood? • Question 5 - What does HIV do? • Question 16 - How can a mom infect her baby with HIV?	The questions should depict how HIV enters the body and how it attaches itself (NDoH, 2016). The questions were left unaltered.
	2. Are there any topics that you feel are not covered by the questionnaire and should be included?	The two professional nurses felt that questions were missing specifically related to the following: • Co-infection of TB and HIV and other sexually transmitted illnesses (STIs) • How to live a normal life after discovering you have HIV • Importance of support groups It was felt that co-infection was important to mention since TB is a leading opportunistic infection in persons living with HIV (Dong et al., 2007).	The question on co-infection was added during Phase 2 of testing the pre-test post-test questionnaire.

Aim	Questions	Results & Comments	Recommendations/Modifications suggested
The use of multiple-choice as a method to elicit an understanding of HIV information in persons with low literacy (Cremers et al., 2017)	3. What are your thoughts on using multiple-choice questions to assess participants' understanding of HIV and ART health education?	All panellists deemed multiple-choice questions as a good way to test people's knowledge on HIV since this method enabled persons with low literacy to select a response from an array of options (Cremers et al., 2017).	None
	4. What are your thoughts on the multiple-choice questions provided? Are they too easy/confusing, etc.?		
The appropriateness of the use of visual aids (pictures) to help participants to respond to the multiple-choice questions (Reynolds-Keefer & Johnson, 2011).	5. Do you think it is helpful to use visual aids for each choice to help participants to respond to questions?	One of the panellists felt that visual aids would make it easier for persons with low literacy to respond to questions since they would not have to think too much about what to say. Another panellist felt that pictures can help the people in understanding better and they do not have to think about what is written (Reynolds-Keefer & Johnson, 2011; Smith et al., 2009). However, researchers warn that this advantage is only evident if the questions are in a simple and clear format (Tsang, Royse, & Terkawi, 2017).	None.
	6. Other comments	One of the panellists felt that the ease with visual aids would only benefit participants who were more familiar with information on HIV.	This was considered but no changes made at this stage.

The panellists felt that the questions covered important aspects about living with a chronic illness such as HIV. This information was not readily available and hence would be helpful to participants. The two professional nurses felt that co-morbidity of TB and HIV should be emphasised (Gao, Zheng & Fu, 2013). A question relating to opportunistic infections was also added. The panellists furthermore thought that the multiple-choice format was an appropriate strategy to assist persons with low literacy to respond to the questions, without shame that might come with the expectation to write (Shisana et al., 2012) or fear of possibly giving the incorrect response (Cremers et al., 2017). This was especially suitable if the choices were going to be depicted by simple and clear visual aids (Webb et al., 2008).

3.3.4. Phases of testing the pre-test post-test questionnaire

Once face validity had been established by the expert panel, a series of pilot testing was undertaken to test the appropriateness of the content of the pre-test post-test questionnaire with potential participants who met the selection criteria for the main study. Participants in the development of the pre-test post-test questionnaire had to have low literacy speak isiZulu as their first language and consented to participate in the study) (Appendices H1 and H2) (Artino et al., 2014). This step was done to assess whether the conceptualisation of the questions in the pre-test post-test questionnaire would be appropriate and feasible to use with persons with low literacy (Gehlbach & Brinkworth, 2011) (see Tables 3.6 to 3.8). All four phases were conducted using the translated isiZulu versions of the pre-test post-test questionnaire (Appendices E1, E2, F1 and F2).

3.3.4.1. Phase 1: Pilot testing of the multiple-choice pre-test post-test questionnaire

A total of nine participants who met the selection criteria of the main study participated in Phase 1 of the pilot test for the pre-test post-test questionnaire

Table 3.3

Phase 1 – Testing of the multiple-choice pre-test post-test questionnaire version 1 (with visual aids) (N=9)

Objective	Materials/Equipment	Procedures	Results	Recommendations for revision of the pre-test post-test questionnaire
1. **To determine the sensitivity of the pre-test post-test questionnaire in determining differences in understanding of HIV health information.** 2. **To establish the appropriateness of the multiple-choice format.**	• NDoH's health education programme (with visual aids) (Appendix D) • Pre-test post-test questionnaire (Appendix E2). • A Pro-Series (DVR-5005 I model) voice recorder	Questions were read out aloud and slowly to participants. The researcher simultaneously pointed to the visual aids that corresponded with the multiple-choice options.	There were no improvements from pre-test to post-test. For some questions the performance was worse at post-test than at pre-test. For questions 3, 8, 20, 22 and 23, participants performed poorer in the post-test, indicating that the multiple-choice format was not appropriate for this group. Some participants stated that the options/choices in the multiple-choice format choices were confusing them.	Questions 7, 9, 12, 13 and 17 would be considered for revision or exclusion, since all nine participants knew the answers at pre-test and post-test. Questions 3, 8, 20, 22 and 23 were excluded as they were not understood by participants. Easy questions mentioned above should be considered for revision after the next testing phase.
3. **To determine the appropriateness of the multiple-choice format using visual aids.**	• Participant Response booklet with Bildstod™ symbols (same as those on the pretest-post-test questionnaire)	The participant response booklet was placed in front of participants while the question and multiple choices were being read out loud and pointed to.	When asked, some participants felt that visual aids helped them to remember the responses, especially if they immediately knew the answer and could spot the corresponding visual aid.	No changes.
4. **To determine the appropriateness of Bildstod™ symbols in aiding persons with low literacy in responding to multiple-choice questions (Cremers et al., 2017).**		The response booklet was placed in front of the participant to be able to point to their choices. Multiple choices were augmented by pointing to the corresponding visual aid while the response choice was being read out loud by the researcher.	In Phase 1, no participants complained about the Bildstod™ symbols used in the multiple-choice format.	No changes were made to the visual aids response booklet.

Objective	Materials/Equipment	Procedures	Results	Recommendations for revision of the pre-test post-test questionnaire
5. **To determine participants' perceptions of the familiarity of the content of the NDoH's health education programme.**	• Appendix E2 (NDOH flipchart tool) • Figures 4.2a and 4.2b		Some questions raised in the session were on information not covered in the health education session. The presence of these questions implied the limitations in bringing an already developed session; the information was predetermined.	Health information pertaining to questions raised must be emphasised during the health education sessions.
6. **To determine the appropriateness of the use of individual health information booklets (A4 pages in a flip file) during the health education session.**	• Appendix D (NDOH flipchart) in the form of health education flip files	The participants were provided with their own NDoH health education booklet in which to follow during the health education session.	Some participants were distracted by the use of two methods, because they weren't sure where to follow. Most participants followed with the researcher on the flipchart (Wood et al., 2009).	The participants' individual health information booklets can be left out since they don't make much of a difference.

Participants' understanding generally did not improve from pre-test to post-test, which was disconcerting. It had been expected that the pre-test scores would be lower than the post-test scores (Dimitrov & Rumrill, 2003; Schlosser, 2003b). However, the pilot study found that participants found no difficulty in answering the pre-test questions and some information was known (as outlined in Table 3.4). Moreover, for 12 questions there was no improvement from pre-test to post-test, and in 11 of the questions, participants performed worse in the post-test than the pre-test. This implied that there was some confusion with the wording of the questions and challenges with some of the multiple-choice options (Cremers et al., 2017). Some of the questions were consequently revised slightly for the second phase of testing the pre-test post-test questionnaire. As many of the participants scored well on the pre-test, the second phase of testing was conducted in a different community that had not been the target of previous HIV programmes or research.

None of the multiple-choice questions were eliminated at this stage because the CBO's leaders shared that the area in which the pilot study took place had previously been highly targeted for HIV interventions. They suspected that participants may have been overexposed to HIV-related interventions. So, the Bildstod™ symbols were also not altered in any way and a second phase of piloting with a different group of participants in a different community was planned. These participants had not been the target of HIV programmes or research.

3.3.4.2. Phase 2: Pilot testing of the multiple-choice pre-test post-test questionnaire

Objectives for Phase 2 were to test the appropriateness of the pre-test post-test questionnaire (Appendix E2). The objective, procedures, results and recommendations for this phase are summarised in Table 3.5. A total of six participants who met the selection criteria of the main study participated in this phase.

Table 3.4
Phase *2 – Testing of the multiple-choice pre-test post-test questionnaire version 1 (with visual aids) (N=6)*

Objective	Materials	Procedures	Results	Recommendations for revision of the pre-test post-test questionnaire
1. **To determine the sensitivity of the rephrased questions of the pre-test post-test questionnaire to test the understanding of HIV information in persons with low literacy.**	• The revised pre-test-post-test questionnaire (Appendix E2) • A Pro-Series (DVR-5005 I model) voice recorder	Questions were read out loud and slowly to participants, and the multiple-choice options were augmented by pointing to the corresponding visual aid as the response option was being read.	Participants still scored high on 12 pre-test questions, namely questions 2, 6, 7, 9, 11, 12, 13, 14, 15, 16, 17 & 18. All of these were considered for exclusion. Six of these questions were answered correctly at pre-test by all the participants. This confirmed the suspicion that the wording or format of the multiple-choice questions was confusing for participants (Cremers et al., 2017), and that it was not the best method to be used to assess the understanding of HIV health information in persons with low literacy.	Twelve questions were removed (Table 3.5). Then two questions were rephrased (Table 3.6). The multiple-choice options of three questions were also rephrased (Table 3.7) and new questions were formulated from the same health information section (Table 3.8). Finally, seven questions were converted to an open-ended format (Mansoor & Dowse, 2003) and some new ones were added (as outlined in Table 3.9).
2. **To determine the appropriateness of the NDoH's health education session presented verbally, without individual booklets.**	• Appendix D (NDOH flipchart) in the form of health education flip files	The researcher read from her notes (which had the translated information from the health education flipchart (Appendix B_2)), and pointed to the visual aids as she was reading (Wood et al., 2009).	Participants were able to follow the session, watching as the researcher pointed, and listening to the health information given (Wood et al., 2009).	The strategy of the researcher – namely to provide the health education session verbally while pointing to the visual aids as she speaks (Kandula et al., 2009; Negarandeh, Mahmoodi, Noktehdan, Heshmat, & Shakibazadeh, 2012) – was suitable for participants during the health education session.

Recommendations after Phase 2 saw 12 multiple-choice questions being removed completely from the questionnaire – as outlined in Table 3.5.

Table 3.5

Recommended questions to be removed

Pre-test Post-test Question		**Multiple-choice options** **1**	**2**	**3**	**4**	**5**	**Recommendations**
Q2	What are CD4 cells?	They are like soldiers of the body	They are found in one's bones	They are cells that carry illness in the body	Cells that cause you to get a very bad cough	I am not sure of the answer	Remove questions from the questionnaire because 100% of participants knew the answers in the pre-test.
Q6	When do you take ARVs?	ARVs are started when you are getting old	ARVs are started any time	ARVs are started when you eat	ARVs are started when you are told by the nurse	I am not sure of the answer	
Q7	Who is at risk of contracting HIV?	Everyone is at risk of contracting HIV	Only people who drink alcohol are at risk of contracting HIV	Only women are at risk of contracting HIV	Only men are at risk of contracting HIV	I am not sure of the answer	
Q9	What do you do when ARVs are making you sick?	When ARVs make you feel sick, you should go to the doctor	When ARVs make you feel sick, you should drink a lot of water	When ARVs make you feel sick, you should consult a traditional healer	When ARVs make you feel sick, you should stop taking them	I am not sure of the answer	
Q11	How can you know if you have HIV?	You can tell your HIV status by seeing a traditional healer	A male who looks healthy can know their HIV status by asking their partner	A person can know their HIV status through an HIV test	A person can know their HIV status through monitoring their weight	I am not sure of the answer	
Q12	How is HIV transmitted?	HIV is transmitted through hugging an HIV-positive person	HIV is transmitted through breathing the same air as an HIV-positive person	HIV is transmitted through sharing eating utensils with an HIV-positive person	HIV is most commonly transmitted through contact with HIV-positive blood	I am not sure of the answer	
Q13	How can you prevent infection from your partner with HIV?	You can prevent infecting your partner by sleeping on the same bed	You can prevent infecting your partner by giving them traditional 'muthi'	You can prevent infecting your partner by taking them to church	You can prevent infecting your partner by practising safe sex	I am not sure of the answer	

Pre-test Post-test Question		Multiple-choice options 1	2	3	4	5	Recommendations
Q14	When should ARV treatment be taken?	ARV treatment is taken only when you have a headache	ARV treatment is only taken by those who are sick	ARV treatment is taken only if you want to feel happy	ARV treatment is taken every day of your life	I am not sure of the answer	
Q15	Must ARVs be taken at the same time?	ARVs should be taken at the same time	ARVs should be taken at the hospital	ARVs should be taken at night	ARVs should be taken in the morning	I am not sure of the answer	
Q16	How can a mom infect her baby with HIV?	An HIV-positive mother could infect her new-born baby by holding them in her arms	An HIV-positive mother could infect her new-born baby through feeding them food	An HIV-positive mother could infect her new-born baby by giving them a bath	An HIV-positive mother could infect her new-born baby through breastfeeding	I am not sure of the answer	
Q17	How is HIV treated?	HIV is treated through traditional medicine	HIV is treated through drinking lots of water	HIV is treated with medication called antiretroviral	HIV is treated with an injection	I am not sure of the answer	
Q18	How long should one take ARVs for?	ARVs are to be taken only when you are at the beach	ARVs are to be taken only when you have a headache	ARVs are to be taken when you exercise	ARVs are to be taken even if you feel strong and healthy	I am not sure of the answer	

Two questions that were felt to be important for the knowledge about living with HIV as a chronic disease, were kept but rephrased (Table 3.7), and the multiple-choice options of three questions were rephrased (Table 3.8). Questions were then rephrased using words like ‘why’, ‘what’, ‘how’, ‘who’ and ‘when’ in all the questions. It was also ensured that these questions were in a positive mode, suggesting what should be done as opposed to what should *not* be done (Bernal, Wooley, & Schensul, 1997).

Table 3.6

Recommendations for the rephrasing of questions in the multiple-choice pre-test post-test questionnaire

Pre-test Post-test question		**Multiple-choice options**					**Recommended rephrased question**
		1	**2**	**3**	**4**	**5**	
Q 11	How do you know that you have HIV?	When you have contracted HIV, you feel happy	When you have contracted HIV, you may feel sad	When you have contracted HIV, you may feel sleepy	When you have contracted HIV, you may have itchy skin	I am not sure of the answer	*What is the only way to be sure that you have HIV?*
Q24	What happens in your body when you take ARVs?	When you take ARVs, the virus should decrease in your blood	When you take ARVs, the CD4 cells should die in your blood	When you take ARVs, your soldiers should decrease in your blood	When you take ARVs, the virus should increase in your blood	I am not sure of the answer	*What do ARVs do to HIV in the body?*

When the questions were rephrased, verbal anchors were used to complement the visual aids and ensure that they demonstrated the particular actions intended by the visual aids (Bernal, Henrieta; Wooley Steve; Schensul, 1997; Choi, 2012). Health education items in positive mode were also highlighted by Hoogwegt et al. (2009), who found that persons with low literacy struggle to understand visual aids indicators such as arrows, in demonstrating what should not be done.

Table 3.7

Recommendations for the rephrasing of the multiple-choice

Pre-test post-test question		**Recommended rephrased multiple-choice options**			
		1	**2**	**3**	**4**
Q7	What is the only way to be sure that you have HIV?	*You suddenly lose weight*	*If your partner has HIV*	*By taking an HIV test*	I am not sure of the answer
Q8	How do ARVs work?	*They kill all the HIV in your body*	*They kill some of the HIV in your body*	*They kill CD4 cells in your body*	I am not sure of the answer
Q3	How do you know if someone is HIV negative?	*The HI-negative person will be thin*	*The HIV-negative person will be fat*	*There is no way to tell if someone is HIV negative*	I am not sure of the answer

In addition to rephrasing the multiple-choice options (Table 3.8), it was decided to reduce the number of options from five to four, i.e., three response options plus one for "I am not sure of the answer" (Bernal et al., 1997).

Five additional questions were added from the NDoH's health education programme (Table 3.9). The new questions were derived by separating ideas in some of the older questions so as to clarify which was the main idea being referred to (Brislin, 1986, p. 145). This was done particularly in certain questions that were ambiguous.

Table 3.8

New questions added to the pre-test post-test questionnaire from the NDoH's health education programme

Question		**Multiple-choice options**			
		1	**2**	**3**	**4**
Q6	What does HIV do when it enters the blood?	HIV makes the blood become thick	HIV makes the blood become thin	HIV makes copies of itself in the blood	I am not sure of the answer
Q13	What will happen if you do not take your ARVs?	You will have less HIV in the blood	You will have more soldiers in the blood	You will have more HIV in the blood	I am not sure of the answer
Q15	What is a common illness in HIV-positive people?	A common illness in HIV-positive people is skin diseases	A common illness in HIV-positive people is	A common illness in HIV-positive people is diabetes	I am not sure of the answer

Question		Multiple-choice options			
		1	**2**	**3**	**4**
			high blood pressure		
Q24	Why is the CD4 blood test done?	To find out how much HIV is in the blood	To find out how strong your immune system is	To find out how long you have been positive for	I am not sure of the answer
Q25	What does HIV do to your immune system?	HIV makes it faster	HIV makes it weaker	HIV makes it stronger	I am not sure of the answer

Next, seven questions were converted to open-ended questions (Table 3.9) as the multiple-choice method was deemed not suitable to assess an understanding of HIV health information in persons with low literacy. Only four of the original questions from Appendix E1/E2 were left unaltered.

Table 3.9

Questions changed from a multiple-choice to an open-ended format in the pre-test post-test questionnaire

Pre-test post-test		**Multiple-choice options**					**New question**
question		1	2	3	4	5	
Q1	What is HIV?	HIV is a virus that enters the body	HIV is found in the lungs	HIV makes you think of dying	HIV makes you feel weak	I am not sure of the answer	*What happens when your immune system gets weak?*
Q4	Why do we take viral load blood?	Viral load blood shows how much HIV is in the blood	Viral load blood checks how sick a person is	Viral load blood shows if someone is hurt	Viral load blood shows if someone has a fever	I am not sure of the answer	*No change to the question*
Q10	How can you know you have HIV?	You can tell you might have contracted HIV when you fall	You can tell that you might have contracted HIV if you feel sad	You can tell that you might have contracted HIV if you like jumping	You can tell you have contracted HIV if you feel too tired	I am not sure of the answer	*What are the most common illnesses an HIV-positive person can get?*
Q19	What are ARVs?	Pills that prevent illness	Pills that give you energy	Pills that assist the body's soldiers	Pills that strengthen the bones	I am not sure of the answer	*How do ARVs work?*
Q20	How does the family help a person who is HIV positive?	It is helpful to share your ARV medicines with family members	It is helpful to have family to support you through your ARV journey	It is helpful to do the ARV journey alone	It is helpful to tell the whole community about your HIV status	I am not sure of the answer	No change to the question
Q21	What is the immune system?	A virus found in the body	An illness that causes your face to be itchy	The blood	A system that makes up the army of the body	I am not sure of the answer	No change to the question
Q22	What do you do when you vomit in the first hour after taking ARVs?	You ignore that, it is normal	You take another dose immediately after	You stop taking them	You go see a doctor	I am not sure of the answer	No change to the question
Q23	What is the cure for HIV?	Healthy food is the cure for HIV	ARVs are the cure for HIV	There is no cure for HIV	There is no cure for HIV that beats exercise	I am not sure of the answer	No change to the question

The conversion of multiple-choice to open-ended questions was in contrast with the view of Cremers at al. (2017) who stated that open-ended questions were not ideal in assessing the views of persons with low literacy. However, the findings of our study evidenced in Table 3.5 show that participants were confused by the multiple-choice format. In addition, the scoping review in Section 2.4.4 highlighted that most interventions using visual aids in health education programmes for persons with low literacy had used open ended questions in an interview format to assess the effects of the interventions on participants (Kheir et al., 2013; Volandes et al., 2014; Yong et al., 2018).

3.3.4.3. Phase 3: Testing of the combined multiple-choice and open-ended pre-test post-test questionnaire

After all the changes from Phase 2 had been incorporated into the pre-test post-test questionnaire, a third phase was implemented to test the appropriateness of the rephrased multiple-choice and open-ended questions. For some of the multiple-choice questions it was not possible to combine the question with a unique visual aid that only represents that idea. Therefore, the Bildstod™ symbols were not used in this pilot study. Our questionnaire had 15 multiple-choice questions, with four response options and seven open-ended questions. The objective of this phase was to test the open-ended questions in particular, and to ascertain if this was a more suitable method for this study (Artino et al., 2014; McMillan & Schumacher, 2011). Phase 3 involved three participants who met the selection criteria. Objectives, procedures, results, and recommendations are summarised in Table 3.10.

Table 3.10

Phase 3 – Testing of the combined multiple-choice (no visual aids) and open-ended pre-test post-test questionnaire (N=3)

Objective	Materials	Procedures	Results	Recommendations for the main study
1. **To administer the pre-test post-test questionnaire with revised questions, multiple-choice options.**	• Revised pre-test post-test questionnaire with multiple-choice and open-ended questions (Appendix F2) • A Pro-Series (DVR-5005 I model) voice recorder	Appendix F2 was administered to participants. Questions were read out loud and slowly to participants, and the multiple-choice options were augmented by pointing to the corresponding visual aid as the response option was being read.	All three participants scored very high on both the pre-test and post-test multiple-choice questions.	Change the whole questionnaire to open-ended questions (Beckstead, 2014)
2. **To test the sensitivity of the open-ended questions in showing the difference in scores between pre- and post-test.**		After answering the pre-test and the post-test multiple-choice questions, participants were asked if they were willing to answer and provide their thoughts on a few further questions. The open-ended questions were asked. Participants were given about three seconds to provide a response in their own words. The participants' responses were recorded next to the question on Appendix I2.	2/3 participants scored better in the post-test when using open-ended questions (from 3 to 8; from 4 to 8 correct responses)	
3. **To assess participants' preferred method of assessment.**		Participants were asked which method they preferred – selecting the multiple-choice options or answering in their own words.	All three participants preferred the open-ended question format.	

All three participants expressed their preference for the open-ended method. Hence it was decided that the whole pre-test post-test questionnaire would be changed to open-ended questions, since participants found it easier to answer in their own words (Beckstead, 2014; Flaskerud, 2012).

3.3.4.4. Phase 4: Pilot testing the open-ended pre-test post-test questionnaire

During the fourth testing phase, the aimed was to test the open-ended pre-test post-test questionnaire and to assure that the questions adequately covered the construct in question, i.e., understanding of HIV health information in persons with low literacy (Artino et al., 2014). Although six participants had agreed to take part in the testing of the questionnaire, only two made it to the interviews.

Table 3.11
Phase 4 – Pilot testing the open-ended pre-test post-test questionnaire (N=2)

Objective	**Materials**	**Procedures**	**Results**	**Recommendations for the main study**
To determine the appropriateness of the open-ended pre-test post-test questionnaire in covering the understanding of HIV health information.	• The open-ended pre-test post-test questionnaire with no visual aids (Appendix I2) • A Pro-Series (DVR-5005 I model) voice recorder	The open-ended pre-test post-test questionnaire of 18 questions was administered to participants. Participants were given about three seconds to provide a response in their own words. The participant responses were recorded next to the question in appendix J2.	2/2 participants scored better in the post-test than in the pre-test.	The open-ended version to be used for the main data collection.

Improvements in post-test scores were seen in both participants when the revised open-ended pre-test post-test questionnaire was used (see Appendix I2). Participant 1 improved from 4/14 to 8/14 correct responses in the post-test. Participant 2 improved from 6/14 to 8/14 correct responses in the post-test. It was decided that this version of the questions could be used for the main study.

3.4. Translation of materials

All materials developed and adapted for this study, i.e., the permission and consent letters, pre-test post-test questionnaire, procedural scripts, and NDoH's health education programme were translated from English to isiZulu. The study was conducted in KwaZulu-Natal where the majority of people speak isiZulu (Statistics South Africa, 2017a). A systematic process of translation was followed as recommended for cross-cultural research (Brislin, 1986; Pena, 2007). The researcher combined various processes to suit the needs of the participants (Brislin, 1986) and prevent the potential loss of meaning of the constructs (Pena, 2007). Four translators assisted with the translation procedures in the study. The translators were proficient in English and isiZulu and had ample experience translating (see Table 3.12).

Table 3.12

Description of translators

Category	**Translator 1**	**Translator 2**	**Translator 3**	**Translator 4**
Qualification	BSc Engineering	Master's in Early Childhood Intervention (MECI) Hon. Psychology BA Sociology and Psychology	National Diploma in Nursing	Higher Diploma in Teaching
Occupation	Translator and transcriber	Public health programmes co-ordinator	Professional nurse	Teacher
First language	isiZulu	IsiZulu	isiZulu	isiZulu, Afrikaans
Other languages	English	English, Afrikaans, isiXhosa, Sesotho	English, Afrikaans	English, Afrikaans
Translation experience	11 years	11 years	32 years	40 years

The process used in translating the materials is described in Figure 3.2.

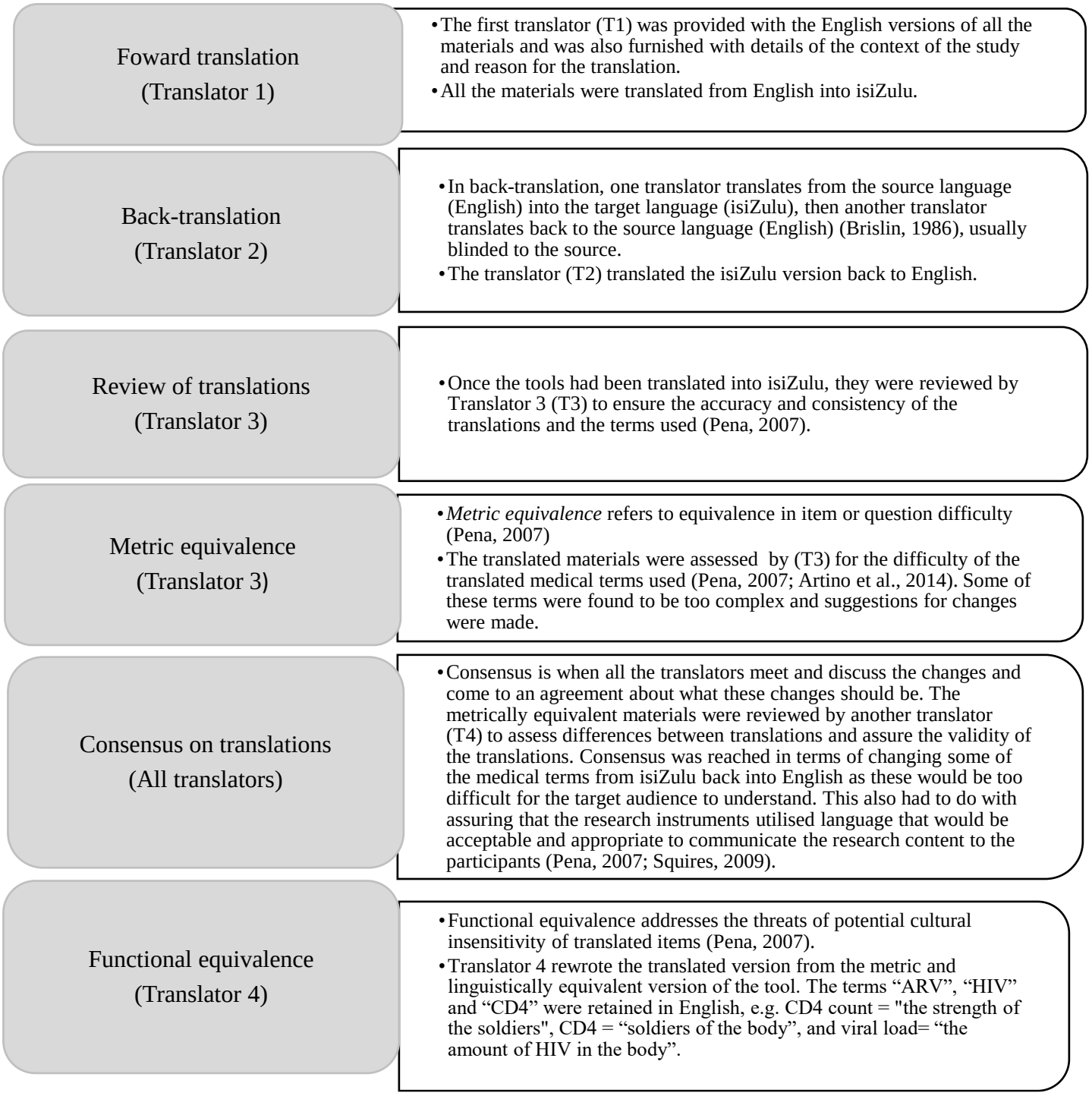


Figure 3.2. The translation process for the materials in this study based on Pena (2007)

Firstly the original documents were translated from English into isiZulu and then *back-translated* into English as suggested by (Brislin, 1986). In this study this was not a *blind* back-translation because the back-translation was compiled by the researcher who had also developed the materials. This method was followed to ensure *linguistic equivalence*. Furthermore, *metric, functional and linguistic equivalence* was sought to minimise cross-cultural validity threats to the instruments (Pena, 2007). (See the translation process in Figure 3.2.)

All original versions of the research tool were translated (by Translator 1) from the source language into the target language (i.e., English to isiZulu). This process is also known as *forward translation* (Hambleton & Kanjee, 1993).

After back-translation, another translator (Translator 3) reviewed the translations to ensure that there was consistency in terms used throughout the tools. This review was done to ensure metric equivalence, i.e., that the difficulty of the items in the pre-test post-test questionnaire would not pose a threat to its validity and reliability (Pena, 2007). Metric equivalence also allows for the instruments to have *cultural equivalence,* which helps to ensure the accuracy and appropriateness of the language used in the research instruments (Squires, 2009).

Once consensus was reached among all the translators that some of the translated medical terms and jargon in isiZulu would be too difficult for the target audience, they were retained in English (Brislin, 1986; Pena, 2007). Therefore *functional equivalence* was checked, whereby a fourth translator (Translator 4) re-wrote the items of the research materials, taking into consideration the suggestions from previous translators (i.e., linguistic and metric equivalence) (Pena, 2007).

All versions of the pre-test post-test questionnaire and the NDoH's health education programme and consent letters were translated using this process. For the pre-test post-test questionnaire, Appendices E1 and E2 were the original pre-test post-test questionnaire with 24 multiple-choice questions that each had five multiple-choice options. Appendices F1 and F2 contain the revised questionnaire after Phase 2, with 15 revised multiple-choice questions each with four multiple-choice options, and seven open-ended questions. Then the final version appears in Appendices I1 and I2, which contain the 18-question open-ended pre-test post-test questionnaire.

3.5. Training of research assistants

Two research assistants were utilised in this study to assist with administering the pre-test post-test questionnaires and to reduce bias, since the researcher herself would be administering the health education session (McMillan & Schumacher, 2011).

3.5.1. Selection of research assistants

Both research assistants were first language speakers of isiZulu who lived in KwaZulu-Natal. They all had experience in working with communities or with HIV programmes and were fluent in both English and isiZulu. The first assistant was selected due to her extensive training in HIV/AIDS and having worked in the community with persons with low literacy. The second research assistant was an undergraduate Social Science student who had experience in administering questionnaires and conducting interviews with community members. Their demographic information is outlined in Table 3.13.

Table 3.13

Demographics of the Research Assistants

Assistant	Profession	Training	Age	Research experience	Gender
Research Assistant 1	Community Health Worker	Community Health Work, Home-Based Care, First Aid, HIV Counselling	49	26	Female
Research Assistant 2	University Student and NPO team leader	B.Sc. Sci (Psychology)	24	1	Female

3.5.2. Training of research assistants

The researcher conducted two sessions with the aim of training the assistants on how to administer the pre-test post-test questionnaires. In the first training session, the assistants were given a brief overview of the study, the aims and objectives of the study, their role, and the process of data collection. The training session included a discussion on the data collection procedures, for example, completing participants' demographic information and pre-test post-test questionnaires. The assistants learnt various interviewing strategies such as probing, gaining rapport and putting participants at ease (Leech, 2002).

In the second training session, role play was used in both the training and the use of the procedural script (Appendix J1). The research assistants also observed the researcher conducting some of these interviews. The research assistants were observed through the use

of the procedural checklist (Appendix J2). They also participated in the pilot study in which they administered some of the pre-test post-test questionnaires (Edwards, 1998). A video recording was made and deviations from the procedural scripts were noted and discussed (Hassan, Schattner, & Mazza, 2006).

3.6. Pilot study

A pilot study was conducted to determine the feasibility of the participant selection criteria, the suitability of the venue for group health education, the most suitable position for the audio- and video-recording equipment and the amount of time the experimental task session would take with each participant (Collins, 2016; Hassan et al., 2006). Table 3.14 outlines these objectives, procedure and results, as well as the recommendations that were made for the main study.

Table 3.14

Pilot study – Objectives, procedures, results and recommendations for the main study (N=2)

Objective	Materials/Equipment	Procedures	Results	Recommendations for the main study
		To determine the appropriateness of the recruitment procedures		
To determine the appropriateness of the participant selection criteria in terms of age and literacy level for recruitment.	• The demographic questionnaire • (Appendix K2)	The demographic questionnaire was completed with the help of a research assistant. The research assistant asked the questions and completed the form on behalf of the person with low literacy.	Some categories confused the participants who couldn't respond to categorised information but preferred to just give an open-ended response. Q: What is your date of birth? (YYYY/MM/DD) _ Some participants don't remember their date of birth. Q: What is the highest level of education that you have obtained? • Grade 7 • Less than Grade 7	To rephrase the questions for date of birth to "What is your age?" To change the categories for highest level of education "Grade 7" to "Grades 5-7", and "Less than Grade 7" to "0-4 years of education".
		To determine the suitability of the venue for health education and recording of the sessions		
To ensure the suitability of the venue for a health education group session.	• Some 6-8 chairs were placed in a small room at the offices of the community-based organisation (CBO).	The participants gathered around the table opposite the researcher to view the health education contents.	Participants could see the researcher, visual aids and hear the information clearly.	Recommended one session with participants.
To establish the positioning of the video camera and the clarity of the video recordings.	• A Canon HD Camcorder (Legaria HF Model) • A MiVision 5858D lightweight tripod for the camcorder	The video recorder was placed in front of the researcher to show her pointing to the visual aids. Only the participants' backs were visible on the video recordings.	The recording was clear and audible. However, the video recorder would stop recording after 20 minutes due to the limiting timer on the recorder's in-built memory.	For the best audio and video results, the video recorder must be placed facing the researcher but behind participants. The video recording must be set to record onto the memory card and not in the video recorder's in-built memory.

		To determine the appropriateness of the material used in the study		
To determine the length of time for individual pre-test post-test interviews.	• A Pro-Series (DVR-5005 I model) voice recorder	Appendix F2 was read to participants while the audio recorder was set to record.	Each interview took about 15-25 minutes per participant.	No changes to be made.
To determine the length of time of the NDoH health education session.	• Appendix D (NDOH health education programme) or figures 4.2a and 4.2b • A Canon HD Camcorder (Legaria HF Model) • A MiVision 5858D lightweight tripod for the camcorder	The researcher read from her notes (which had the translated information from the health education flipchart (Appendix B2)), while pointing to the visual aids as she read (Wood et al., 2009).	The health education session took about 40 minutes. Participants asked questions about mother-to-child transmission during pregnancy. Having a separate researcher script (translated health education text) made it difficult for the researcher to follow since the NDoH tool has a new section on each page.	The session can be done in less time. This will depend on how interactive the group of participants are and whether there are questions asked. The researcher's script was stuck on the flipchart tool.

Both the participants and the researcher found the questions about “date of birth” (DOB) and level of education difficult, as some participants could for example not remember their own date of birth or when exactly they stopped going to school.

Participants sought clarity in certain health information from the health education session on living with HIV, such as being pregnant or breastfeeding while HIV positive and taking ARVs while pregnant. This information seemed unfamiliar to participants, as has been highlighted by other studies. Most health education programmes for persons with low literacy had not invested time discussing this type of information with patients.

3.7. Conclusion

The pre-experimental phase of the study was described in terms of the development of the pre-test post-test questionnaire, translations, training of the research assistants, and the pilot study. The main development involved the pre-test post-test questionnaire, whose face validity was established by an expert panel. Chapter 3 also described the process of testing the pre-test post-test questionnaire through a series of four phases conducted with participants with low literacy. These development phases lead to the questionnaire changing from multiple-choice to open-ended questions. The chapter ends by providing details of the research objectives, procedures and results, and the pilot study, from which emerged recommendations for the main study.

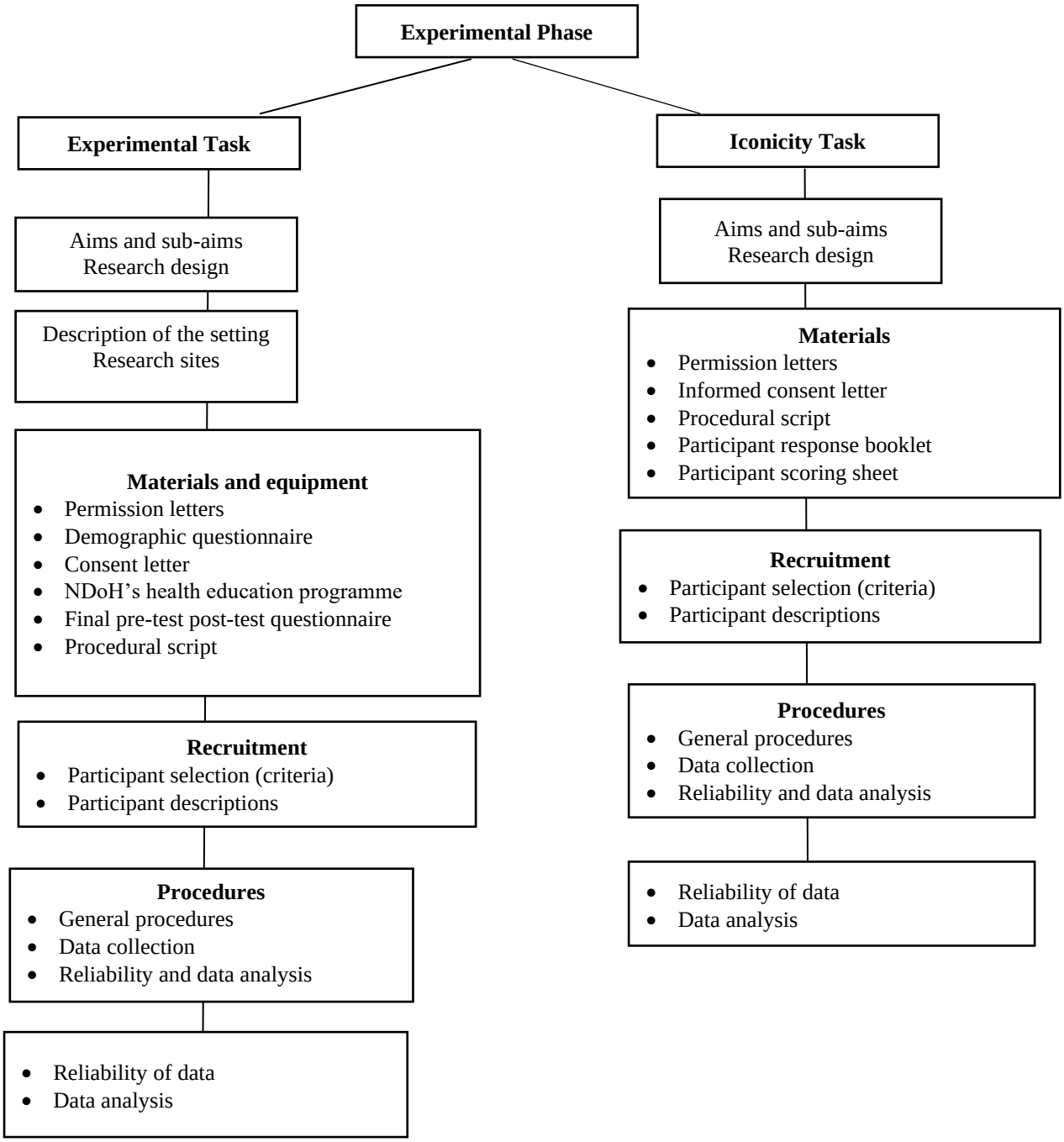
CHAPTER 4
RESEARCH METHODOLOGY

4.1. Introduction

This chapter provides an overview of the methodology followed during the experimental phase of the study. The aims and sub-aims of the study of the study are presented. The experimental phase comprised two tasks: the experimental task and the iconicity task. Each task is presented separately in the chapter, in terms of the aims are presented, followed by the research design and research setting. This is followed by a description of the research sites, recruitment procedures and materials, as well as the general procedures and procedures for data collection, reliability and data analysis for each task.

4.2. The experimental phase

The experimental phase is depicted in Figure 4.1. The figure illustrates the experimental phases of the study, i.e. the experimental and iconicity tasks.



F*igure 4.1*. Schematic representation of the experimental phases of the study

4.3. Aims of the study

The main aim of the study was twofold: first, to determine the effect of visual aids on the understanding of HIV health education in persons who have low literacy (experimental task), and second, to determine the stakeholders' perspectives on the transparency and

translucency of the visual aids used in the NDoH's health education programme (iconicity task).

4.3.1. Sub-aims: Experimental task

In order to explore the main aims, the sub-aims of the experimental task were as follows:

i. To determine the effect of the NDoH's HIV health education programme presented verbally *with* visual aids (Intervention 1) on the understanding of HIV health information in persons with low literacy (Group 1).
ii. To determine the effect of the NDoH's HIV health education programme presented verbally *without* visual aids (Intervention 2) on the understanding of health information in persons with low literacy (Group 2).
iii. To compare the effect of the NDoH's HIV health education programme between Groups 1 and 2, Groups 2 and 3 (control group); and Groups 1 and 3 (control group).
iv. To determine the effect of the level of education on the understanding of HIV health information in persons with low literacy among the three groups.

4.4. Research design

This study adopted an overall quantitative design since the researcher planned all the procedures, from tools to data collection, including the manner in which the procedures were followed (McMillan & Schumacher, 2011). For the experimental task specifically, a multi-group pre-test post-test research design (see Table 4.1) was adopted (McMillan & Schumacher, 2011; Schlosser, 2003a) due to its ability to show effects of one condition (intervention) on another (relative effects), as well as absolute effects – those related to comparison with a control group (Blanche, Blanche, Durrheim & Painter, 2006; Schlosser, 2003a). The advantage of this type of design is that it allows comparison of interventions, both within groups as well as between groups. It is further strengthened by a control group and is strengthened by a control group (Field, 2013).

During the experimental task, the NDoH's HIV health education programme was presented verbally and with visual aids to Group 1 (Intervention 1). Group 2 participants received the NDoH's HIV health education programme verbally, only without visual aids (Intervention 2). During Intervention 2, the researcher still read out the health information but neither showed nor pointed at the visual aids. Participants in Group 1 and 2 had the

opportunity to ask questions of clarity after the session was completed. Group 3 did not receive any programme between their pre-test and post-test and thus served as a control group. However, for ethical reasons, Group 3 did receive the NDoH's HIV health education programme (Intervention 1) after their post-test (Creswell, 2014; Creswell & Creswell, 2017). In this study, the independent variable was the NDoH's HIV health education programme, while the dependent variable was the understanding of HIV health information in persons with low literacy (as measured by the responses on the pre-test and post-test questionnaire).

The pre- and post-test questionnaires were administered on the same day (Theofanidis & Fountouki, 2018) to control for extraneous variables such as participants engaging in discussions about the intervention content in-between the tests (Arndt, Schüler, & Scheiter, 2015). The test administration was conducted by the research assistants, who were blind to the group to which the participant would belong. The design also allowed for the control of threats to internal validity, such as attrition (participants not coming back for their post-test), as well as natural and statistical regression (McMillan & Schumacher, 2011). However, not all threats to internal validity were eliminated, since the selection of participants into the groups was done through non-probability techniques which are prone to bias (McMillan & Schumacher, 2011). However, the assignment to groups was done randomly (Schlosser, 2003b). The pre-test post-test questionnaire was also in the form of face-to-face open-ended questions, which was time consuming to administer. The researcher had to exercise extra caution to be a neutral medium to which participants could respond honestly and freely (McMillan & Schumacher, 2011).

Table 4.1
Multigroup pre-test post-test research design from Schlosser (2003a)

Group	Pre-test	Treatment	Time lapse	Post-test	Treatment
1	O	X^1	30 minutes	O	
2	O	X^2		O	
3	O		30 minutes	O	X^1
			Time lapse (within 1 day)		

Intervention(condition)
X^1= NDoH's HIV Education programme with visual aids
X^2= NDoH's HIV Education programme without visual aids
O=pre-test post-test

4.5. Description of the setting

The current research study took place in the province of KwaZulu-Natal (KZN) in South Africa. KZN is the second most populated province in South Africa with a population of 10.9 million residents. Population numbers are larger in the age group 0-34 years, after which the numbers in the older age groups gradually decline (Statistics South Africa, 2015; 2016). The majority of South Africans who speak isiZulu reside in KZN (Engelbrecht et al., 2008; Statistics South Africa, 2016). KZN has vast rural areas and 15.7% of people live in traditional dwellings. In addition, this province ranks third among households who depend on pensions, social insurance and family allowances, with more than 50% of the population being social grant beneficiaries (Statistics South Africa, 2016).

Although KZN has 22% of persons above the age of five who are enrolled in school, 5.4% of the population 20 years and older have reportedly never received any formal schooling (Statistics South Africa, 2017b). This study was conducted in KZN because it was anticipated that there would be a substantial number of adults above 20 years old who had low levels of literacy, and who also spoke isiZulu (Statistics South Africa, 2016, 2017b). This group of adults is likely to be under-researched, as most studies on persons with low literacy tend to focus on the elderly (Delgado & Ruppar, 2017; Lee et al., 2009) (see the scoping review in Section 2.4.4). In addition, since the researcher is fluent in isiZulu, which is her home language, this was an advantage since she was administering the intervention.

The KwaZulu-Natal Department of Health manages 11 health districts. These health districts consist of approximately 561 primary health care (PHC) clinics, as well as 12 regional, 47 district, and 23 specialised chronic care or psychiatric hospitals. The research took place within one health district in KZN, the eThekwini district, which is densely

populated, with approximately 3.52 million people in 2015/16. eThekwini contains the city of Durban, which is the economic hub of the province. The eThekwini district has 114 PHC facilities, with three district, six regional and one tertiary hospital (KwaZulu-Natal Department of Health, 2018). These clinics are situated in 110 wards that cover a surface area of 2 297km^2. Despite being highly urbanised, the district has pockets of rural communities that exist on the outskirts of the west, south and north sub-districts, where access to services in the areas is affected (see Figure 4.2). The two DoH clinics from which data was collected for this study are based in the South sub-district, which is further from the CBD and more rural than other sub-districts of eThekwini (KwaZulu-Natal Department of Health, 2018).

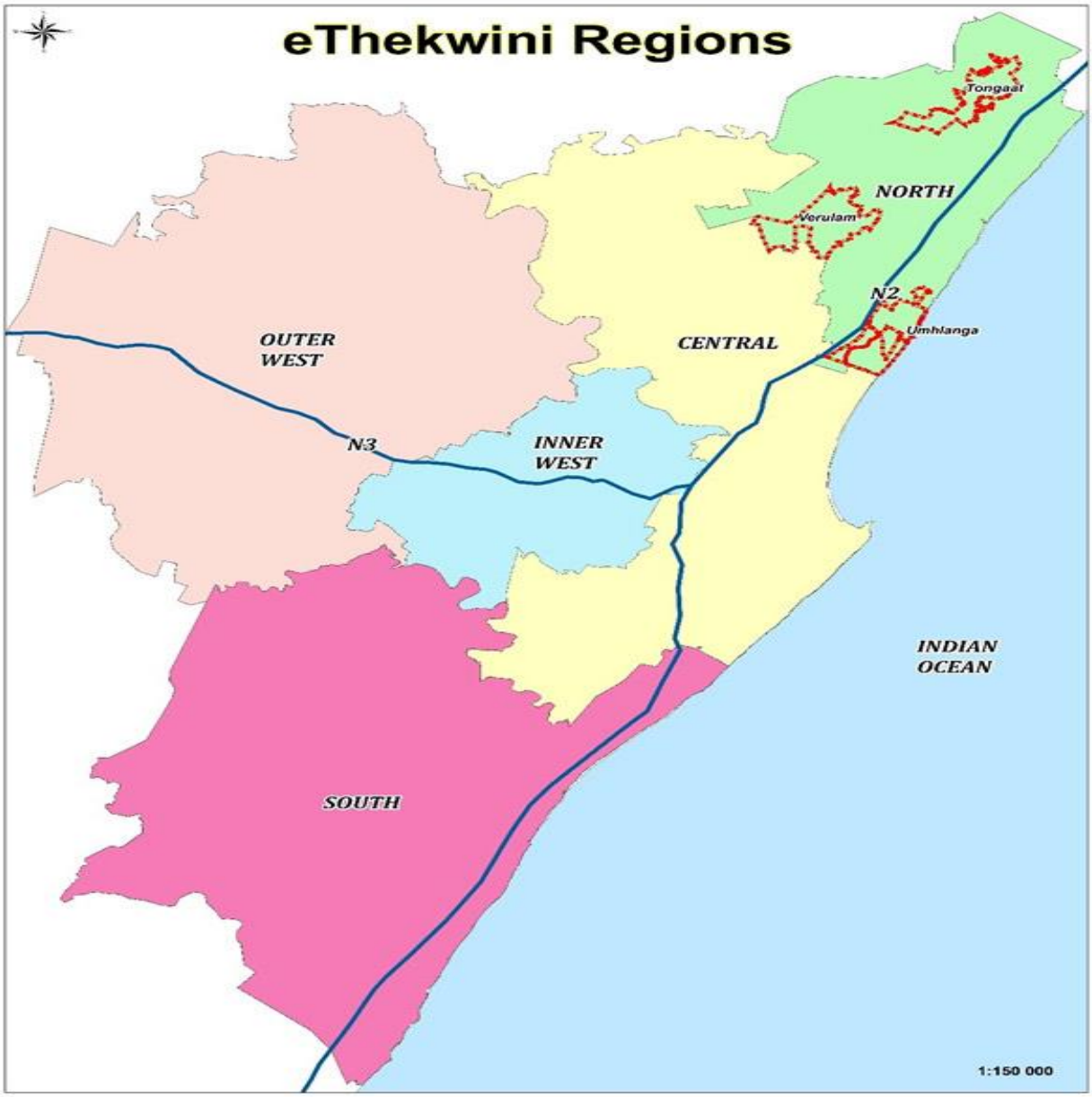


Figure 4.2: Map of eThekwini sub-districts (regions)
Source: KwaZulu Natal Department of Health (2016).

4.6. Materials

This section explains the materials used in the experimental task.

4.6.1 Ethics approval

An online application process for ethical approval was followed through the submission of a proposal. Approval from the ethics committee of the Faculty of Humanities, University of Pretoria, was obtained (Appendix L).

4.6.2 Permission letters

Permission letters were developed to seek permission from the KZN Department of Health (DoH) where the study took place. In addition, permission letters for the various research sites and the CBOs were developed to seek their permission to participate in the study. All permission letters stated the voluntary nature of participation in the study (McMillan & Schumacher, 2011) and participants' right to withdraw from the study at any time without any negative consequences (see Appendices M1, M2,N1, M2, O, P, and Q). Furthermore, the letters provided information regarding data handling and storage to ensure confidentiality of the participants' responses.

4.6.2.1. Letter requesting permission from the National Department of Health (NDoH)

The letter sent to the NDoH included information about the purpose of the study as well as data collection procedures and requested permission to use the NDoH's Health Education Programme. This request outlined that the researcher would not alter the NDoH's tool in any way but intended to use it to provide information on HIV during the experimental task of the study (Appendix M1). Approval from the NDoH was obtained via an email (Appendix M2).

4.6.2.2. Letter requesting permission from the KZN DoH

The letter sent to the KZN DoH stated the researcher's request to do research in the primary health care (PHC) clinics in KZN (Appendix N1). The letter also stated that this request stemmed from a desire to access participants who met the study's criteria. The KZN DoH provided permission to conduct the study in two clinics in the eThekwini South sub-district (Appendix N2).

4.6.2.3. Letter requesting permission from the district office and the DoH clinics (research sites)

Permission was obtained from the Chief Director and Senior Medical Managers for the research to take place in their district (Appendix O). Furthermore, a permission letter (Appendix P) was provided to the specific clinics outlining the recruitment procedures, the selection criteria for potential participants and the request for space at the clinic. The facility managers at the two clinic sites completed an official form obtained from the KZN DoH, granting permission for the researcher to conduct the study in their clinics (Appendix Q).

4.6.3 Demographics questionnaire

The demographics questionnaire was developed to obtain specific demographics such as age, gender, level of education and employment status of participants (Wali et al., 2016). The questionnaire consisted of six closed questions and one open-ended question (see Appendix K1).

Table 4.2

Justification of the questions used in the demographic questionnaire

Question no.	Area	Justification
1	Gender	To determine the gender equation of the participants. Research shows that women tend to seek medical help more easily than men (Dong et al., 2007; Woldemicael & Tenkorang, 2010).
2	Age	To determine participants' eligibility in terms of age (between 18-65 years). This selection criterion was used so that only adults (as they are defined by Statistics SA, 2016; 2017a) would be selected. Adults over the age of 65 years were excluded since their reading ability and literacy level could have been affected by other age-related factors and not just their level of education (Delgado & Ruppar, 2017; Wali et al., 2016).
3	Home language	To ensure that participants could speak and understand isiZulu, which is widely spoken in KZN (Engelbrecht, 2008). The researcher's home language is isiZulu, and the study was conducted in isiZulu to accommodate participants in their home language.
4 & 5	Employment status and type of employment	To observe the employment status of participants in the study since employment status is associated with low literacy (Wali et al., 2016). In KZN only 53% of households have an adult income earner (Hall, 2011).
6	The highest level of education	To determine the participants' literacy level, which is a key criterion in this study. The study sought a person who has less than seven years of formal schooling or did not progress beyond Grade 7 at school (Aitchison & Harley,2006; Carstens et al., 2006).
7	Family's monthly household income	Household income is said to correlate with low literacy, as does employment status. As mentioned above (Hall, 2010; Al Sayah et al., 2012), KZN has only 53% of households with an income earner (Hall, 2011).

4.6.4 The informed consent letters

The informed consent letters to participants were developed in English and also translated into isiZulu. The translation process was described in Section 3.6. The informed consent letters described the nature of the study, procedures to ensure the confidentiality of the data and data storage. The letters also explained that participation was voluntary and that participants could withdraw from the study at any time without negative consequences. The letter stated an estimation of the time that it would take to participate in the study and explained what participation in the study entailed. The consent letters used simple language and no jargon (Kripalani et al., 2008) to accommodate the participants' literacy levels (Appendices H1, H2, R1 and R2). Participants could use their thumbprint on the form to show consent if they preferred (Shisana et al., 2014).

4.6.5 The NDOH's health education programme

The NDoH's health education programme was developed by the South African National Department of Health with the aim of improving clinical outcomes and supporting patients' adherence to chronic treatment (National Department of Health: South Africa, 2016). The programme is the result of continued collaboration between various stakeholders, including civil society organisations. The topics in the NDoH's health education programme are a build-up from a previously developed programme for persons living with HIV, namely the Integrated Access to Care and Treatment (I-ACT). The objectives of I-ACT are to provide education, and to empower and retain people in care. I-ACT is provided either exclusively for persons living with HIV (closed support groups) or in groups that include the treatment supporters of persons living with HIV (open groups). Both these open and closed groups allow for discussions between health care professionals (or support group facilitators) and participants. I-ACT sessions cover topics such as understanding living with HIV, available treatment and care, as well as how to live healthy with a chronic illness and engage in ongoing treatment services such as testing ("Integrated Access to Care and Treatment," 2013; National Department of Health South Africa, 2016). The topics of the NDoH's health education programme ("Education on HIV and ART" section) are based on those of I-ACT.

The NDoH's health education programme is available to various stakeholders, including civil society organisations that aim to improve health outcomes in the communities. The programme, which comes in the form of a flipchart tool, was used as the intervention (independent variable) to enable the provision of health information with text and visual aids

(see Figures 4.2a and 4.2b). For the experimental task, the "Education on HIV and ART" section of the programme was used to provide health education (Appendix D).

Table 4.3

The "Education and ART" sections of the NDoH's health education programme

Section of the NDoH's health education programme
What is HIV?
What are CD4 cells?
What happens when your immune system gets too weak?
What are the signs and symptoms of HIV?
How is HIV spread?
How is HIV treated?
How is ARV treatment taken?
Do ARVs have side effects?
Why is family or a friend's support important when you are on ARV treatment?
What are the risks of poor adherence?

The readability of the English version of the NDOH health education programme was assessed using the Flesch-Kincaid Grade Level Index Formula (Cotugna, Vickery, & Carpenter-Haefele, 2005; Stockmeyer, 2009). This index provided results for two tests, namely the Flesch Reading Ease test, which indicated how easily the document read, and the Flesch-Kincaid Grade Level test, which refers to a readability grade level based on the US grade level (Flesch & Kincaid, 2017). This index was selected due to its availability in Microsoft Word and convenience in assessing the readability level of health education materials (Cotugna et al., 2005). The Flesch readability test scores are interpreted in Table 4.4.

Table 4.4

Interpretation of Flesch-Kincaid Readability Test scores

Flesch-Kincaid Reading Ease Score	Interpretation of score	Flesch-Kincaid Reading Grade Level
90.0-100.0	Easily understood by an average 11-year-old	Under Grade 7
60.0-70.0	Easily understood by 13 to15-year-olds	Grade 7 or above
0.0-30.0	Best understood by university students	University level (post-matric in SA)

Source: Stockmeyer (2009)

According to Table 4.4, the higher the Flesch-Kincaid score, the easier the readability of the content. Therefore, a score of 70 and higher is recommended for persons with low

literacy. The English version of the NDoH's health education programme had a Flesch Reading Ease score of 70.7, its Flesch-Kincaid Grade Level was at Grade 7 and it was considered to read at the recommended level for persons with low literacy. Unfortunately, the Flesch-Kincaid test is applicable only to English text (Flesch & Kincaid, 2017), so the test was not applicable to the translated isiZulu version of the programme used in this study.

The final version of the NDoH's health education programme was presented in the original A4-sized ring-bound flipchart format, which could be placed on the table in an upright triangle. The researcher read from the side that showed the health information demonstrated by a small visual aid in the top right-hand corner of the page (Figure 4.3a). The side of the flipchart facing the participants showed the idea and only the visual aids pertaining to the health information that was provided by the researcher (see Figure 4.3b). The NDoH visual aids were colour pictograms.

Figure 4.3a: NDoH's health education flipchart facing the researcher

Figure 4.3b: NDoH's health education flipchart facing the participant

4.6.6 The final pre-test post-test questionnaire

The development of the pre-test post-test questionnaire is described in Chapter 3 (Section 3.5). The final questionnaire consisted of 18 open-ended questions covering nine sections of the NDoH's health education programme (see Table 4.5). Five questions in this questionnaire were derived in line with the two items taken from the BEHKA (Osborn et al., 2010). These were Q2: "Why do we test for the CD4 count (in the blood)?"; Q5: "What are CD4 cells?"; Q6: "Why is a viral load test done?"; Q10: "After how many months on ARVs should one have their first viral load test done?"; and Q17: "When should you have another viral load test after you have had your very first one?" (Appendices F1 and F2).

Table 4.5

The "Education and ART" sections of the NDoH's health education programme used in the pre-test post-test questionnaire

Section of the NDoH's health education programme	Question/s
What is HIV?	1,7
What are CD4 cells?	2, 5
What happens when your immune system gets too weak?	3, 16
What are the signs and symptoms of HIV?	4
How is HIV spread?	8
How is HIV treated?	6, 10, 13
How is ARV treatment taken?	11, 14, 17
Do ARVs have side effects?	Not included
Why is family or a friend's support important when you are on ARV treatment?	15
What are the risks of poor adherence?	9, 12, 18

The questionnaire was printed on an A4 page and came in a table format with three columns. The first column was the question, the second column was space for the researcher to transcribe the participant response and the last column was for scoring the participant's response. The scoring column was only used during data capturing and analysis.

4.6.7 Procedural script: experimental task

The procedural script for the experimental task introduced the researcher to the participants, outlined the purpose of the study and explained the procedures of the day. The script combined the procedures for the pre-test, the implementation of the NDoH's health education programme, and post-test procedures. The scripts also emphasised the audio and video recordings and reassured participants that the rationale of the exercises was to collect their opinions and knowledge on certain health-related information (Appendix I1). The script was converted into a checklist (Appendix I2) that was used to determine procedural reliability (Schlosser, 2002).

4.6.8 Recording equipment

A Pro-Series (DVR-5005 I model) recorder was used to audio record all the pre-test post-test questionnaire interviews. In addition, a Canon HD Camcorder (Legaria HF Model) was used to video record the intervention sessions during the experimental task. The camera

was mounted on a MiVision 5858D lightweight tripod, which was about 1.5m high when extended fully (see Figure 4.4). A 32 GB SD memory card was used to record the sessions. Recorded sessions were then saved on a Passport hard drive and a memory stick and the files were password protected.

Figure 4.4: Positioning of the video camera and stand during the health education session

4.6.9 Stationery

Two (6 cm in diameter) round *"Trodat"* thump print stamps were used during the informed consent procedures.

4.7. The experimental task

Next, the experimental task is discussed in terms of the research sites, participants' recruitment and demographics, general procedures and data collection procedures.

4.7.1 Research sites

Participants in the experimental task were recruited from two primary health care (PHC) clinics in two semi-rural areas in the South sub-district of eThekwini. These clinics were allocated to the researcher by the district since they are situated in a district with the most rural areas in KZN. These two clinics were open from 07:00 to 16:00, from Mondays to Fridays.

4.7.2 Recruitment and sampling

The DoH clinics have been set up in three 'streams', which is a move towards a model called the 'ideal clinic' status. This model requires that clinics separate clients into three streams: minor ailments, chronic illness, and maternal and child health services (National Department of Health, 2018). This allows patients coming for different services to enter the queuing system in separate areas and to ease the patient flow and reduce waiting time at the clinics (National Department of Health, 2018).

In the two clinics where the current study took place, the researcher recruited persons from all three of the streams' waiting areas. She provided a brief description of the study and asked people who would be interested to know more about the study to speak to her in a designated room. The designated room was a consultation room that the clinic manager allocated to the researcher for data collection. Recruitment numbers are shown in Table 4.2.

Table 4.6.

Recruitment – experimental task

Research site	Catchment population	Number of participants who were informed of the study	Number of participants who met the study criteria (as determined through the demographic questionnaire)	Number of participants who signed a consent form	Number of participants who remained to complete the experimental task
Clinic A	38965	625	190	86	78
Clinic B	27626	50	25	14	12
Total		675	215	100	90

From Table 4.6 it is evident that 215 participants met the selection criteria and a total of 100 agreed to participate in the study. A sample size of 90 participants was deemed appropriate as was determined in a prior study that calculated an expected medium effect size with a sample of about 30 participants per group, and a statistical power of 0.80 (Kheir et al.,

2013). Table 4.6 shows that most of the recruitment took place in clinic A and not in clinic B. The attrition between the number of participants who signed consent forms and those who were available at the time of data collection could be attributed to time and transport constraints. Since participants were dependent on the availability of common transport, some needed to leave as transport became available (which was before they could wait out the duration of the intervention).

4.7.3 Participant selection and sampling

Participants in this study were selected using non-probability convenience sampling. This style of sampling was selected because the study sought participants who would be readily available and accessible at the specified research sites (Etikan, Musa & Alkassim, 2016). Moreover, the study purposefully sought to select participants who spoke isiZulu as a home language and had low literacy (Babbie & Mouton, 2001; Bryman, 2012). The advantage of this sampling technique was that potential participants could be accessed easily and be assumed to be homogenous (Mackey & Gass, 2015). However, the main disadvantage of this sampling method is that the sample could be biased or over-represent a particular group of people (Etikan et al., 2016). Table 4.5 lists the participant selection criteria, the motivation behind the criteria and the measure used. This was done to recruit participants with specific characteristics required for the study (McMillan & Schumacher, 2011).

Table 4.7.

Participant selection criteria

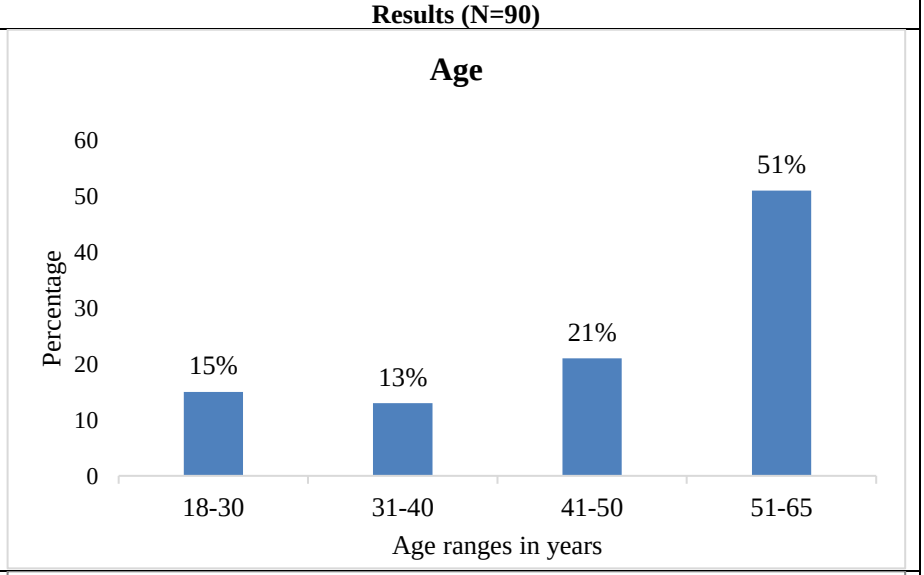
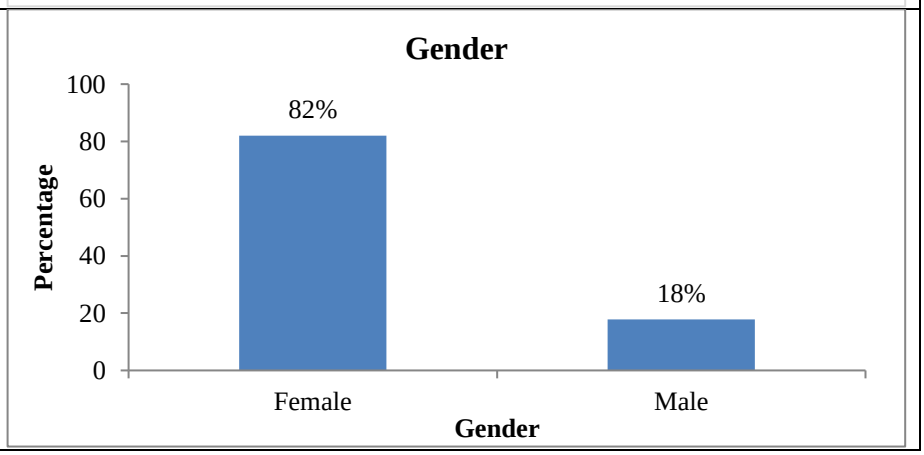
Participant criteria		Justification	Measure
i)	**Persons with low literacy were defined as having completed less than 7 years of formal schooling (Hoogwegt et al., 2009)**	In this study, a person with less than seven years of formal schooling was considered as having low literacy (Carstens et al., 2006; Dowse & Ehlers, 2001; Hoogwegt, 2007). Low literacy has been found to be closely associated with a poor understanding of health information (Al Sayah, Fatima Majumdar et al., 2012; Forsyth, Vandormale, Kershaw, & Grobelaar, 2008).	Demographic Questionnaire (Appendix K2)
ii)	**Persons between the ages of 18 and 65**	This criterion was used due to the need to include consenting adults in the study. The study was not focused on children who were still developing their literacy and attending school. The study focused specifically on adults with low literacy, as defined in Section 4.6.2.	Demographic Questionnaire (Appendix K2)
iii)	**Persons who spoke isiZulu as their first language**	The entire study was conducted in isiZulu as the language is widely spoken in KZN.	Demographic Questionnaire (Appendix K2)

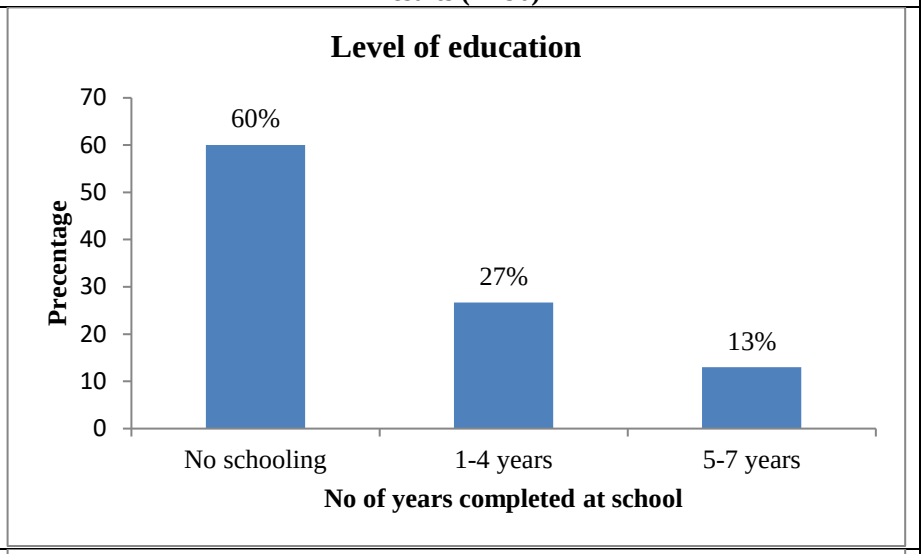
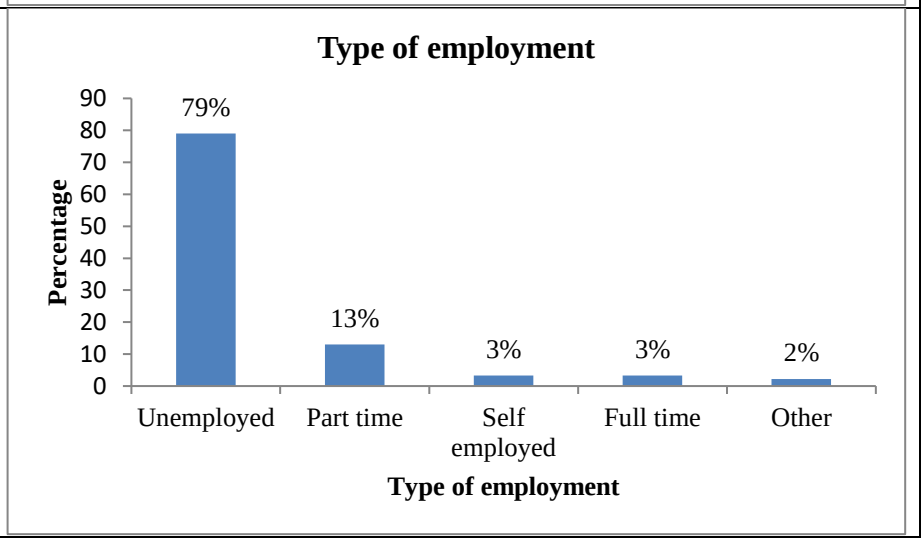
4.8. Participant descriptions: Experimental task

The 90 participants who participated in the experimental task are next described in terms of their age, gender, educational level, employment status and type of employment (Table 4.8).

Table 4.8.

Descriptive demographics of the experimental task participants (N=90)

Descriptive demographics	Results (N=90)
Age of participants 18-30 years: 15% (n = 13) 31-40 years: 13.% (n = 12) 41-50 years: 21% (n = 19) 51-65 years: 51% (n = 46)	
Gender Most of the participants 82% (74) were female, while only 18% (16) were male**.**	

Descriptive demographics	Results (N=90)
Level of education Approximately 13% (11) of the participants had no schooling, 27% (25) had 1 to 4 years of education and the majority (60% or 54) had completed 5 to 7 years of education.	
Type of employment In line with the low rates of employment in KZN (Hall, 2011; Statistics South Africa, 2017a), the majority of the participants 79% (or 71) were not employed. Only 3% (3) participants had full-time employment, 3% (3) were self-employed, while 13% (11) were employed on a part-time basis.	

Further descriptive demographics for the three experimental groups are also presented in Table 4.9 below.

Table 4.9

Descriptive demographics- age and level of education of each experimental group (N=90)

Demographics characteristic	Group 1 (with visual aids) (n=30)	Group 2 (without visual aids) (n=30)	Group 3 control group(n=30)
	Age -*n* (%)		
18-30 years	7 (23.3%)	5 (16.7%)	1 (3.3%)
31-40 years	5 (16.7%)	5 (16.7%)	2 (6.67%)
41-50 years	4 (13.3%)	7 (23.3%)	8 (26.7%)
51-65 years	14 (46.7%)	13 (43.3%)	19 (63.3%)
	Level of education *n* (%)		
No schooling	3 (10%)	4 (13.3%)	4 (13.3%)
1-4 years of education	9 (30%)	7 (23.3%)	9 (30%)
5-7 years of education	18 (60%)	19 (63.3%)	17 (56.7%)

According to Table 4.9, approximately 45% participants in both groups 1 and 2 were between the ages of 51-65 years and only 63% of participants in the control group. Across all three groups there were very low numbers of persons who had never been to school (less than 14%). In both groups 1 and 3, 30% of the participants had between 1-4 years of education. Group 2 had the highest number of persons with 5-7 years of education (63%).

4.9. Procedures: Experimental task

Once ethical approval was obtained from the Ethics Committee at the University of Pretoria, the KwaZulu-Natal DOH and the eThekwini District clinics, data collection could commence.

4.9.1 General procedures: Experimental task

Once participants were recruited, they met the researcher in a room and the informed consent letter (Appendix H1/H2) was read to them in isiZulu (Bhutta, 2004; Schmidt et al., 2004). Participants were encouraged to ask questions to gain clarity and express their dissent where applicable (Bhutta, 2004; Karlawish, 2003). They were also allowed the opportunity to weigh the potential risks and benefits of participation in the research (Bhutta, 2004; Karlawish, 2003). Participants were not required to write, but instead were assisted to show their agreement by making a thumbprint after the researcher had ticked the appropriate box on the form (Shisana et al., 2014). The researcher signed each form and inserted the date. Thereafter the demographic information was completed. The participants were asked the questions and the researcher wrote down their responses in Appendix K2.

Once the demographics were ascertained, the researcher attempted to allocate the participant to a group by using paired randomisation, which is a desirable way to allocate participants to groups though difficult to obtain (Schlosser, 2002). Participants in each group were paired according to categories for age and level of education as the two key selection criteria (see Table 4.10). As eligible participants came into the data collection room, their age and level of education were noted, and they were assigned to one of the three groups. For age, participants were divided into two age groups – 18-35 and 36-65 years – in an attempt to ensure that the groups were similarly compiled in terms of younger (18-35 years) and older adults (36-65 years). It was anticipated that the performance of older adults might be affected by old age (Delgado & Ruppar, 2017; Wali et al., 2016). Participants level of education was

divided into two categories – "no schooling" for participants who had never attended school; "1-4 years of education"; and "5-7 years of education". This was done to assure that the three groups were matched as closely as possible on age and level of education (Altman & Bland, 1999). The group to which each participant would be allocated was decided initially through assessing the composition of each group, since the aim was to have groups as equivalent in characteristics as possible.

Table 4.10

List for participant allocation to the experimental task groups

The highest level of education obtained			**Age**		**Group allocation**
No schooling	0-4 years	5-7 years	18-35yrs	36-65 yrs.	(1, 2 or 3)

The researcher managed the allocation of the participants to one of the three groups (Appleby & Maden, 1991). However, the participants and the research assistants were blind as to the exact groups in which the participants were placed (Kalichman et al., 2013; Viera & Bangdiwala, 2007). The research assistants, and not the researcher, completed the pre-test post-test questionnaire and it was therefore essential that the assistants were blind to the group that participants were in.

4.9.2 Data collection procedures: Experimental task

Data collection procedures for the experimental task took place in the interview room. All sessions for the pre-test post-test questionnaire were audio recorded and video recorded for data and procedural reliability respectively. The implementation of the NDoH's health education programme was also video recorded for procedural reliability (Schlosser, 2002). The video camera and stand were placed behind the participants, facing the flip chart and the researcher (See figure 4.4).

4.9.2.1. Pre-test questionnaire

All participants commenced by completing the pre-test questionnaire. The research assistant and participant sat opposite each other and the research assistant read the questions in the first column in isiZulu (Appendix I2). The research assistant read each question in the interview schedule and recorded the participant's responses in the response booklet. This approach was selected to enable the participants to respond without the expectation to write

down their own responses. This was important for this study since all participants were persons with low literacy (Kripalani, Bengtzen, Henderson, & Jacobson, 2008).

The research assistant patiently waited for the participant to respond. Questions were repeated if necessary or if requested by the participants. The research assistant also provided non-contingent feedback such as "you are doing a good job" or "keep going" *(usaqhuba kahle (noma) qhubeka*), while conducting the pre-test. The research assistant then recorded each participant's answer verbatim in the second column of the same form (Appendix I2). This pre-test was done in a one-on-one structured interview format that was audio recorded.

4.9.2.2. NDOH's health education programme (intervention)

After completion of the pre-test with the research assistant, the participant met with the researcher. The researcher implemented the health education programme with the participants individually in isiZulu. The NDoH's health education flipchart tool (Figures 4.3a and b) was placed on the table as explained in Section 4.5.3. The researcher followed the steps outlined in the procedural script (Appendix J1).

With Group 1 (intervention 1), the researcher stood in front of the participants with the flipchart on the table next to her. By following the procedural script (Appendix J1), the researcher read the health information (see Figure 4.2a) out loud to the participant (Clark & Paivio, 1986; Kim & Lee, 2016), while pointing to the corresponding visual aids as she did so. Participants could follow the visual aids on the side of the flipchart that faced them (see Figure 4.2b).

For participants in Group 2, the researcher stood in front of the participants with the flipchart tool on the table next to her. However, this time the researcher only read the health information out loud to the participants (Kim & Lee, 2016) and did not point to the visual aids.

Participants in groups 1 and 2 were then offered a 30-minute refreshment break as suggested by Arndt et al. (2015). Thereafter the research assistant completed the post-test questionnaire with the participants individually by reading the questions to the participants and writing their responses as was done in the pre-test.

Group 3 participants completed their pre-test questionnaire. They were then offered a 30-minute refreshment break (Arndt et al., 2015). Next, the research assistant administered the post-test questionnaire to participants in the same way that the pre-test had been conducted. Group 3 participants received the NDoH's health education programme with visual aids, like Group 1. Participants in all groups were provided with a token of appreciation and thanked for their participation in the research.

4.10. Reliability: Experimental task

Procedural and data reliability procedures for the experimental task were strictly adhered to.

4.10.1 Procedural reliability: Experimental task

In accordance with the guidelines provided by Schlosser (2002), all videos were assessed for procedural reliability. An independent inter-rater watched 25% of the randomly selected videos recorded during Intervention 1 (for the group that received the NDoH's health education intervention verbally, with visual aids), and 25% of videos for Group 2 (the group who received the NDoH health education intervention verbally but without visual aids). The rater watched each video and completed the script for adherence to the experimental task procedures (Appendix I2). Procedural integrity was calculated according to an approach that ensures accuracy in the reporting on treatment integrity (Schlosser, 2002). Each step was scored '√' if done and 'X 'if not done on the checklist. Procedural integrity was calculated according to the following formula (Schlosser, 2002):

$$\frac{\text{Number of correctly computed steps}}{\text{Total numbers of steps}} \times 100$$

The calculations for procedural reliability are found in section 5.2.1

4.10.2 Reliability of the pre-test post-test procedures

The inter-rater also listened to approximately 40% of a randomly selected audio recording of the pre-test post-test questionnaire (Schlosser, 2002). These were selected by the inter-rater from a folder of saved audios. Again, the rater listened to each audio and completed the adherence-to-procedures script (Appendix J1) as was done for the video recordings (Schlosser, 2002). The reliability of the pre-test post-test procedures was also calculated according to the formula presented in Section 4.9.1.

4.10.3 Data reliability: Pre-test and post-test questionnaires

Each participant in the experimental task had a set of two completed surveys, both marked with a unique participant number. Participants gave their responses and the researcher recorded each response. Afterwards, the model answer sheet with correct responses from the NDoH's health education programme was used to determine correct and incorrect responses (see examples in Table 4.9).

The last column for each question was a place for the researcher to place the code for the response. The number "1" was given for responses scored as correct and "0" was for the incorrect responses. Each participant's total pre-test and total post-test scores were calculated by adding together all the scores marked "1".

Together with this data, each participant's coded demographic data was captured on a spreadsheet in Microsoft Excel (2010) in one row. Once all data was captured, steps were taken. Incorrect data was corrected and noted. Missing data, where participants could not provide a response or opted not to answer the question, was left blank, as this would automatically be marked "999" by the software package used (the Statistical Package for the Social Sciences (v5) (SPSS) when the data set was uploaded into the system (on the SPSS data set).

An inter-rater subsequently examined the transcribed answers and checked that the scoring was correct, as well as that the score from the pre-test post-test questionnaire was correctly captured on the Excel sheet. The rater marked discrepancies and these were recorded and used to calculate data reliability. All discrepancies were corrected on the Excel sheet. Data reliability was calculated according to the following formula:

$$\frac{\text{Number of correctly captured data entries}}{\text{Total number of data entries to be captured}} \times 100$$

The calculations for data reliability are found in section 5.2.3

Once errors found were corrected by the raters, the data was uploaded to SPSS. The totals for the pre-test and post-test scores for each participant were used for data analysis.

Table 4.11

Examples of responses for the pre-test post-test questionnaire

	Questions	Correct response	Transcription/ score	Incorrect response	Transcription/ score
Q3	What is one of the symptoms that could indicate that someone has contracted HIV?	One of the following: fatigue, night sweats, flu-like symptoms, weight loss.	1	Light - coloured hair, light-coloured skin.	0
Q7	Why is the HIV virus clever?	Because it mutates / changes and uses the body's own cells to make copies of itself.	1	Because it kills.	0
Q9	What would happen if you don't take ARV medicines as you should?	The HIV virus would multiply in the body/You develop resistance to medicines/You get opportunistic infections/You get sick.	1	You die.	0
Q10	After how many months on ARVs should one have your first viral load test done?	At 6 months.	1	After 3 months.	0
Q11	Why is it helpful for a breastfeeding mother to be on ARV medicines?	To keep herself healthy and reduce the chances of infecting the baby with HIV.	1	It is not helpful.	0
Q13	How do ARV medicines suppress the HIV virus?	It stops it from multiplying/It makes it tired/ It makes it to become less.	1	By making you healthy.	0
Q18	What happens when the HIV virus encounters a few ARVs in the blood?	It multiplies/It transforms itself/It becomes able to resist HIV/The ARVs will no longer kill your HIV.	1	You die.	0

4.11. Data analysis

Prior to data analysis, the data collected for this study was prepared and subjected to reliability procedures

4.11.1 Descriptive statistics

Descriptive statistics (see Table 4.11) were used to provide an overview of the data obtained and to identify variability in scores (Bors, 2018). The Shapiro-Wilk test was used to determine the distribution of samples in each group and is appropriate to test for samples with less than 200 participants (Field, 2013).

Depicting measures of central tendency also aided in making a justification for testing assumptions related to the sub-aims of the two experimental tasks (Bors, 2018). Frequency distributions (Bors, 2018) were used to assess properties of the distribution of the scores and to indicate possible relationships or challenges with the data (Fields, 2013).

Table 4.12

Descriptive statistics

Name of descriptive statistic	Aim of the descriptive statistic	Description of test	Justification
Shapiro-Wilk Test	To provide an overview of the data obtained and to identify variability in scores (Bors, 2018).	Assessment of the distribution of the data.	Assesses the distribution of the data for samples less than 200 (*p* must be > 0.05).
Frequency distributions		The determination of how many times each score appears (Fields, 2013).	Assesses properties of the distribution of the scores. To indicate possible relationships or challenges with the data (Fields, 2013).
Measures of central tendency		The arithmetic average of the observations. The value that divides the rank-ordered observations in half.	Aids in making a justification for testing assumptions related to the sub-aims of the experimental and iconicity tasks (Bors, 2018).
Measures of spread		The difference between the largest and smallest value in the data. The range of the middle (50% mark) of the rank-ordered observations. The square root of the variance.	

Source: Adapted from Bors (2018) and Field (2013)

4.11.2 Statistical analyses

Statistical analyses were run on SPSS (v5). The variables in the experimental task were evaluated using non-parametric tests that were selected due to the distribution of the data (Fields, 2013). The level of significance for both tasks was set at $p<0.05$. The analytical techniques are depicted in Table 4.11.

Table 4.13

Statistical tests computed for the experimental task and justifications for their use

Sub-aims of the experimental task	Statistical test run	Justification
Sub-aim i): To determine the effect of the NDoH's HIV health education programme presented verbally *with* visual aids (Intervention 1) on the understanding of HIV health information in persons with low literacy (Group 1).	Wilcoxon signed-rank test: A non-parametric equivalent to the dependent t-test. Used to investigate any change in scores from one time point to another, or when individuals are subjected to more than one condition (Bors, 2013).	To compare the difference in pre-test post-test scores for groups 1 and 2 (Fields, 2013). Level of significance was set at $p<0.05$.
Sub-aim ii): To determine the effect of the NDoH's HIV health education programme presented verbally *without* visual aids (Intervention 2) on the understanding of health information in persons with low literacy (Group 2).		
Sub-aim iii): To compare the effect of the NDoH's HIV health education programme between Groups 1 and 2, Groups 2 and 3 (control group), and Groups 1 and 3 (control group).	Kruskal-Wallis H test: A non-parametric test used to compare performance between several independent groups (Kline, 2011).	To compare the performance in pre-test-post-test scores across the three experimental groups (1, 2 and 3) (Fields, 2013). The level of significance was set at $p<0.05$.
	Mann-Whitney U test: A non-parametric test used to compare significant scores where there are more than two different interventions conditions (Fields, 2013); where *p* must be <0.05.	Used when you have more than two groups experiencing different conditions such as in the experimental task where Groups 1, 2 and 3 received different forms of the intervention.
	Effect size: The magnitude of the difference between two or more groups, usually the difference between mean or median outcomes in two different intervention groups (Sullivan & Feinn, 2012).	To test the null hypothesis 4a, 4b, and 4c where a sample is small and p-value can be confounded by the sample size (Sullivan & Feinn, 2012).
Sub-aim iv): To determine the effect of the level of education on the understanding of HIV health information in persons with low literacy among the three groups.	Two-way analysis of covariance (ANCOVA): Used when one wants to statistically control for the possible effects of one or more confounding variables (covariates). This is useful when you suspect that your groups differ in performance, based on some variables that may influence their performance on the independent variables (the treatment) (Pallant, 2010).	To ascertain whether the level of education had an effect on the understanding of HIV health information in each group.

Table 4.13 shows that the Wilcoxon signed-rank test was used to compare the distribution (medians) of scores among the groups and determine the effect size (Fields, 2013). Effect sizes were reported as small if Cohen's d_a was between 0.0 and 0.2, medium if Cohen's d_a was between 0.2 – 0.8 and large if Cohen's d_a was greater than 0.8 (Cohen, 1988). The Kruskal-Wallis H test was run for comparisons of the difference in post-test scores across all three experimental groups. The Mann-Whitney test was used to determine comparisons of scores between two groups experiencing two different conditions (Field, 2013).

4.12. The iconicity task

The next section discusses the data collection procedures of the iconicity task.

4.12.1 Sub-aims: Iconicity task

The aim of the iconicity task was to determine stakeholders' perspectives on the transparency and translucency of the visual aids used in the NDoH's HIV health education programme.

4.12.2 Research design: Iconicity task

The research design for the iconicity task was a survey that was conducted using a semi-structured interview that was administered individually. Using this interview style followed the same strategy that had been adopted in similar studies that investigated the iconicity of visual aids (Kheir et al., 2013; Roberts et al., 2008). The researcher read each question in the interview schedule and recorded the participant's responses in the response booklet. This approach was selected to enable the participant to respond without the expectation to write down their own responses since they were persons with low literacy (Kripalani et al., 2008). A survey was chosen because the aim was to describe the participants' thoughts and experiences on the transparency and translucency of visual aids used in the NDoH's health education programme (Fink, 2003).

According to McMillan and Schumacher (2011), the survey approach is desirable for the iconicity task, since semi-structured interviews allow for the researcher to minimise bias. An interview also has flexibility, given that participants can respond from their own viewpoint. In the current study, the interview approach furthermore accommodated the low literacy levels of the participants by not expecting them to write anything (Kumar, 2005). The interview was also facilitated using a Likert scale that involved visual aids (Cremers et al., 2017). Accommodating literacy levels was important for participants in this study. They were known to have low literacy, so the researcher was aware of possible difficulties the participants might have when having to write or understand research concepts (Davidson, Espie & Lammie, 2011) – for completing both the pre-test post-test questionnaire and the iconicity task.

One of the challenges of conducting the survey using semi-structured interviews was that its administration is time consuming and expensive. Bias is also a possibility as participants may choose to provide favourable responses in order to be viewed in a positive light by the researcher (McMillan & Schumacher, 2006; Stopher, 2012).

4.13. Materials: Iconicity task

The materials, general procedures and data collection procedures used for the iconicity task are discussed in this section. The materials used included the permission letters to the CBOs, the consent letter for participants (Appendices R1/R2), the participants' response booklet, scoring sheets, and the procedural scripts.

4.13.1 Ethics approval: Iconicity task

Ethics approval was obtained from the University of Pretoria as outlined in Section 4.6.1 under the experimental task. In addition, permission was obtained from the relevant ward councillors and CBO.

4.13.2 Permission letters to the CBOs involved

The permission letters used in the iconicity task followed the same format as those in the experimental phase by giving important information on and stating the voluntary nature of participation in the study (McMillan & Schumacher, 2006). The CBOs were informed about their desired role in the recruitment process. In addition, the CBOs were asked for permission to use their space for data collection (Appendix S).

4.13.3 Permission letter to the ward councillors

The letters to the ward councillors explained the purpose of the study and the researcher's desire to conduct the research in the community through the specific CBOs (Appendix T).

4.13.4. Informed consent letter: Iconicity task

In addition to the information already shared in Section 4.6.4 – which was common to all the informed consent letters (overview of the study, purpose and voluntary nature of participation) – the consent letter for participants in the iconicity task informed them that they would be asked questions about themselves and about some pictures. The letters also stated that the exercise was not a test but rather an exercise to discuss pictures and their meaning. Participants were also informed that there were no right or wrong answers and that their answers would be kept confidential (Appendix R2).

4.13.5 The procedural script: Iconicity task

The procedural script (Appendix U1) covered the procedures of the iconicity task and explained what the exercise entailed and how the two questions for each picture would work. The script also included an explanation of the scale that would be used.

The researcher explained that during the exercise she would be asking two questions about the visual aids. Participants were told that they would be shown visual aids and then asked their thoughts/opinions about each visual aid, i.e. how much they thought each looked like a certain thing. The three-point Likert scale was explained in terms of what each of the block tables meant and participants were told that they could indicate how much each visual aid looked like a certain thing by choosing from one of three boxes. A procedural checklist was developed from the procedural script (Appendix U2).

4.13.6 Participant response booklet: Iconicity Task

A response booklet (Appendix V) that was developed depicted all the visual aids used for the iconicity exercise (19 NDoH visual aids and five visual aids that were not related to health, as trial items). The NDoH visual aids were selected by the researcher as those depicting the most pertinent information for the NDOH's health education information programme. The trial items were added at the beginning of the response booklet (a cola

bottle, toothpaste, a book, a road sign, and an aeroplane), before the NDoH visual aids. The booklet consisted of 24 pages of A4 black cardboard with 7cm x 8cm visual aids on each page (see Table 4.14 or Figure 4.4). Under each visual aid (which was for the transparency question), was the three-point visual aids Likert scale (see Figure 4.4) on which participants could select responses for the translucency question (Batorowicz, King, Vane, Pinto, & Ragavendra, 2017).

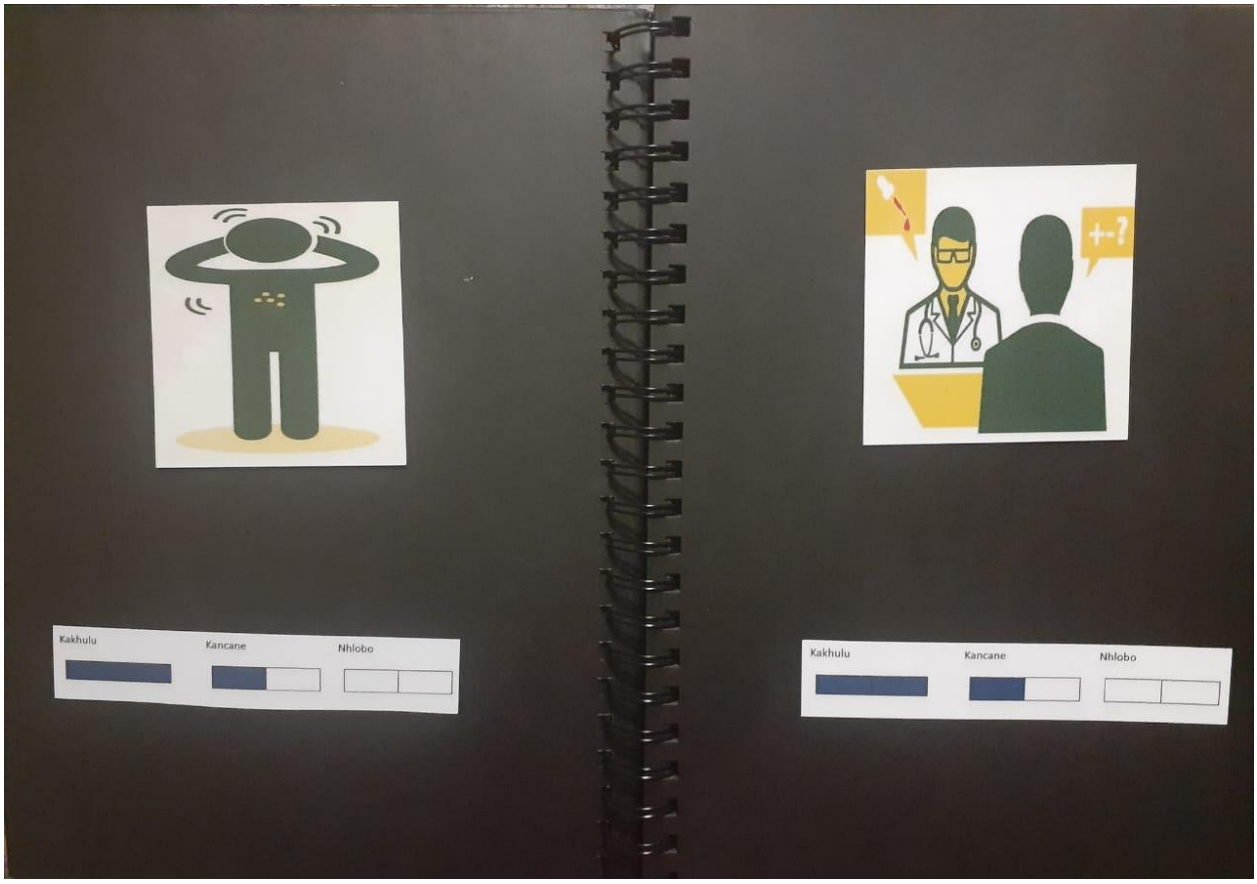


Figure 4.4: Participant response booklet for the iconicity task

For the Likert scale, the box with two full blocks indicated “a lot”, the box with one block full indicated “a little”, and the box with no blocks full indicated “not at all”. Using such a graphic symbol to depict the three-point Likert scale was previously done by Bernal et al. (1997) for persons with low literacy. A three-point Likert scale was deemed suitable for this study as Bernal et al. (1997) suggested that for populations with low literacy levels, response scales containing more than four responses could either confuse or frustrate participants. Therefore it was expected that a three-point Likert scale would enable the

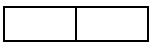
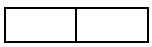
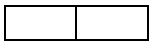
participants with low literacy to carry out the exercise of responding to the question on translucency with relative ease (Berthenet et al., 2016).

4.13.7 Participant scoring sheet

A participant scoring form (Appendix W) was also developed for the iconicity task. This scoring form contained the same information as the participant response booklet, namely the NDoH visual aids and the Likert scale (see Table 4.14). Each scoring form had six columns. The first column contained the question number; the second column the health idea (based on the visual aid); the third column, the visual aid; the fourth column a space for the researcher to insert the participant's answer to the transparency question ("what do you think this picture means/what do you see when you look at this picture?"); the fifth column for the coding of the response; and the last (sixth) column had the Likert scale, where the researcher could mark (with an "X") the participant's response to the translucency question (If I told you this is… *(e.g. a virus/being sick/blood?)*, how much you say would say this picture looks like *(e.g. a virus/being sick/blood?)*.)

Table 4.14

Example of the scoring form for the iconicity task

Number	Idea	Visual aid	Participant's response	Response code (0/1)	Translucency
1	Virus				**A lot**  **A little**  **Not at all** 
2	CD4 cell/ soldier of the body				A lot  A little  Not at all 
3	HIV-negative person				A lot  A little  Not at all 

4.14. General Procedures: Iconicity task

Once permission was obtained from the ward councillors and the CBOs, recruitment for the iconicity task could commence.

4.14.1 Recruitment: Iconicity task

A separate group of participants not involved in the experimental task were recruited to participate in the iconicity task. Participants for the iconicity task were recruited through contact with two CBOs and by using the same participant selection criteria mentioned in Section 4.4.3. The two organisations were based in KwaNyuswa (Durban) and in Mpophomeni (Pietermaritzburg) respectively. They mainly provided home-based and health support services through household visits and outreach programmes in their communities. Kwanyuswa is semi-rural area in the west of the eThekwini district of KwaZulu-Natal with a population of 3.8 million residents, of which women constitute 52.8% and men 47.2%. Mpophomeni is an area near Hilton, Pietermaritzburg in the midlands of KwaZulu-Natal, with a population of 25 732 000 residents. This figure is made up of 54% women and 46% men.

During recruitment, 64 participants were approached by the community health workers (CHWs), then 45 later consented to take part in the study. However, only 39 eventually took part in the interviews after providing their consent. This attrition in numbers was due to some participants not attending their appointments – for a variety of reasons, such as ill health, personal emergencies or having to prioritise their work (especially those who were self-employed either as farmers or spaza shop owners). The recruitment process for the iconicity task is summarised in Table 4.14.

Table 4.15

Recruitment process: Iconicity task

CBO	Number of participants recruited by CHWs and meeting the criteria	Number of participants who agreed to participate after receiving information from the CHWs	Number of participants who consented	Number of participants who participated
1 – Durban	24	24	20	19
2 – Pietermaritzburg	40	21	20	20
Totals	64	45	42	39

4.14.2 Selection criteria: Iconicity task

The selection criteria for the iconicity task were the same as those for the experimental task (Table 4.5). Participants had to have a low literacy level, be between the

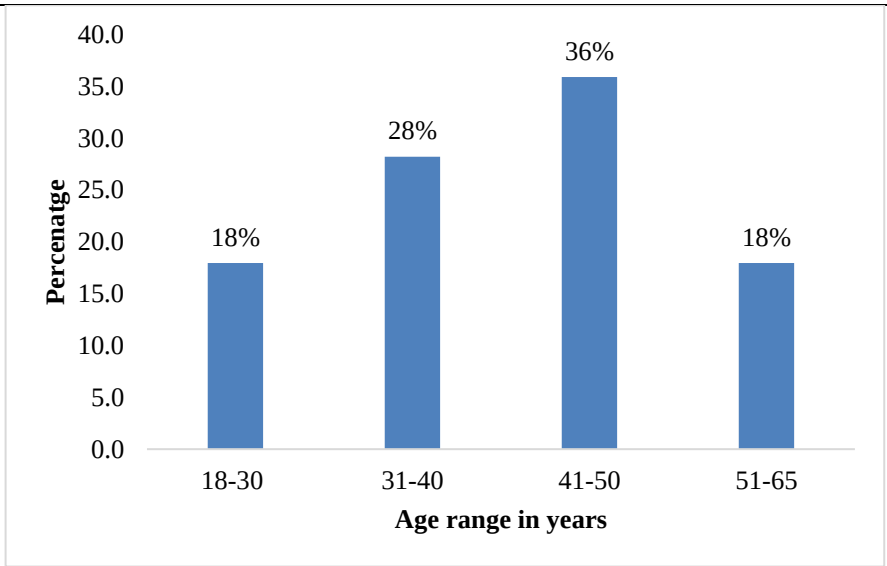
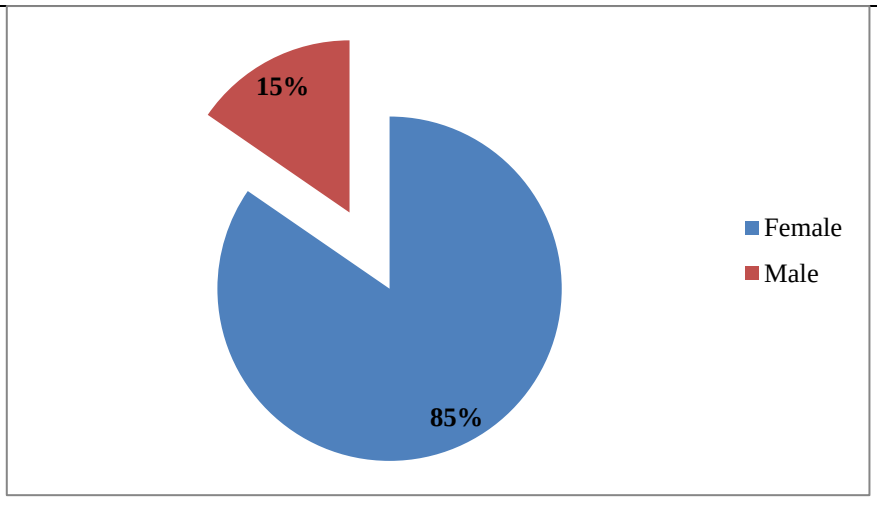
ages of 18 and 65 years and speak isiZulu as home language, as is widely spoken in KZN (Engelbrecht et al., 2008; Statistics South Africa, 2017).

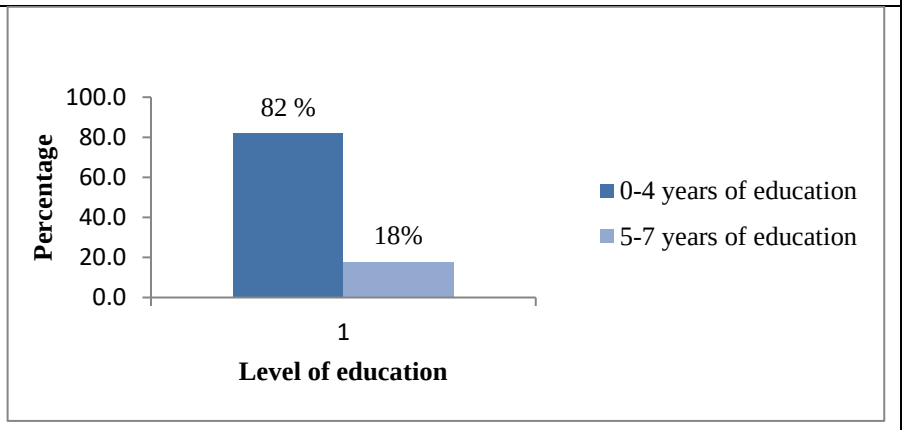
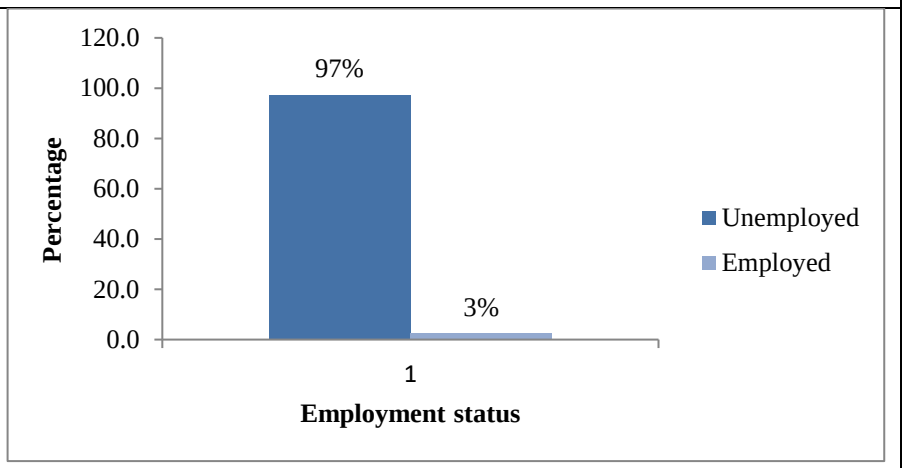
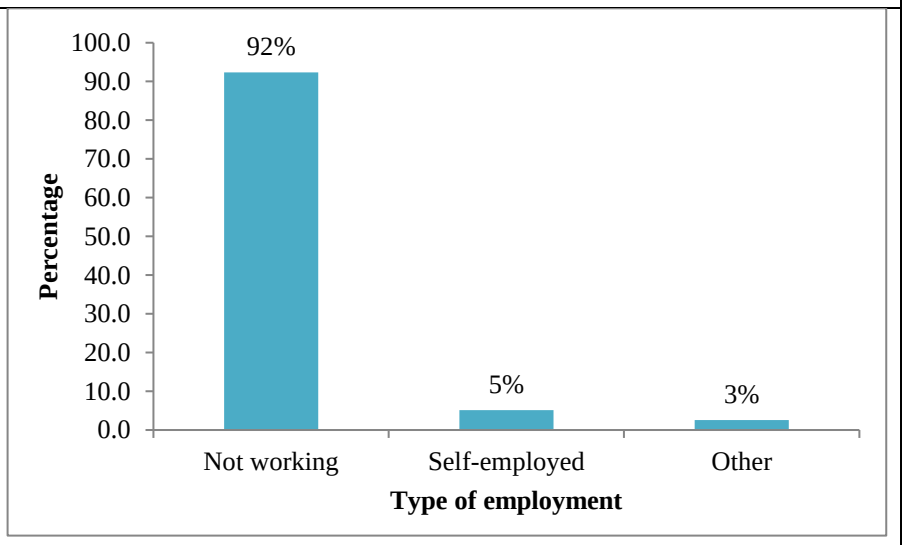
4.14.3 Participant descriptions: Iconicity task

Table 4.16 provides an overview of the participants in terms of their age, gender, employment status and type of employment.

Table 4.16

Demographic information of iconicity task participants (N=39)

Description	Results
Age of participants (N=39) Participants' age for the iconicity task spread: 18% (n = 7) were between 17-30 years old 28% (11) participants were between 31-40 years old 36% (14) were between 41-50 years old 18% (7) were between 51-65 years old	
Gender (N=39) The iconicity task sample had more women (85% or 33) than men, who only made up 15% (6) of the sample. This gender distribution followed a similar trend as in the experimental task.	

Description	Results
Level of education (N=39) The level of education in this group was divided into two categories: 82% (32) of the participants with 0-4 years of education 18% (7) who had 5-7 years of education	
Employment status (N=39) Over 97% of the sample (38) was unemployed, with only 1 (3%) person reportedly being employed.	
Type of employment (N=39) Only 5% (2) of the participants were self-employed, 3% (1) had 'other' forms of employment, while the majority (92% or 36), were unemployed.	

4.13.3.1. Household income

The results show that all participants iconicity tasks (N=39) had a household income less than the South African average of R4500 per month (Statistics South Africa, 2016). This could be related to the fact that most of the participants' reported source of income was a grant or pension (Hall, 2011; Statistics South Africa, 2017).

4.15. Data collection procedures: The iconicity task

The participants met with the researcher at the CBO site on the agreed date. The CBO site was used as a meeting place because it was easily accessible for participants who were local residents and knew the site for the services rendered there. Participants arrived early in the morning and assembled in the hall. As participants arrived, the researcher read the consent letters and, once consent was provided, proceeded to explain the study in isiZulu. The research assistants assisted with filling in the demographics form (Appendix H2). They read the questions to participants and confirmed and filled the forms in on the participants' behalf. The research assistants afterwards confirmed the responses with each participant. Upon completion of the demographic form, the researcher and each participant went to a separate room, where the iconicity task was conducted with each participant individually.

4.15.1 Structured interview

The iconicity task was completed using a procedural script in isiZulu (Appendix S1). Firstly, the researcher explained to the participant that the discussion would be about looking at a couple of pictures and discussing what they mean. Participants were also told that although the pictures may be about certain health information, there was no expectation from them to disclose their health (or HIV) status. The researcher emphasised that the exercise was about sharing information and thinking about the meaning of the pictures and information outlined in the participant response booklet (Appendix T). Participants were also told that a video recording would be made to ensure nothing would be missed and that the camera would focus only on the visual aids and not on their faces.

The iconicity task subsequently commenced. The five trial items in the participant response booklet (Figure 4.4) and scoring form (Appendix U) were the first visual aids presented for the exercise. This was done to assist participants to become familiar with the visual aids and the use of the scale. All five items were presented to each participant before the researcher moved on to the NDoH visual aids. However, the move was not indicated to participants and the exercise simply continued as normal.

For the transparency question, the researcher asked the participants, "What do you think this picture means? / What do you see when you look at this picture?" ("Ngabe ucabanga ukuthi siqonde ukuthini lesisithombe? / Ubonani uma ubheka lesisithombe?"). The

researcher pointed to the visual aid as she spoke (Wood et al., 2009). The participants were given few seconds to respond and each one's response was recorded on Appendix T.

Thereafter, the researcher revealed the meaning of the visual aid by asking the participant, "If I told you this is… *(e.g., a virus /being sick/blood?),* how much you say would say this picture looks like *(e.g., a virus/being sick/blood?)".* ("Uma ngingase ngikutshele ukuthi lokhu yi (*isib. igciwane/ukugula/igazi*) ungathi lesisithombe sifana kangakanani ne (*isib. igciwane /ukugula/igazi*)". The participant was encouraged to use the Likert scale to indicate "a lot", "a little" or "not at all". The response chosen by the participant was marked with an "X" on the Likert scale in Appendix W.

4.16. Reliability: Iconicity task

Procedural and data reliability procedures were also followed for the iconicity task.

4.16.1 Procedural reliability: Iconicity task scripts

Procedural reliability and adherence to the iconicity task procedural script were determined. An inter-rater listened to 25% of the randomly selected videos of the iconicity task interviews. Using Appendix R2, a checklist was used, and each step was scored '√' if done and 'X' if not done. Procedural integrity was calculated according to the same formula used for the experimental task (Schlosser, 2002). Procedural integrity was calculated according to the following formula (Schlosser, 2002):

$$\frac{\text{Number of correctly computed steps}}{\text{Total number of steps}} \times 100$$

The calculations for reliability of the iconicity task are found in section 5.5.1.

4.16.2 Data reliability: Iconicity task scoring sheets

Each iconicity task scoring form had a unique identifier number. Participants transparency responses were grouped and coded using codes that the researcher and statistician had agreed on. All responses given by the participants for the transparency question were listed and given a number, starting from 1. These codes are shared in Table 4.17.

Table 4.17

Coding for transparency of the NDoH visual aids used in the iconicity task

	Question	1	2	3	4	5	6	7
	Idea	virus	CD4	HIV-negative person	HIV-positive person	cough	tired	fever
	Visual aid							
Responses given by participants	**Code**							
	1	traffic light	person/a man	a person	a person/people	a person	a person	a person
	2	the sun	strong/fit person/people	many CD4 cells	HIV positive / signs of HIV	coughing/covering mouth/sick	sick person (flu/sneezing)	sick person (flu)
	3	puzzle with a snake	person exercising	CD4 cells in a person	CD4 cells/soldiers	crying	chest infection (TB)	person holding head
	4	a problem in the chest	strength	(strong) people/strength	CD 4 cells falling/reducing	yawning	sores/rash/skin infection	headache
	5	the inside of a person	person's arms raised	healthy soldiers	person with something growing inside them	HIV positive	diseased person	yawning

Question	1	2	3	4	5	6	7
6	button	boxer	how many soldiers you have	CD4 cells fighting	robot (1)	HIV in a person	a problem in their body
7	flower	I don't know	power	strong/healthy people	thinking	signs/symptoms	pain
8	a wheel		CD4 cells no longer working	I don't know	sad	itchy	thin person
9	I don't know		small boxer	I don't know	dustbin	vomiting	a person who is alive
10			I don't know		healthy person	dots	person exclaiming
11					pants	kettle	I don't know
12					kettle	I don't know	
13					I don't know		
14							

When all the correctly identified visual aids were scored '1' and the incorrect responses scored '0' (Berthenet et al., 2016), the scores were captured on the scoring sheet under the fifth column with coding for the transparency response (see Table 4.13). For translucency, the codes for the scale were 1 = "a little"; 2 = "a lot"; 3 = "exactly". Once the data was captured, an inter-rater examined the transcribed answers and checked that the scoring was correct, as was done in Section 4.9.2. The inter-rater checked that the scoring on the participants' scoring forms was the same as what was captured on the Excel sheet and used Appendix R_2 to rate the steps followed. The data reliability was calculated using a similar formula as before:

$$\frac{\text{Number of correctly captured data entries}}{\text{Total number of data entries to be captured}} \times 100$$

4.17. Preparing of the data

Once data reliability was established, the coded response was entered on Microsoft Excel (2010). After all the steps to clean the data were completed, the data was exported to SPSS (v5). Frequencies were run for all categorical data (Bors, 2018; Field, 2013). No correlations that were computed for this task (see Table 4.10).

4.18. Conclusion

This chapter discussed the methodology used for the experimental phase of the study. For both the experimental and iconicity task, the research design was explained and justified; the main and sub-aims of the research were delineated, and the research setting, sampling and participant selection criteria were shared. This was followed by a description of, the recruitment procedures, materials and procedures of the experimental task were share. General procedures, data reliability procedures and data analysis procedures were also delineated for each of the tasks. The experimental task included 90 participants divided into three groups, while another group of 39 participants who did not take part in the experimental task made up the sample for the iconicity task.

CHAPTER 5
RESULTS

5.1. Introduction

This chapter provides an overview of the results in accordance with the aims of the study as outlined in Section 4.2. It presents the results of first i) the experimental phase followed by the ii) Iconicity task separately. Each section commences with reports on procedural and data reliability. The results of the experimental task are presented according to research questions and hypotheses formulated from these questions. Next follow the frequencies of correct and incorrect responses on the pre-test post-test questionnaire, the comparison of the effects of the NDoH's health education programme within and between each experimental group, as well as the effect of level of education on the understanding of HIV health information. Lastly, the results of the iconicity task are presented in terms of transparency and translucency of the visual aids used in the NDOH's health education programme. Figure 5.1 provides a visual overview of the results chapter for both the experimental and iconicity task.

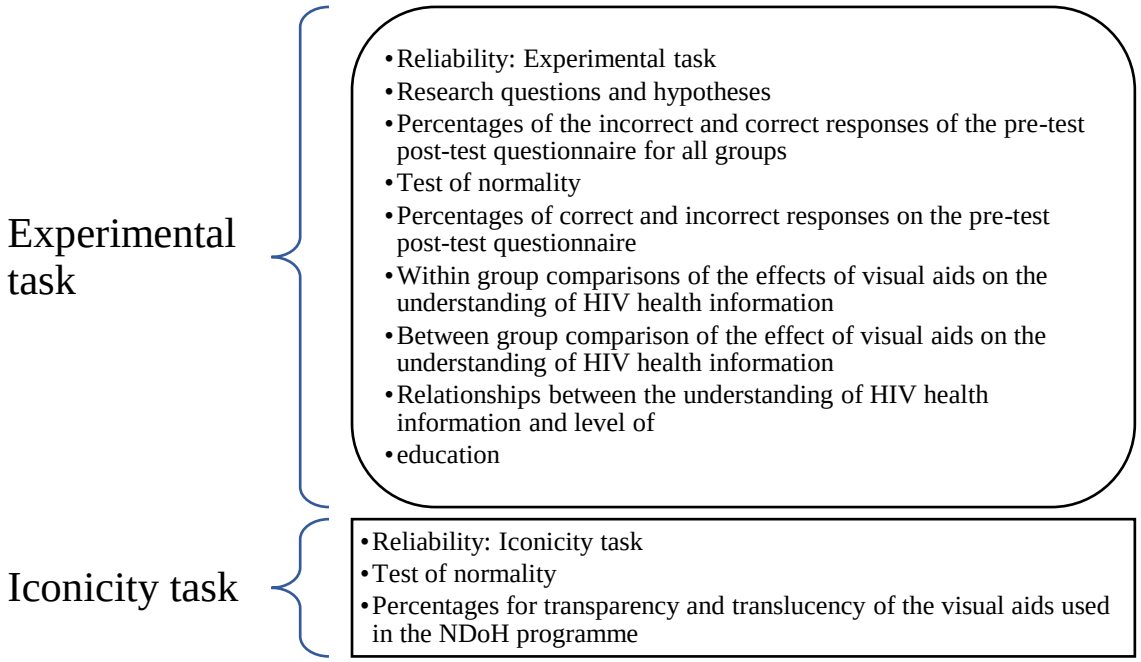


Figure 5.1. Schematic representation of the results chapter

5.2. Reliability: Experimental task

The researcher calculated both procedural integrity and data reliability according to procedures outlined in Sections 4.10.1 and 4.10.2.

5.2.1. Procedural reliability: Pre-test and post-test administration

Procedural reliability for the audio recordings of the administration of the pre-test post-test questionnaire was calculated as outlined in Table 5.1. In this study, the percentage reliability for each group ranged from 96% to 99%. Therefore, the mean (average) reliability across all the intervention groups, also known as overall integrity, was 97%. This reliability was well above the acceptable rate of 80% (Schlosser, 2003b).

Table 5.1

Procedural reliability for the administration of the pre-test post-test questionnaire

Formula	Group 1 (with verbal and visual aids) (n=30)	Group 2 (with verbal and without visual aids) (n=30)	Group 3 - control group (n=30)
Number of correctly computed steps / **Total numbers of steps** **x 100**	281 / 288 = 96%	287 / 288 x 100 = 99%	280 / 288 = 97%

5.2.2. Procedural reliability for the intervention

Procedural reliability for the video recordings of the experimental task was calculated so as to determine the accuracy of the provision of visual aids during the interventions (1 and 2). The procedural reliability ratings are described in Table 5.2.

Table 5.2

Procedural reliability for the video recordings of the experimental task in terms of the provision of visual aids

Formula	Group 1 (with visual aids)	Group 2 (without visual aids)
Number of correctly computed steps / **Total number of steps** x 100	13 / 16 = 97%	12 / 16 x 100 = 99%

The procedural reliability of the implementation of the experimental task was 97% for the intervention with visual aids (Intervention 1) and 99% for the intervention without visual aids (Intervention 2). These ratings were acceptable for procedural integrity according to Schlosser (2002).

5.2.3. Data reliability: Pre-test and post-test questionnaires

Data reliability was calculated according to the process and formula described in Section 4.9.2.

Table 5.3

Data reliability for the pre-test and post-test questionnaires

Formula	Group 1 (verbally with visual aids)	Group 2 (verbally without visual aids)	Group 3 (control group)
Number of correctly transcribed responses	1398	1396	1400
	1410	1410	1410
x 100		x 100	
Total number of responses	99%	99%	99%

The percentage of accuracy in transcription for data across all three groups was 99%. This rate exceeds the minimum of 85% level of accuracy that Heilmann et al. (2008) contends is possible to obtain if the person administering the test was adequately trained. The researcher and the assistants were adequately trained in the administration of the pre-test post-test questionnaire, as is clear from the steps taken in the development of the questionnaire and the prior training of the research assistants (see Chapter 3).

5.3. Research questions and hypotheses

In order to test the theory that is underpinned by the main aims of the research, clear research questions must be developed (Schlosser, 2003b; Field, 2013). Devising research questions for the current study gave the researcher a sound structure on which to relate the results to the theory being tested (Schlosser, 2003b), that is, in the form of hypotheses (Bors, 2018). Testing the hypotheses allowed for the explanation of the phenomenon in question, namely understanding of HIV health information in persons with low literacy (Schlosser, 2003b). The following research questions and hypotheses were developed:

Question 1: What is the effect of the NDoH's HIV health education programme – presented verbally with visual aids (Intervention 1) – on the understanding of HIV health information in persons with low literacy (Group 1)?

Hypothesis 1:

H_0: There will be no improvement in the understanding of health information by Group 1 participants.

H_1: There will be an improvement in the dependent variable for Group 1 participants.

Question 2: What is the effect of the NDoH's HIV health education programme – presented verbally without visual aids (Intervention 2) – on the understanding of HIV health information (Group 2)?

Hypothesis 2:

H_0: There will be no improvement in the understanding of HIV health information by Group 2 participants.

H_1: There will be an improvement in the understanding of HIV health information by Group 2 participants.

Question 3: What is the effect of exposure to the pre-test post-test questionnaire on the understanding of HIV health information in the control group (Group 3)?

Hypothesis 3:

H_0: There will be no improvement in the understanding of HIV health information by Group 3 participants.

H_1: There will be an improvement in the understanding of HIV health information by Group 3 participants.

Question 4a: Is there a statistically significant difference in the understanding of HIV health information between the groups, specifically Groups 1 and 2?

Hypothesis 4a

H_0: There will be no difference in the understanding of HIV health information between Groups 1 and 2.

H_1: There will be a difference in the understanding of HIV health information between Groups 1 and 2.

Question 4b: Is there a statistically significant difference in the understanding of HIV health information between the groups, specifically Groups 2 and 3?

Hypothesis 4b

H_0: There will be no difference in understanding of the HIV health information between Groups 2 and 3.

H_1: There will be a difference in the understanding of HIV health information between Groups 2 and 3.

Question 4c: Is there a statistically significant difference in the understanding of HIV health information between the groups, specifically between Groups 1 and 3?

Hypothesis 4c

H_0: There will be no difference in understanding of the understanding of HIV health information between Groups 1 and 3.

H_1: There will be a difference in the understanding of HIV health information between Groups 1 and 3.

Question 5: What is the effect of level of education on the understanding of HIV health information among the three groups?

The results of the experimental task will be presented in accordance with the aims of the study and the hypotheses formulated above.

5.4. Results of the experimental task

Before computing any analyses for the whole experimental task group (N=90), descriptive statistics were conducted in order to compare the three groups (1,2 and 3) in terms of age and level of education. Table 5.4 below outlines these descriptive statistics.

Table 5.4

Age and level of education in the three experimental groups (N=90)

Demographics characteristic	**Group 1 (with visual aids) (n=30**	**Group 2 (without visual aids) (n=30)**	**Group 3 control group(n=30)**	***p* value**
Age (yr., mean ±_SD)	43.7 ± 13.0	45.8 ± 12.2	53.0 ± 8.0	<0.01*
Level of education (number of yrs., mean ± SD)	4.9 ± 2.2	4.5 ± 2.5	4.6 ± 2.3	0.83

Note: p-values were calculated using one-way ANOVA test for between and within group comparisons.
*= significant *p*-value

Age was seen as categorical variable because it was reported in categories for this study, and not as a continuous variable (Pallant, 2010). Hence, age was analysed using a one-way ANOVA test. The mean ages were similar for group 1 (M = 43.7; SD = 13.0) and group 2 (M = 45.8; SD = 12.2). Group 3, the control group had a higher mean age (M= 53.0;SD = 8.0). Post hoc tests showed that this was a significant difference(p< 0.01) as both groups 1 and 2 differed significantly from group 3. There were no significant differences between the groups, in terms of level of education (p= 0.83).

5.4.1. Percentages of correct and incorrect responses on the pre-test post-test questionnaire

The first set of results to be presented will be the percentages of correct and incorrect responses to the pre-test post-test questionnaire per group (see Table 5.4).

Table 5.4

Percentage of correct and incorrect responses on the pre-test and post-test questionnaire per question and per group

Question		Group 1 (n=30) (with visual aids)				Group 2 (n=30) (without visual aids)				Group 3 (n=30) (control group)			
		Pre-test		Post-test		Pre-test		Post-test		Pre-test		Post-test	
		Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct
Q1	What happens to you when the "HIV" (virus) kills the soldiers of the body?	80%	20%	43.3%	56.7%	80%	20%	50%	50%	83.3%	16.7%	70%	30%
Q2	Why do we test for the CD4 count (in the blood)?	93.3%	6.7%	76.7%	23.3%	96.7%	3.3%	76.7%	23.3%	90%	10%	90%	10%
Q3	Apart from TB, what is another common illness an HIV-positive person can get?	83.3%	16.7%	40%	60%	90%	10%	43.3%	56.7%	96.7%	3.3%	90%	10%
Q4	What is one of the symptoms that could indicate that someone has contracted HIV?	30%	70%	33.3%	66.7%	23.3%	76.7%	41.7%	58.2%	33.3%	66.7%	33.3%	66.7%
Q5	What are CD4 cells?	90%	10%	70%	30%	90%	10%	63.3%	36.7%	93.3%	6.6%	96.7%	3.3%
Q6	Why is a viral load test done?	93.3%	6.7%	73.3%	26.7%	90%	10%	90%	10%	100%	0	100%	0
Q7	Why is the HIV virus clever?	80%	20%	60%	40%	83.3%	16.7%	70%	30%	93.3%	6.7%	93.3%	6.7%
Q8	How can an HIV-positive pregnant mother reduce the chances of infecting her unborn baby with HIV?	76.7%	23.3%	33.3%	66.7%	76.7%	23.3%	46.7%	53.3%	96.7%	3.3%	83.3%	16.7%
Q9	What would happen if you don't take	66.7%	33.3%	40%	60%	70%	30%	56.7%	43.3%	73.3%	26.7%	73.3%	26.7%

Question		Group 1 (n=30) (with visual aids)				Group 2 (n=30) (without visual aids)				Group 3 (n=30) (control group)			
		Pre-test		Post-test		Pre-test		Post-test		Pre-test		Post-test	
		Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct
	ARV medicines as you should?												
Q10	After how many months on ARVs should one have their first viral load test done?	86.7%	13.3%	20%	80%	86.7%	13.3%	33.3%	66.7%	90%	10%	86.7%	13.3%
Q11	Why is it helpful for a breastfeeding mother to be on ARV medicines?	43.3%	56.7%	16.7%	83.3%	36.7%	63.3%	26.7%	73.3%	43.3%	56.7%	36.7%	63.3%
Q12	What should you do if you vomit within the first hour after taking your ARV medicines?	80%	20%	33.3%	66.7%	83.3%	16.7%	53.3%	46.7%	90%	10%	86.7%	13.3%
Q13	How do ARV medicines suppress the HIV virus?	76.7%	23.3%	70%	30%	80%	20%	80%	20%	73.3%	26.7%	70%	30%
Q14	How much of the HIV virus must be in the body if your ARV medicines are working?	100%	0%	56.7%	43.3%	100%	0%	66.7%	33.3%	100%	0%	96.7%	3.3%
Q15	What is one of the ways in which family can assist an HIV-positive person?	56.7%	43.3%	20%	80%	66.7%	33.3%	20%	80%	83.3%	16.7%	80%	20%
Q16	How are the symptoms of a person infected with HIV different to	66.7%	33.3%	50%	50%	70%	30%	56.7%	43.3%	80%	20%	76.7%	23.3%

Question		Group 1 (n=30) (with visual aids)				Group 2 (n=30) (without visual aids)				Group 3 (n=30) (control group)			
		Pre-test		Post-test		Pre-test		Post-test		Pre-test		Post-test	
		Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct
	symptoms of any other illness?												
Q17	When should you have another viral load test, after you had your very first one?	86.7%	13.3%	43.3%	56.7%	80%	20%	33.3%	66.7%	86.7%	13.33%	76.7%	23.3%
Q18	What happens when the HIV virus encounters few ARVs in the blood?	66.7%	33.3%	70%	30%	73.3%	26.7%	76.7%	23.3%	60%	40%	66.7%	33.3%
Mean rank (Total scores)		50.3%		61.7%		48.9%		51.8%		37.3%		23.5%	

According to Table 5.4, overall performance in the pre-test post-test questionnaire shows that Groups 1 and 2 showed improved post-test scores as is seen by the higher mean ranks of the post-test scores (61.1%; 51.8%), as compared to lower mean ranks of pre-test scores (50.3%; 48.9%). Group 3, on the other hand, showed a decline, as the mean rank for total post-test scores (23.5%) was lower than that of the total pre-test scores (37.3%).

In Group 1, the highest frequencies of incorrect responses in the pre-test were 93.3% for both Question 2, "Why do we test for the CD4 count (in the blood)?" and Question 6, "Why is a viral load test done?". For Group 2, the highest rate of incorrect responses in pre-test questions was also for Question 2, at 96.7%. In both Groups 1 and 2, the rate of participants who gave the incorrect response for Question 14, "How much of the HIV virus must be in the body if your ARV medicines are working?" was 100%, meaning that none of the participants knew the answer at pre-test. For Group 3, the rate for incorrect responses for Question 6, "Why is a viral load test done?" and Question 14, "How much of the HIV virus must be in the body if your ARV medicines are working?" at pre-test, was 100%.

Regarding improvement in the accuracy of responses (i.e., the difference between accuracy at pre-test and post-test), Group 1 participants' responses improved at post-test for following questions: Question 1, "What happens to you when the "HIV" (virus) kills the soldiers of the body?"; Question 3, "Apart from TB, what is another common illness an HIV-positive person can get?"; Question 8, "How can an HIV-positive pregnant mother reduce the chances of infecting her unborn baby with HIV?"; Question 10, "After how many months on ARVs should one have their first viral load test done?"; Question 12, "What should you do if you vomit within the first hour after taking your ARV medicines?"; and Question 17, "When should you have another viral load test after you had your very first one?". The improvement from pre-test to post-test ranged from 36% for Question 1 to 66.7% for Question 10. It was noted that none of the questions for which an improved score was obtained, dealt with medicine-taking instructions (as has previously been the focus of many studies (Kripalani, Schmotzer & Jacobson, 2012; Mbuagbaw & Ndongmanji, 2012; Webb et al., 2008)), but rather with information pertaining to living with the disease. This implied that participants in this group gained an improvement in their information about living with the disease.

For Group 2 participants, improvements in the accuracy of responses (i.e., difference between accuracy at pre-test and post-test) were noted for the following questions: Question 3, "Apart from TB, what is another common illness an HIV-positive person can get?"; Question 10, "After how many months on ARVs should one have their first viral load test done?"; Question 15, "What is one of the ways in which family can assist an HIV-positive person?". Question 17 also showed improvement through decreased rates of incorrect responses. For these questions, the improvement from pre-test to post-test ranged from 46.7% for Question 3 to 56.7% for Question 10.

In Group 3, there were no notable differences in accuracy at pre-test and post-test, with the rates of incorrect responses remaining similar.

5.4.2. Test of normality: Experimental groups

The Shapiro-Wilk test was run to determine the distribution of the pre-test and post-test scores for each of the experimental task groups (Field, 2013). This test was selected due to its suitability for samples smaller than 200 (Field, 2013), such as the samples in the experimental task (n=30 for each group). Reporting the results for the test of normality for each group was also aligned to the fact that Wilcoxon signed-rank tests would be used as the non-parametric test when determining comparisons of the effects of the independent variable. This test compares each group separately (n=30), and does not combine the comparison across all participants in the experimental task (N=90) (Pallant, 2010).

Table 5.5

Test of normality: Experimental task

Scores	***Groups***		
	Group 1 (n=30) (with visual aids)	**Group 2 (n=30) (without visual aids)**	**Group 3 (n=30) (control group)**
***p* value for total pre-test scores**	0.005	0.185*	0.049
***p* value for total post-test scores**	0.101*	0.120*	0.018

Note: * Statistically significant *p*-value at the 5% confidence level

The Shapiro-Wilk results for normality (see Table 5.5) showed that the distribution of pre-test and post-test scores across the three groups was not standard, with some being normally distributed (marked with '*') and others not so. Due to this finding, non-parametric tests were run (Field, 2013; Pallant, 2013).

5.4.3. Within group comparisons of the effects of visual aids on the understanding of HIV health information

In order to address Hypotheses 1, 2 and 3, Wilcoxon signed-rank tests were completed (see Table 5.6).

Table 5.6

The effects of the NDoH's health education programme: With in group comparison

	Group 1 (n=30) (with visual aids)		**Group 2 (n=30) (without visual aids)**		**Group 3 (n=30) (control group)**	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Medians	4	10	4	9.5	3	3
Wilcoxon z score	-4.79		-4.49		-1.43	
***p* value**	*<0.05**		*<0.05**		0,15	
	0.87		0.82		N/A	
Effect size						
Interpretation of effect size	Large effect size		Large effect size		Not applicable	

Note: * Statistically significant p-value at the 5% confidence level
0.0– 0.2 = small effect size
0.2 – 0.8 = medium effect size
> 0.8 = large effect size (Cohen, 1988)

There was a statistically significant difference between the pre-test and post-test scores of both Group 1 and Group 2 ($p<0.05$). Hence, null hypotheses 1 and 2 were rejected and the alternative hypotheses were not rejected. These results indicate that there was a statistically significant improvement in understanding of HIV health information in both Group 1 and Group 2. Effect sizes were also reported to articulate stronger support for rejecting the null hypotheses 1 and 2 (Sullivan & Feinn, 2012). The formula used to calculate the effect size was: "$r=z/\sqrt{n}$" (Bors, 2013), where 'r' was the effect size, 'z' for the z-score and 'n' was the total number of cases (i.e., sample size). For this calculation, the negative sign in front of the z values was ignored. The effect sizes for Group 1 and 2 were large ($d^a=0.87$ and $d^a=0.82$ respectively), meaning that the effects of the intervention on participants in these groups were large (Cohen, 1988).

For Group 3 there was no statistically significant difference between the pre- and post-test scores (p=.15). The *p*-value was greater than 0.05, resulting in failure to reject null hypothesis 3 and the conclusion that there was no improvement in understanding of HIV health information in Group 3 participants. This was expected as this group (control) did not

receive any health education programme between the administration of the pre-test and post-test questionnaires (Pallant, 2010).

5.4.4. Between group comparison of the effect of visual aids on the understanding of HIV health information

Prior to determining between-group comparisons, the normality distributions for the whole experimental group (n=90) were also calculated. This was to accommodate the between-group comparisons which would be computed across all experimental task participants, at once (n=90).

5.4.4.1. Test of normality: Experimental group (N=90)

For the combined scores of the whole group combined, the Shapiro-Wilk test showed that both the pre-test scores ($p<0.001$; $M = 4$, $SD = 2.09$) and the post-test scores ($p=0.002$, $M = 7.19$, $SD = 3.87$) for the whole group were not normally distributed (Field, 2013; Pallant, 2010). This reiterated the need to use non-parametric tests when computing the between-group comparisons.

To test Hypotheses 4a), 4b) and 4c), a Kruskal-Wallis H test was used due to its suitability for a continuous dependent variable such as the pre-test and post-test scores; and since each experimental group had received different forms of the intervention (Bors, 2018). The Kruskal-Wallis H test confirmed that the difference between the pre-test scores in the three groups was not significant ($p= 0.10$). However, the differences between the post-test scores were statistically significant ($p<0.05$).

Being a non-parametric test, the Kruskal-Wallis test does not have post-hoc tests. Through merely providing mean ranks, the test could not show exactly between which groups the differences were. Therefore, a Mann-Whitney U test was conducted to determine between-group differences. A Bonferroni adjustment was done to control for Type 1 errors (Pallant, 2010). In this study, this meant adjusting the significance level to a stricter level by dividing the alpha level (p) of 0.05 by the number of tests that would be run. Therefore, a new significance level – 0.05 divided by 3, namely 0.017 – was selected.

Table 5.7

Mann-Whitney comparisons of significant post-test scores between experimental task groups

Comparison groups	*U*	*z*	*p-value*	Effect size (d[a])	Effect size interpretation
Group 1 and 2	365.5	-1.39	0.16	n/a	N/A
Group 2 and 3	167	-5.59	<.001*	1.02	large
Group 1 and 3	73.5	-4.97	<.001*	0.91	large

Note: * Statistically significant p-value at the 5% confidence level
0.0-– 0.2 = small effect size
0.2 – 0.8 = medium effect size
> 0.8 = large effect size (Cohen, 1988)

Table 5.7 illustrates that there were statistically significant differences in post-test scores between Groups 2 and 3 (U=167, p<0.005), with large effect sizes d=1.02 between Groups 2 and 3, and d=0.91 between Groups 1 and 3 (U=73.5, p<0.05) (Kotrlik, Williams, & Jabor, 2011; Sullivan & Feinn, 2012). These results indicated that the null hypotheses 4b) and 4c) were rejected as there was a difference in the understanding of HIV health information between Groups 1 and 3; as well as between Group 2 and 3. Null hypothesis 4a) was not rejected, indicating that was no statistically significant difference in the understanding of HIV health information between Groups 1 and 2.

5.4.5. Relationships between the understanding of HIV health information and level of education

The level of education was one of the main selection criteria for this research, due to its association with low literacy (Al Sayah, Fatima Majumdar et al., 2012) and a poorer understanding of health information (Easton et al., 2010). Therefore, the frequencies of the proportions for the categorised level of education were reported to give an overview of the distribution of the number of years of education completed by participants in each of the groups of the experimental task. The level of education was divided into the two categories described in Section 4.8.1.

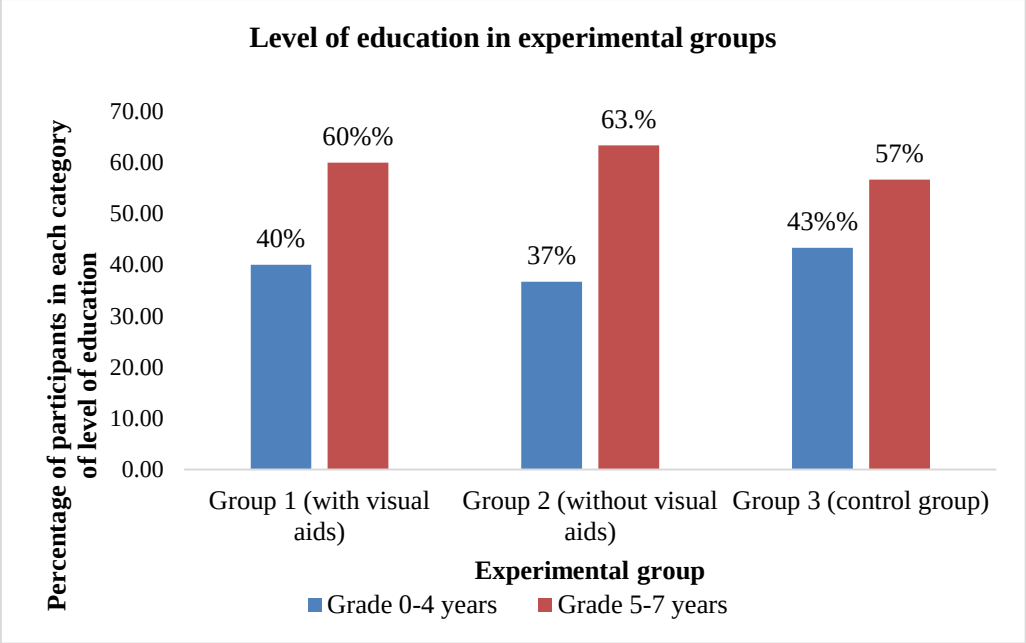


Figure 5.2: Analysis of levels of education in the three experimental groups

According to Figure 5.2, all three experimental groups had approximately the same proportions of participants falling in the two main categories of level of education (0-4 years; 5-7 years of education). These percentages indicated that the three experimental groups were similar in proportions of the categories of level of education. The Levene Test of Equality of Error Variances showed equality of variance in the three groups (p=0.054). This meant that the error variance of the post-test scores was equal across groups (Pallant, 2010).

A two-way analysis of covariance (ANCOVA) was run (Pallant, 2010) to determine the relationship between the groups' performance in post-test scores and their level of education. The question asked pertained to the fourth sub-aim of the research study: "Is the effect of the NDoH's HIV health education programme different, depending on participants' level of education, when participants are classified as having 0 to 4 years or 5 to 7 years of education?". The results of the interaction effect, also known as the 'tests of between-subjects' were not significant (p=0.60). This meant that the level of education did not have an influence on the performance in post-test scores in any of the experimental groups, as illustrated in Figure 5.3.

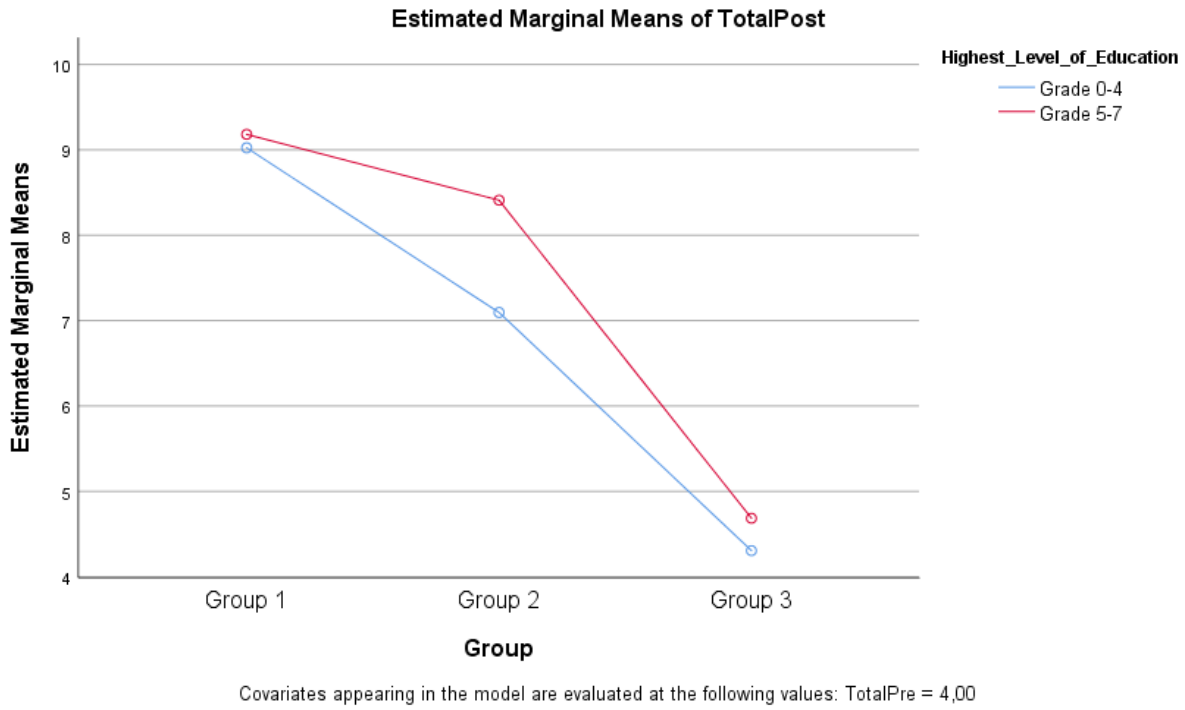


Figure 5.3: Estimated marginal means of total post-test scores across the three experimental groups

Figure 5.3 shows that the experimental groups differed in their performance only as a result of their understanding of HIV health information (i.e. as determined by which intervention they received), and not in level of education ($p<0.05$).

5.5. Results: Iconicity task

The next section reports on the results of the iconicity task.

5.5.1. Reliability: Iconicity task

5.5.1.1. Procedural integrity: Iconicity task

Procedural and data reliability for the iconicity task was calculated using the same formulae as those for the experimental task, as outlined in Sections 4.9.1 and 4.9.2. The results are depicted in Table 5.8 below.

Table 5.8

Procedural reliability of the iconicity task

Formula	Reliability
Number of correctly computed steps x 100 / **Total number of steps**	142 / 150
	93%

Table 5.8 illustrates that the procedural reliability for the iconicity task was 93%, which is accepted as sufficient (Schlosser, 2003b).

5.5.1.2. Data reliability

Data reliability for the iconicity task scripts was calculated as outlined in Table 5.9. It amounted to 99%, thereby indicating that the level of accuracy with which the iconicity task data was captured, was sufficient (Heilmann et al., 2008).

Table 5.9

Data reliability of the iconicity task

Formula	Data reliability for the iconicity task
Number of correctly transcribed responses x 100 / **Total number of possible responses**	1691 x 100 / 1700
	99%

5.5.2. Test of normality: Iconicity task

Similar to the experimental task, the Shapiro-Wilk test was run to ascertain the distribution of age of participants (Field, 2013) in the iconicity task (mean age 40.35; *SD*=11.58 years). This means that the age in this sample met the assumption of normality; with p=0.38. Age was used in this case, as it was the only continuous variable in this task (Pallant, 2010).

5.5.3. Percentages for transparency and translucency of the visual aids used in the NDoH programme

Percentages for transparency and translucency in this task were calculated for the number of participants who gave a particular response (guess) for transparency; and for the total for each of the selected options on the Likert scale for translucency. These frequencies were derived through running Fisher's Exact Test (Bors, 2018; Field, 2013). The percentage for transparency refers to the number of participants who guessed the visual aid accurately while the percentage for translucency refers to the number of participants who reported how

much a visual aid looked like the intended idea (Berthenet et al., 2016) (according to the three-point Likert scale described in Section 4.13.4).

In this study, recommendation ISO 1984 of the International Organization for Standardization (ISO) was used as a standard (ISO, 2014). . This standard outlines a method for testing the comprehensibility of graphical symbols (or visual aid in this study), as was used in Bethernet et al. (2016) and Roberts et al. (2010). Geneva (1984) provides a measure of the extent to which a visual aid communicates its intended message to ensure that graphical symbols (visual aids) used in materials are readily understood by the end users (ISO, 2014). Therefore, in this study, only visual aids that scored 67% for transparency were considered to be transparent and if a visual aid also had a score of 67% (or more) for translucency, it was considered to be translucent (Berthenet et al., 2016).

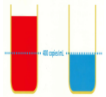
5.5.3.1. Percentages for transparency of the visual aids used in the iconicity task

Table 5.10 illustrates that none of the 19 visual aids in the iconicity task met the recommended ISO score for transparency.

Table 5.10

Percentages and transparency scores of the visual aids used in the NDoH's health education programme (N=39)

Idea	Visual aid	Number of the visual aid	Percentage correct
A person taking medication		14	64.1%
Testing for HIV		8	61.5%
Time to take medicines		18	41.0%
Go to see the doctor		17	33.3%
An HIV-positive person		4	30.8%

Idea	Visual aid	Number of the visual aid	Percentage correct
Flu		5	30.8%
Mother breastfeeding a baby		11	28.2%
Time to take medication		13	28.2%
A sick person		16	15.4%
Unprotected sex		10	17.9%
Family		19	5.1%
High and low		12	5.1%
Virus		1	0%
Soldier of the body		2	0%
An HIV-negative person		3	0%
Tired		6	0%
Fever		7	0%
Blood		9	0%
Taking medication at the same time		15	0%

Furthermore, seven visual aids scored 0%, meaning that none of the participants could correctly identify what these visual aids were. These were the visual aids for "virus" []; "soldiers of the body []"; "HIV-negative person" []; "tired" []; "fever" []; "blood" []; and "taking medication at the same time" [].

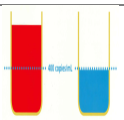
5.5.3.2. Percentages of translucency scores for the visual aids used in the NDoH's health education programme

For translucency, participants responded how much a visual aid looked like a certain concept on a three-point Likert scale (Berthenet et al., 2016). The results of this question are presented in Table 5.11.

Table 5.11

Percentages and translucency scores for the visual aids used in the iconicity task (N=39)

Idea	Visual aid	Number of the visual aid	Not at all	A little	A lot
Virus		1	41%	18.4%	39.5%
Soldier of the body		2	18.4%	18.4%	63.2%
An HIV-negative person		3	18.4%	34.2%	47.4%
An HIV-positive person		4	7.9%	26.3%	65.8%
Flu		5	21.1%	21.1%	57.9%
Tired		6	18.4%	28.9%	52.6%
Fever		7	7.9%	23.7%	68.4%*

Idea	Visual aid	Number of the visual aid	Not at all	A little	A lot
Testing for HIV		8	2.7%	10.8%	86.5%*
Blood		9	2.6%	15.8%	81.6%*
Unprotected sex		10	8.3%	8.3%	83.3%*
Mother breastfeeding a baby		11	10.5%	12.2%	76.3%*
High and low		12	8.1%	5.4%	86.5%*
Time to take medication		13	0%	2.7%	97.3%*
A person taking medication		14	0%	2.7%	97.3*
Taking medication at the same time		15	0%	5.4%	94.6%*
A sick person		16	2.7%	16.2%	81.1%*
Go to see the doctor		17	10.8%	2.7%	86.5%*
Time to take medicines		18	0%	2.7%	97.3%*
Family		19	5.4%	8.1%	86.5%*

*Note: * indicates scores that meet the ISO standard for translucency*

Table 5.11 shows a broad overview in terms of participants' views on whether the visual aids looked "a lot" like the intended idea or not. When rated according to the ISO standards (ISO, 1984; 2014) mentioned above, the visual aids for 'virus' [] at 41% and 'flu' [] at 21,1% scored the smallest percentages for not looking "at all" like the intended idea.

On the other hand, 13 visual aids gained the 67% recommended score for looking "a lot" like the intended idea and therefore met the ISO standard for translucency (Berthenet et al., 2016). Of these visual aids, the highest scores for translucency were those of "a person taking medication" [] (97.3%) and the two visual aids used to indicate "time to take medicines" [] (97.3%) and "time to take medication" [], (97.3%). These visual aids mainly deal with medicine-taking instructions. Since similar studies had found the level of education not to be a factor in overall transparency and translucency scores, it was not explored in this study (Berthenet et al., 2016).

5.6. Conclusion

This chapter reported the results of the study. The results were presented for each task of the experimental phase, starting with the procedural integrity and data reliability of the recorded data. The first section presented results for the experimental task, as they addressed each of the study's aims and their respective hypotheses. The experimental task results showed that the NDoH health education did not have a significant effect on the understanding of HIV information between Groups 1 and 2, as was anticipated. The percentages for the transparency and translucency of the visual aids used in the NDoH's health education programme demonstrated that none of the visual aids met the recommended ISO standards for transparency. However, the percentages for translucency were more promising, as 13 of the visual aids met the recommendation for looking "a lot" like the intended idea.

CHAPTER 6
DISCUSSION

6.1. Introduction

In this chapter, the results of the experimental phase are deliberated upon. Firstly, the results of the experimental task are discussed highlighting factors that may have influenced the results with reference to the literature. Next, the results of the iconicity task are discussed, with a focus on a discussion of the possible influences on the transparency and translucency ratings of the visual aids used in this study.

6.2. Within group comparisons of the effects of visual aids on the understanding of HIV health information

With respect to Hypotheses 1, 2 and 3, the results indicated that both with in Group 1 (with visual aids) and Group 2 (without visual aids) participants derived a statistically significant improvement in their understanding of HIV health information (i.e. pre-test versus post-test scores). The statistically significant differences and large effect sizes in both groups reiterated the effects that the health education intervention (with and without visual aids) had on the improvement of understanding of HIV health information in each group (Creswell, 2014; Terr Blanche & Durrheim, 1999). The large effect sizes also implied a similar effect in both groups. A statistically significant difference was absent in Group 3 (control group). This was anticipated and indicates that exposure to the pre-test alone did not result in an improved performance in the post-test. Similarly, some studies that adopted group design studies also found the same lack of improvement in control groups (Choi, 2015; Koops van't Jagt et al., 2017; Shea et al., 2008) that received standard interventions with text only and were not given verbal education by a health care professional.

These results are similar to those found in health education programmes provided by a professional in the spoken modality. For example, participants who received a nurse-delivered intervention (without visual aids) that targeted outcomes of chronic illness, showed an improvement in post-test health knowledge scores (Huggins & Phillips, 1998). Furthermore, in another health education intervention for breast cancer it was found that participants who had received the intervention with additional visual aids (to text), experienced an increase in health knowledge from 16% at baseline to 59% at post-intervention observations (Gupta, 2009). Such studies serve as further evidence that persons

with low literacy will gain increased health care knowledge or improved health literacy when receiving a health education intervention given verbally by a health care professional with or without visual aids support.

In Chapter 2, it was also highlighted that 'spoken communication' (conversations between patients and the health care professional) was deemed the best strategy for discussing experiences with illness (Kim & Lee, 2016), since it gave both participants and health care professional an opportunity to engage in conversation about the health information being discussed (Sheridan et al., 2011). Providing direct feedback and answering questions were also seen as useful strategies in the nurse-delivered ARV interventions of DeWalt et al. (2004) and Kalichman, Cherry and Cain (2005), which saw the improvement of health knowledge in intervention participants. Although the experimetal task of this study did not follow the teach-back method as described by Lee et al., (2012) and Sheridan et al., (2011), the element of spoken communication in Groups 1 and 2 (Kim & Lee, 2016) gave the participants, in both groups, an opportunity to ask questions, and this paved the way for them to receive clarity and engage with the health information received.

A further explanation of the statistically significant within group differences (Group 1 and 2) may be attributed to the fact that the health education programme was provided in isiZulu, the home language of the participants. The use of isiZulu would be an added beneft in this instance, since most health care professionals in SA do not speak the language of the population they serve (Mophosho, 2018; Pillay & Kathard, 2015). Therefore, the participants in the experimnetal task might have felt more at ease discussion health matters in their own language (Engelbrecht et al., 2008). The right to health care is a key issue in SA whose health sector is characterised by huge difference in service quality and resources between the public and private health sectors (Coovadia et al., 2009) whereas most users of the public health system are non-English speaking (van den Berg, 2016) and persons with low literacy levels.

6.3. Between group comparison of the effect of visual aids on the understanding of HIV health information

When testing Hypotheses 4a, 4b and 4c, it was found that the only statistically significant differences in post-test scores were between Groups 1 and 3 and between Groups 2 and 3. There were no statistically significant differences between Groups 1 and 2.

The findings of this study contrasted with the hypothesis underlying the study which argued that the that the 'pictorial superiority complex' exists because some pictorial (non-verbal) inputs hold a more effective symbolic meaning than their associated labels (verbal inputs) alone (Nelson et al., 1976) as proposed by various theories of processing discussed in Chapter 2, Section 2.5. Theories of processing suggest that the best types of intervention for persons with low literacy are those that combine verbal and non-verbal inputs as in Group 1 (Kim & Lee, 2016; Lee et al., 2012), where persons with low literacy derived advantageous performance from the 'pictorial superiority complex' (Nelson et al., 1976; Houts et al., 2006). Although the pictorial meaning can be conveyed without a label (Nelson & Reed, 1976), the dual code (Clark & Paivio, 1991; Paivio, 1986) assumes that the superiority effect may not always be superior when the pictorial stimuli (visual aids) are not appropriately labelled or accompanied by verbal inputs (Nelson et al., 1976).

It is also suggested that the 'pictorial superiority complex' depends on paired association of the visual aid with prior knowledge and previously acquired sensory meaning (Mayer, 2002; Mayer, 2001; Nelson et al., 1976). In this study the visual aids were not labelled (with text) nor were they explained prior to the commencement of the health education session. Therefore, the participants could have been concentrating on understating the pictures rather than listening to the spoken inputs-thereby causing cognitive overload from both non-verbal (visual aids) and verbal (spoken) inputs (Mayer, 2001; Mayer & Moreno, 2003).

Another explanation for the between groups findings could be that the NDoH's health education programme covered a number of sessions (which ranged from disease, symptoms, prevention, treatment and psychosocial support (NDoH, 2016) in one session. This could have been too much information for the participants. Hence, it may have been better given over few sessions (Negarandeh et al., 2012; Tsahakis et al., 2014) in order to avoid cognitive

overload. Moreover, Mayer (2001) also adds that persons with low literacy may be at a disadvantage when required to process large amounts of new information because processing of information improves with exercise; most of which happens from exposure to more years at school years at school.

Another possible explanation may be attributed to the nature of the questions used in the pre-test- post- test questionnaire. When looking at the type of information participants struggled with, it was questions about the types of tests done for a person living with HIV that had the lowest pre-test scores for example (Question 2), “Why do we test for the CD4 count (in the blood)?”; or (Question 6), “Why is a viral load test done?”; and (Question 14), “How much the HIV virus must be in the body if your ARV medicines are working?”, then, (Question 10), “After how many months on ARVs should one have their 1st viral load test done?”; and (Question 17), “When should you have another viral load test after you have had your very first one?”. The poor performance on these questions may be attributed to the fact that a more through explanation of complex health information may be required for persons with low literacy. Such assumptions are also based on the dearth in studies that report on notable improvements in health knowledge for persons with low literacy. For example, some studies (Dewalt et al., 2004) found that participants had poorer improvement in health knowledge about heart disease when compared to the improvement in self-care skill. Then other studies which suggest that the most noteworthy improvements in health knowledge are when the intervention is able to improve understanding of information on the interpretation of CD4 and viral load blood results (Kalichman et al., 2005), or with knowledge of how and when to seek medical attention (Sutherland & Hayter, 2009).

When analysing the questions that saw an improvement in the accuracy of responses from pre-test to post-test it was noted that the improved knowledge was from questions that dealt more with the following: how HIV works in the body: Question 1, “What happens to you when the “HIV” (virus) kills the soldiers of the body?”; mother-to-child transmission of the (HIV) virus: Question 8, “How can an HIV-positive pregnant mother reduce the chances of infecting her unborn baby with HIV?”; and the crucial blood tests that a person living with HIV should take: Question 10, “After how many months on ARVs should one have their first viral load test done?” and Question 17, “When should you have another viral load test after you have had your very first one?”. The improvement in this type of knowledge demonstrated that participants gained a greater understanding of information pertaining to living with the

disease. This finding is supported by studies that found an increased self-efficacy in participants living with diabetes who were exposed to a multimedia intervention (Gerber et al., 2005), and by another study where intervention caused participants' improvement in respect of breast self-examination after receiving verbal inputs as well as a short educational film (Gupta et al., 2009). In these studies, the interventions focused on unpacking new health information on living with disease (Gerber et al., 2005; Gupta et al., 2009).

In addition, interventions comparing the use of both visual aids (pictograms) with text against interventions with text-only, found that the participants who received both text and pictograms derived more positive effects than those who received text-only interventions (Kheir et al., 2013; Meppelink & Bol, 2015). In these studies, the improvement understanding of information on living with HIV was attributed to the presence of the pictograms (Kheir et al. 2013; Meppelink & Bol 2015). These findings also highlighted that participants who received standard interventions with text only, without verbal inputs by a health care professional, could not derive a statistically significant improvement in health information (Choi, 2015; Koops van't Jagt et al., 2017; Shea et al., 2008). In this way it can be argued that health care professionals play an important role in providing health information verbally to persons with low literacy.

The findings in this study were also contradictory to reports from (Kheir et al., 2013)'s study which found that participants receiving pictogram plus verbal instructions had better results when compared to written only instructions or pictograms alone. Another intervention saw an increase from baseline ARV, HIV/AIDS and side effect knowledge in the group which received a text and pictograms patient information leaflet; and where the knowledge retention lasted over 6 months (Dowse et al., 2014). Then (Kalichman et al., 2013) also found that lower literacy participants in their pictograph-guided and standard counselling conditions used more adherence (to HIV treatment plan) strategies than those in a general health improvement condition.

6.4 Transparency and translucency of the visual aids used in the NDoH's health education programme

In view of the results of the iconicity task in this study one could argue that some visual aids in this study did not hold a more effective symbolic meaning than their associated labels (verbal inputs) (Nelson et al., 1976). This was demonstrated by the fact that none of the visual aids used in the NDoH's health education programme met the ISO standards for transparency (ISO, 2014) discussed below (Section 6.4). The transparency scores imply that the visual aids used in the NDoH's health education programme could have been abstract images to the participants and may have been confusing for persons with low literacy (Hoogwegt et al., 2009).

For those visual aids that had a score of 0% for transparency, it was noted that they were visual aids (images) of the 'virus', 'soldiers of the body', 'HIV-negative person' and 'blood'. The difficulty in understanding or recognising these visual aids could be related to the fact that some studies have realised that persons with low literacy struggle to understand visual aids that require prior knowledge of human anatomy (Hwang, Tram, & Knarr, 2005); especially if the image was not presented within the context of the body itself. However, this is especially true in visual aids aiming to portray instructions or health-promoting behaviours or "what ought to be done" (Hoogwegt et al., 2009; Hwang et al., 2005).

Another possible reason for the low transparency ratings of the visual aids was that they all used standard colours (mainly green). In contrast, research recommends the use of real-life situations as possible (Dowse et al., 2014; Hoogwegt et al., 2009). This is because these studies also emphasised the importance of familiarity and cultural appropriateness of visual aids as features that increase the effectiveness of visual aids (Davis et al., 2003; Poureslami et al., 2012). The transparency results in this study also implied that the visual aids used in the NDoH's health education programme might not have been culturally appropriate for this audience

A further possible explanation of the poor transparency ratings of the visual aids may be attributed to the lack of the involvement of persons with low literacy in the development of these visual aids (Dowse & Ehlers, 2001). The perceptions of persons with low literacy should inform direction as to which type of visual aids are acceptable to the end user, and for

which type of health information the visual aids are most effective or confusing (Chuang et al., 2010; Park & Zuniga, 2016). This involvement of persons with low literacy in the development of visual aids is also said to improve effectiveness of visual aids (Berthenet et al., 2016; Kheir et al., 2013; Kripalani et al., 2007). However, there is no written evidence of the engagement of persons with low literacy in the development of the visual aids used in the NDoH health education programme. Therefore, due to the poor translucency ratings, it is postulated that this may not have been done.

The fact that 13 visual aids met the 67% ISO criteria for looking "a lot" like their referent (translucency), implied that a person's experience with (Dada et al., 2013) and prior training on visual aids (Mansoor & Dowse, 2003; Roberts et al., 2008) has the potential to increase the ability of the visual aids and to foster understanding of health information (Sheridan et al., 2011). When engaging participants in a translucency testing exercise where participants were exposed to a series of pictograms and the corresponding word meanings of these symbols, Roberts et al. (2008) found that most of the pictograms were deemed to reflect their meaning well as reported by the participants. These findings thereby increased the likelihood of these pictograms in meeting the ISO recommendation (ISO, 1984, 2014). This was further seen as the resulting pictorial asthma action plan was well understood by patients with varying cultural and educational backgrounds (Roberts et al. 2008). These findings on translucency results also resonate with Lonke et al. (1999) who emphasise that designers of visual aids for health education ought to capitalise on the translucency of visual aids as one of the factors that can increase their analogical ability to increase the understanding of health information in persons with low literacy.

6.5. Conclusion

This chapter deliberated on the research results of the study as posed in Chapter 5. The discussion focused on the results as they relate to the effect of visual aids on the understanding of HIV health information in persons with low literacy. Within group comparisons revealed that persons with low literacy gained increased health care knowledge which is given verbally by a health care professional. This is even enhanced when the health care professional speaks the same language as the participants. The NDoH health education was also able to improve pertinent health knowledge about living with disease and seeking healthcare. Between group comparisons revealed that the expected superiority complex when both verbal (spoken) and non-verbal (visual aids) inputs are used in interventions, was not

derived in this study. This could be due to the lack of prior knowledge or training on the visual aids used in the NDoH health education programme. The lack of improvement in Group 1 was also attributed to possible cognitive overload from too much information paired with unfamiliar visual aids. The iconicity task affirmed the importance of familiarity and cultural appropriateness of visual aids as it was found that none of the visual aids used in the NDoH's health education programme (for transparency) and 13/19 (for translucency) met the ISO standards. These findings also emphasized the importance of involving persons with low literacy in the development of visual aids.

CHAPTER 7
CONCLUSION

7.1. Introduction

In this chapter, a summary is provided of the most important findings from the experimental phase. The study is then evaluated in terms of its strengths and limitations. Finally, the clinical implications of the study are discussed, and recommendations are suggested for future research.

7.2. Overview of the results

Research shows the benefits of addressing issue of low literacy and low health literacy in health care. This is because low health literacy is understood as an inability to obtain, understand and use health information in pursuit of good health (Al Sayah et al., 2010). However, for persons with low literacy, research shows that carefully designed health education interventions can foster improved health literacy (Calderón et al., 2014). These health education interventions ought to include visual aids (Park & Zuniga, 2016) such as written text and pictures, and should be delivered appropriately by a health professional (Kim & Lee, 2016; Nouri & Rudd, 2015).

Visual aids allow for persons with low literacy to map (Wood et al., 2009) and understand (Mayer, 2001) the health information that is delivered to them verbally (Baddeley, 1983) and they are therefore able to make better decisions about their health (Al Sayah, Fatima Majumdar et al., 2012; Forsyth et al., 2008). The core aim of this study was to compare two groups that received two forms of the intervention. Group 1, where the participants received verbal inputs (with visual aids) was compared with Group 2, which received verbal information only (without visual aids). Group 3 did not receive any programme between their pre-test and post-test and thus served as a control group. The central finding was that there were statistically significant within group differences for Groups 1 and Group 2 and none for Group 3 (control group). This indicated that both Group 1 and 2 had significantly improved scores in the post test when receiving the health education programme with or without visual aids. However, the comparisons between groups, i.e. between Group 1 and Group 2, did not yield statistically significant differences indicating that the health education programme (with visual aids) did not have superior effects as had been hypothesised in this study. This may be attributed to a variety of reasons

including the possible cognitive overload (Mayer & Moreno, 2003), as well as to the transparency and translucency of the visual aids used in the study.

The fact that the visual aids in the NDoH's health education programme fell short of meeting the ISO recommendations for transparency (ISO, 2014) also alluded to the possibility of the visual aids having being developed without following proper guidelines as offered by previous research on the development of visual aids for persons with low literacy.

7.3. Evaluation of the study

A critical evaluation of this study's strengths and weaknesses, as well as the limitations identified, is discussed next.

7.3.1 Strengths of the study

This study offered an updated integrated review that focused on interventions that used visual aids in health education programmes for persons with low literacy (Mbanda, Dada, Bastable, Grelerbund, Schlosser, submitted). The review yielded a synthesis of findings which included a view from LMICs; which were previously underrepresented in prior reviews (Houts et al., 2006; Park & Zuniga, 2016; Pignone et al., 2005). The findings reveal that interventions using visual aids for persons with low literacy, particularly in SA, have focused on medicine-taking instructions and demonstrated the effectiveness of visual aids in enhancing the recall, and adherence to these instructions (Dowse et al., 2014; Dowse et al., 2011). This study demonstrated that complex health information can be presented to persons with low health literacy with positive effects on understanding health information.

The development of the pre-test-post-test questionnaire was done in line with recommendations for tool development for persons with low literacy which suggested comprehensive coverage of the construct to be measured (Artino et al., 2014; Brislin, 1986) i.e. understanding of HIV health information in persons with low literacy. Hence the questionnaire expanded on a previous tool to measure HIV health information (Osborn, Davis, Bailey & Wolf, 2010) introducing more information on living with a chronic disease, and not only on instructions for taking medication.

The extensive process of testing the pretest-post-test questionnaire was a strength of the study. A variety of formats were tried in line with the literature suggestions and adapted

to ensure it was suitable for the specific population that would participate in the study. However, the stages of testing the pre-test- post- test questionnaire indicated that the use of visual aids, and multiple- choice formats did not appear to work well for persons with low literacy in this particular context. This was in contrast with other studies that suggest these are good formats (Cremers et al., 2017; Mantri-Langeveldt, 2019). It is possible that participants from these contexts, the performance was due to higher literacy levels than the participants in this study. Participants in this study either had no schooling (Matsuyama et al., 2011; M. van Beusekom et al., 2015) or had completed less than 7 years of school. Hence, the study highlights the importance of developing appropriate materials before going into the field (Artino et al., Collins, 2016).

Rigour was used in the translation process of the materials used in this study was evident. The translation process allowed for reviewing between four translators and the arrival at metric and cultural equivalence (Pena, 2007). This ensured that the content of the materials was simple and understandable to participants and that it was culturally appropriate to discuss health in the manner and language (IsiZulu) that participants could understand.

The training of the research assistants was appropriate as was evidenced by the procedural reliability calculations of the administration of the pre-test-post-test questionnaires (Heilmann et al., 2008). In addition, the researcher demonstrated high experimental control evidence by the procedural reliability scores (Collins, 2016; Cremers et al., 2017).

The study also utilised a multi-group pre-test post-test group design (Schlosser, 2003a) whose main advantage is its ability to allow for comparison of intervention both within groups and between groups. The design also afforded this study the ability to analyse absolute effects as there was a control group (Field, 2013) (Blanche, Blanche, Durrheim & Painter, 2006; Schlosser, 2003a) which did not receive the intervention.

The iconicity task enabled obtaining stakeholders' perspectives on the transparency and translucency of the visual aids used in the NDoH health education programme and provided valuable information regarding the transparency and translucency of the visual aids used in the study.

Finally, the study was conducted in isiZulu, the participants home language, which enabled the participants a novel opportunity to not only receive unfamiliar health information in their first language from a researcher who is isiZulu speaking from the area which may have made them more comfortable to ask questions.

7.3.2 Limitations of the study

This study employed a convenience sample of patients attending a primary health care day clinic in a rural setting of KwaZulu-Natal Department. Hence the results if the study are not generalisable to other geographical areas.

The sample size was somewhat limited and there was may be attributed to the distances participants have to travelled to get to the clinic as well as transport and financial constraints.

The pre-test and post-test were administered on the same day with a wash out period. Thus, the findings are indicative of retention of information on the day. The long terms effects of the interventions on the recall of the health information was not explored in this study.

Although the participants and the research assistants were blinded as to which groups the participants were allocated to (Viera & Bangdiwala, 2007). The researcher, who also allocated participants to each experimental group, was not blinded to the groups (Appleby & Maden, 1991) as would have been ideal (Schlosser, 2003). This knowledge could have affected the manner in which she administered the intervention although the procedural reliability indicated that the interventions were provided in the appropriate manner.

The sample sizes of the experimental task groups were also small (n=30), although these were close to the studies on which the study was based (Kheir et al., 2013). Moreover, due to purposive sampling, true randomisation was not possible. This means that the generalisability of this study's results is limited to the populations from which the samples were taken, and not all persons with low literacy. Due to the experimental nature of this study, larger samples would have enhanced the generalisability of the results (Pallant, 2010; Theofanidis & Fountouki, 2018)

During the intervention for Group 1 (who received the intervention verbally with visual aids), although the concept of the use of visual aids was introduced; there was no discussion or training as to what each visual aid represented and it was expected that the visual aids might be understood purely from the pointing when augmented with the verbal inputs. However, the importance of explaining visual aids is typically the method of providing augmented input (Dada et al., 2013). This lack of explanation may have lessened the transparency of the visual aids. This is why some studies suggest that that prior exposure to visual aids serves to enhance the analogical ability of participants (Kheir et al., 2013; Lonke et al., 1999).

7.4. Clinical implications

The findings from the study suggest a number of clinical implications.

The design of health education interventions using visual aids should be grounded in theories of processing (Park & Zuniga, 2016) such as the Dual Coding Theory (Paivio, 1969) and Mayer's cognitive theory of multimedia learning (Mayer, 2001). This will ensure that interventions are comprehensive, since they will be planned with the aim of maximising the cognitive skills and tasks that adults utilise when learning or solving a problem (Simon, 1987). When interventions are based on the above theories, they will be aligned with the notion that humans respond to the information received and integrate it with prior knowledge (Mayer, 2002).

Health care professionals should consider the patient's literacy levels, as these levels should inform the content of the programme. Health education programmes for persons with limited literacy should utilise carefully selected, clear and simple text that only covers key concepts deemed critical for understanding the information (Park & Zuniga, 2016; Seligman et al., 2007). This will facilitate the processing and recall of information in persons with low literacy.

Programme content should read at a level below Grade 6 (Schubbe et al., 2018; Sutherland & Isherwood, 2016; Williams et al., 2016) and focus on living with and managing chronic illness. This is because it has been shown that patients are in need of such

information, especially in terms of adherence to HIV treatment (Dyrehave et al., 2016; Audet et al., 2017). The content should also be presented in shorter sessions to accommodate the processing capacity of persons with low literacy and reduce the incidence of forgetting information at a later stage (Mayer & Moreno, 2003).

The text used in written health education programmes should be accompanied by visual aids (Friedman et al., 2010; Kripalani, Schmotzer, & Jacobson, 2012; Meppelink & Bol, 2015). These aids should be placed next to each other so as to avoid any ambiguity (Carstens, 2007; Ma, 2016) that can arise, particularly with complex medical information (Ma, 2016). There is some literature that suggests that visual aids for persons with low literacy should be simple black-and-white pictograms (Park & Zuniga, 2016; van Beusekom et al., 2017). The visual aids should be clear and depict familiar objects and real-life scenarios (Bacardi-Gascon et al., 2002; Dowse et al., 2010). Abstract images must be avoided, since these are not easily understood by persons with low literacy (Hoogwegt et al., 2009).

The need for involving persons with low literacy in the development or selection of acceptable and appropriate visual aids has been highlighted in the scoping review. This may ensure that the transparency and translucency of the visual aids are increased, thus also increasing the likelihood of the visual aids complying with the ISO recommendations for suitability (ISO, 1984; 2014; Mansoor & Dowse, 2003). Stakeholders can furthermore be involved in the developing of new visual aids with the assistance of an artist who can help represent the images described by the stakeholders (Davis et al., 2003). Moreover, Kheir et al. (2013) and Kripalani et al. (2007) assert that it is important to train on visual aids prior to the implementation the intervention for maximum analogical ability (Lonke et al., 1999).

In terms of the delivery of health education programmes, the results of the experimental task also highlight the need for health practitioners to invest time in providing face-to-face health education in the person's home language. This finding is sustained by research that has found that the best type of interventions to achieve this goal include 'tailored counselling' and 'empowerment' (Kim & Lee, 2016; Lee et al., 2012). The latter are methods that include face-to-face interaction between the health care professional and the patient, an interaction that fosters improved self-management of chronic illness (Nouri & Rudd, 2015).

7.5. Recommendations for future research

Future research could focus on the long term understanding of health information by repeating the current study using a multigroup pretest- post-test design with withdrawal. Two modifications could be made firstly Group 1 could receive the NDoH health education programme with visual aids (with an explanation of the visual aids first thereby increasing the transparency of the visual aids). Secondly the pretest post-test questionnaire could be repeated one month later to determine the long-term retention of the health information.

Further research may focus on comparing health education programmes with visual aids comparing visual aids developed by researchers and those developed through consultations with persons with low literacy. This may result in visual aids with higher transparency and translucency of visual aids. Such an exercise also has the potential to increase the likelihood of visual aids meeting the recommended ISO standards (1SO, 1984; 2014), which may activate the 'pictorial superiority complex' effect found in other studies.

More studies are required to explore the role of different types of visual aids such as coloured pictograms, multimedia and cartoons, as they have the potential to enrich persons with low literacy's understanding of health information (Hwang et al., 2005). A randomised control group design could be adopted for the study as they have the potential to provide comparable information on the impact of various visual aid (Schubbe et al., 2018).

With the vast majority of studies with persons with low literacy focused on medicine-taking instructions, it has become apparent that health education programmes ought to seek ways to emphasise health information and address disease broadly and in complex ways – especially for chronic illness (Dyrehave et al., 2016; Hill et al., 2016).

Future studies may also further examine the effect of pictographs on desired behaviour changes (such as adherence to discharge instructions) and improved health outcomes (e.g., decreased emergency or hospital readmission) (Choi, 2015), which is a neglected area of research.

Alternative delivery methods that could be explored for example, comprising of information in the form of multiple sessions over several weeks covering one health idea per session as opposed to once off information sessions. In addition, booster or follow-up

sessions can be provided if required by the patients (Negarandeh et al., 2012; Tsahakis et al., 2014).through innovative picture symbol texts or emojis.

It is also evident that there is a need to develop health literacy scales to assess their patients' health literacy level in various languages and specifically for LMICs. This recommendation is made from the number of reviews and studies that involved the most frequently used measures for health literacy (DeWalt, Berkman, et al., 2004)

7.6. Summary

This chapter presented a summary of the main findings that emerged from the experimental task and the iconicity task. Clinical implications, suggestions for future research as well as a critical evaluation of the contribution, strengths and limitations of the study, were provided.

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Appendices

Appendix A

Summary of findings from reviews on low literacy and health literacy (N=14)

No.	Year	Author/s	Aim of review	No. of studies in the review report	Definition of low literacy	Definition of health literacy	Measure of health literacy	Health Outcomes	Findings in relation to aims	Contribution to the study
1	2004	DeWalt, Berkman, Sheridan, Lohr & Pignone	To review the relationship between literacy and health outcomes.	44	Not defined	A set of skills needed to function in the health care environment	WRAT*, TOFHLA*	Use of health care services, knowledge outcomes, health outcomes, costs of health care	16 studies showing positive and significant relationship between reading ability use of health care knowledge of some chronic diseases like diabetes.	Supports the examination of confounders on health outcomes as a useful strategy to analyse the relationship between reading ability and health.
2	2005	Pignone, DeWalt, Sheridan, Berkman & Lohr	To systematically review interventions designed to improve health outcomes for persons with low literacy	20	"an inability to read, write or use numbers effectively" pp. 185	Not defined	WRAT, REALM*, TOFHLA	Health knowledge, health behaviors, biochemical or other intermediate markers, use of health services	12 studies showed a mix effect of interventions on health knowledge and comprehension. The rest of the studies presented mixed results on the health outcomes	Highlights the benefits of interventions that are efficient for overcoming literacy barriers to health
3	2008	Keller, Wright, and Pace	To examine the relationship between low health literacy and disease state control OR medication adherence in the primary care setting.	11	Not defined	They refer to functional health literacy which is a person's ability to perform basic reading and numeric tasks	TOFHLA, s-TOFHLA*, REALM	Disease state control and medication adherence	2 studies found a significant relationship health literacy and the targeted health outcomes. The other 9 studies with Conflicting results regarding the relationship	Highlights the significance of controlling for confounders that may influence health outcomes such as adherence

						in the healthcare environment			between health literacy and ,disease state control and adherence to glaucoma therapy	
4	2010	Sayah, Majumdar, Williams, Robertson, & Johnson	To identify, appraise, and synthesize research evidence on the relationships between health literacy (functional, interactive, and critical) or numeracy and health outcomes (i.e., knowledge, behavioral and clinical) in people with diabetes.	34	Not defined	"Health literacy is a set of skills that people need to function effectively in the healthcare environment. These include functional, interactive, critical and numeracy skills" pp. 444	TOFHLA, s-TOFHLA REALM, WRAT	Health knowledge, behavioral and clinical outcomes	9 studies summed that improved health literacy was related to better diabetes knowledge. Then 3 studies found no relationship between health literacy self-efficacy and self-care. Others found inconsistent relationship between health literacy and diabetes complications.	Proposes future research to look at interventions that are most efficient for overcoming literacy barriers to health
5	2010	Easton, Entwistle & Williams	To further the understanding of the relationship between functional/health literacy level and health in a working age population with low functional or health literacy skills	24	"Low functional literacy: the inability to read, write and speak in English, and to use mathematics at a level necessary to function at work and in society in general" p. 1	"The cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain	REALM, TOFHLA, s-TOFHLA, NART* and Test of Adult Education.	Potential mediating variables (i.e. health promoting/risk behaviors, self-management, access to and use of health care services) between functional literacy, health literacy and health status i.e.	Mixed findings in the relationship between health literacy and health risk or promoting behaviors, use of health care services	Puts forth that mediators and moderators of health literacy may affect access to health and self-care services amongst persons whose literacy is unknown or not assessed ("hidden population")

						good health" p. 1				
6	2011	Berkman et al.,	To update systematic review to determine whether low health literacy is related to poorer use of health care, outcomes, costs, and disparities in health outcomes among persons of all ages.	207	Not defined	"a set of skills that people need to function in health care environment" pp. 97	REALM, TOFHLA, S-TOFHLA. Numeracy Test-Schwartz–Woloshin (11), WRAT	Use of health care services and access to health care; viz Frequency of hospitalisations & health care related skills e.g. interpreting labels and health messages	96 studies found an association between low health literacy and poor ability to understand and follow medical guidance. Moderate evidence on health literacy and interpretation of medication labels, Low evidence on relation between HL and understanding of severity of health condition such as HIV. Strong evidence between low health literacy and depression.	Suggests health literacy thresholds in future research to help define the differences in health outcomes and the populations that are best suitable for these interventions.
7	2011	Sheridan ,Halpern , Viera , Berkman ,Donahue & Crotty	To examine the effects of interventions designed to mitigate the effects of low health literacy through either single or multiple literacy-directed strategies	42	Not defined	"The degree to which individuals can obtain, process and understand basic health information and services needed to make appropriate health decisions and	REALM, TOFHLA, s-TOFHLA, WRAT, WRAT-R*, DR Numeracy test,	Health care survive usage, accuracy of risk perception, knowledge, comprehension, self-efficacy, behavior, quality of life, adherence, disease, symptoms	Interventions categorized into single or mixed interventions. Mixed strategy interventions showed inconsistent evidence on the effects on health literacy, knowledge self-efficacy and adherence.	

						function effectively in the health care environment				
8	2012	Lee, Lee, Kim & Kang	To identify effective intervention strategies to improve health outcomes in patients with cardiovascular disease and low literacy skills	9	Not defined	"the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" p.128	REALM, TOFHLA	Knowledge about related knowledge and understanding of physician instruction, (b) psychological outcomes including improved self-efficacy, self-confidence, and quality of life, (c) self-management behavior, and (d) physiological factors	Define three forms of strategies (a) tailored counseling, (b) education with self-monitoring, and (c) periodic reminders. Tailored counseling was the most effective strategy for improvement on health outcomes.	Emphasizes the cultural aspect of health literacy and suggests future research to include a broad but representative section from the population of interest
9	2016	Wali, Hudani, Wali, Mercer, Grindrod	To systematically review the evidence on interventions for improving medication knowledge and adherence for low health literate populations. To identify different categories in health	47	Not defined	The patient's ability to obtain, read and understand medication information to make appropriate health decisions" p. 831	REALM, TOFHLA, NVS* PIAT*	Medical knowledge (verbal, written questionnaires) and adherence (pill counts)	All six intervention strategies demonstrated some effect on health knowledge and adherence Defined 6 types of intervention strategies; written, ii) verbal, iii) visual, iv) labels/medicine bottle, v) reminder systems and vi) educational programmes and services.	Summarised some of the effective strategies for effective patient-centred interventions such as the inclusion of aids to enforce written information and ease of navigation in the format (if written/printed materials)

			information intervention							
10	2016	Williams, Muir and Rosdahl, 2016	To review the literature on readability of ophthalmic patient education materials	13	Not defined	"the ability to read, understand and act on health information" p. 2	Flesch-Kincaid Grade Level	Studies evaluating patient education materials	All studies scored a readability level of 12.9, which is at university education level. The studies fell short of the recommended readability level for persons with low literacy (6^{th}-7^{th} grade.	Demonstrates that Patient educational materials suitability for patients with low health literacy can be improved by using guidelines on writing easy-to-understand materials.
11	2016	Park & Zuniga	To examine and evaluate studies related to picture-based health education materials for people with low health literacy	11	Not defined	"the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions"	TOFHLA, s-TOFHLA, REALM, SLT*	Picture based health education on various health conditions and outcomes	10 studies on picture-based materials had a positive effect on health management of heart failure, understanding of health education materials, and recall of instructions.	Synthesizes studies that show that pictographic health education materials are effective in successfully conveying healthcare messages to people with low health literacy.

12	2016	Kim & Lee	To systematically review health-literacy-sensitive diabetes management interventions, with a focus on identifying strategies for accommodating patients with low health literacy, and to examine the efficacy of these interventions to improve health outcomes.	13	Not defined	" the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" p. 324	Not defined	a) cognitive or psychological outcomes (knowledge, self-efficacy, activation, and perceived susceptibility); (b) self-care behavioral outcomes (e.g. diet), (c) health outcomes e.g. (blood pressure, BMI)	Three categories: spoken communication, written communication, empowerment and language or cultural consideration. Each category of interventions was effective for different health outcomes.	Summarizes strategies for patients with low health literacy into four domains and found that health-literacy-sensitive interventions were most effective for improving health outcomes.
13	2017	Malloy-Weir & Cooper	To examine the extent, range and nature of research on empirical relationships between health literacy, literacy or numeracy and the understanding and use of nutrition labels.	16	not defined	“The ability to access, comprehend, evaluate and communicate information as a way to promote, maintain and improve health in a variety of settings across the life-course” p. 309	NVS*, REALM	Understanding and use of nutrition labels (health information)	Significant relationship between reading ability and understanding of nutritional label information seen in 3 studies. In the other 12 showed contradictory results (some positive, negative or no relationship) between health literacy and the use of nutrition labels though consumers with lower literacy benefitted from nutritional label	Found that health literacy and nutrition label understanding and use may be overlapping; rather than to be understood as independent variables.

									information using visual aids.	
14	2017	Taylor	To summarize the evidence for associations between reduced health literacy and patient outcomes in chronic kidney disease (CKD)	29	not defined	The ability to access, understand and use health-related information p. 1	REALM, REALM-T, s-TOFHLA, BHLS*, NVS	Disease knowledge), hospitalisations, utilisation rate, clinical parameters (e.g. BP), lab measure (bloods) and clinical outcomes like mortality and time to transplant referral.	1 cohort study has a significant relationship between reduced understanding of disease treatment and reduced ability to control cardiovascular risk factors. Though other study results were also mixed, they also confirmed that patients with less health literacy had poorer outcomes	Reports that the majority of evidence came from the USA, which limits the application of findings to other healthcare systems.

Note:
**name of test provided in full in the notes section of the table*
BHLS: Brief health literacy screen; NART: a test of functional literacy. Full definition not provided by reviewers; NVS: The Newest Vital Sign; PIAT: Peabody Individual Achievement Test; SLT-Short Literacy Test; TOFHLA: Test of Functional Health Literacy in Adults; s-TOFHLA: short version of the TOFHLA; WRAT: Wide Range Achievement Test; WRAT-R, Wide Range Achievement Test-Revised*

Appendix B

Summary of the findings from the scoping review on interventions using visual aids for persons with low literacy (N=50)

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
1	Bacardi-Gascon Jimenez-Cruz, M.A, Jones, E, 2002 (United States of America)	To evaluate and compare graphical impact, overall understanding of message and ability to apply food guides information in two groups of different education levels in Baja, California	Not specified	Individuals viewing a diet leaflet with visual aids	An apple or pyramid of health containing pictures of different types of food	Comprehension	Focus group	Persons with low literacy and persons with high literacy preferred more familiar visual aids with simple and specific text, to more technical visual aids.
2	Bello-Bravo, Dannon, Agunbiade, Tamo, & Pittendrigh, 2013 (Germany)	To assess the potential reaction of local populations to the use of animated videos as an educational tool in technology dissemination.	Explorative	Individuals watching videos and then answered a questionnaire	Three prevention videos shown on cell phone: on crop protection, cholera and malaria	Prevention education and perception of the videos	Questionnaire	Respondents preferred the videos and were highly positive about the use of these animations for educational purposes.
3	Berthenet, Vaillancourt, Pouliot, 2017 (Canada)	1) To validate a set of pictograms depicting medication instructions for use among the elderly to support health literacy. 2) To improve the pictograms by redesigning them based on the feedback received from participants and	Not specified	Structured interviews assessing transparency and translucency of pictograms	International pharmaceutical federation pictogram set	Transparency and translucency of visual aids	Visual aid recognition/interpretation	Level of education did not affect overall comprehension scores (transparency and translucency). No difference in overall comprehension between persons with high literacy and persons with low literacy.

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
		then reassessing their comprehension.						
4	Bickmore, Pfeifer, & Paasche-Orlow, 2009 (United States of America)	To design and evaluate an animated computer agent (ECA) to explain research consent forms to potential research participants	Randomized controlled trial	A wheeled kiosk with a touch screen display attached to an articulated arm that can be positioned in front of patients (trial 1) or at home (trial 2)	Embodied Conversational animated computer characters that simulate face-to- face conversation with patients using synthetic speech.	Satisfaction and suitability	Questionnaire and use of the ECA at home	Overall satisfaction and ease of use with the ECA, regardless of health literacy level.
5	Borrayo, 2004 (United States of America)	To create an educational video based on findings from previous studies that we have conducted to better understand Latinas breast cancer perceptions and educational needs	Not specified	A video telenovela about the risk of breast cancer viewed by focus groups	An 8-minute video telenovella in a soap opera format	Decision to consider mammography screening	Not specified	Results not reported
6	Bryant et al., 2009 (United States of America)	To develop a novel multimedia version of the AUA-SS to improve patient understanding and decrease symptom score errors	Randomized controlled trial	Self-administered assessment of the American Urological Association Symptom Score (AUASS) scale (1) tradition written version (2) multimedia version	A novel multimedia computer version of AUA which included videos	Comprehension-American Urological Association symptom score (AUA-SS)	Interview	Improvement in AUA-SS scores for both persons with low and high literacy. Improved comprehension for persons with low literacy using visual aids in a multimedia presentation even when verbal input was also received.
7	Calderon et al, 2014 (United	(1) To determine the effectiveness of standard screening	Randomized	Participants evaluated either (1) video animated	An animated easy Spanish video with	Diabetes health literacy assessment (DHLS) score	Pre-test Post-test DHLS scores	Experimental group participants with STOFHLA scores < 17

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
	States of America)	tools may be improved using a multimedia format and to test the feasibility of integrating the multimedia version into clinical practice. (2) To measure the time required to complete the written vs multimedia versions	controlled trial	diabetes intervention which involves a culturally appropriate diabetes information (experimental) (2) an easy read (control)is something missing here easy read what?	easy read subtitles			(inadequate functional health literacy) had significantly greater improvement in a diabetes health literacy survey than control group participants with similar STOFHLA scores
8	Carstens, Maes, & Gangla-Birir, 2006 (SA)	To determine the scope and nature of differences in picture comprehension between literate and low-literate audiences in the context of HIV and AIDS	Not specified	Low literate and literate respondents interviewed using the same schedule about their comprehension of the visual aids.	Humans, analogous objects and abstract objects	Visual aid comprehension	Interview	Human are more easily recognised than non-human visual aids. The identification of abstract objects was difficult for persons with high literacy and persons with low literacy although more difficult for the persons with low literacy.
9	Choi, 2013 (United States of America)	To examine the acceptability and comprehension of pictograph-based discharge instructions in 15 low-literate older adults	Cross sectional pilot study	Focus group examining the acceptability and comprehension of pictograph-based discharge instructions.	Simple pictograms (stick figures) showing explicit care actions	Acceptability of pictograms	Interview	Participants perceived the pictograms to be effective in helping them to understand step by step procedures and discharge instructions

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
10	Choi, 2012 (United States of America)	To develop and pilot breast health-care instructions enhanced by pictograms (simple line drawings representing health-care actions)	Not specified	Participants reading the text and viewing pictograms, then reporting on clarity, acceptability and ability to understand the pictograms	Pictograms drawn by a professional illustrator and text whose readability was reduced to grade 6 level	Acceptability and suitability of pictograms	Not specified	Pictograms were found to be useful and easy to understand
11	Choi, 2015 (United States of America)	To examine the effect of pictograph-based discharge instructions on comprehension and recall in older adults with low literacy	Pre-test-post-test control group designs	(1) One on one session and take-home pictograph-based instructions (2) Session together with family member	Pictograms	Comprehension and recall	Questionnaire	Greater improvements in scores for comprehension and recall demonstrated by the intervention group when compared to the control group
12	Chuang, Lin, Wang, & Cham, 2010 (Taiwan)	To compare dimensions of preference and comprehension of pictographs between medical staff and persons with low literacy	Not specified	Survey and comparison of preference and comprehension between two literacy groups: (1) medical staff and (2) participants with low literacy	Pictograms	Comprehension and choice of pictogram	Interview	Preference and comprehension of pictograms differed significantly between patients and medical staff.
13	Chung, Choi & Kim, 2016 (United States of America)	To explore dementia patients' experiences of a media presentation including images of nature	Not specified	Participants exposed to fascinating natural scenes in a recreation room	Multimedia slideshow (video) presentations with images of nature	Feelings and experiences of the media presentations	Interview+ medical record review	Most of the participants indicated a positive emotional and physical consequences from the intervention

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
14	Davis et al, 2003 (Australia)	To evaluate climacteric symptoms (menopause) among rural and remote, indigenous Australian women and to develop culturally relevant women's health midlife educational material	Cross sectional /cohort	Health messages translated into both traditional language and vernacular and given to women in the form of a survey, to evaluate the cultural relevance of the art used in the health messaging.	Culturally inspired art images	Climacteric symptoms	Not specified/applicable	Cultural art was created for use in health-education materials.
15	Dewalt et al, 2004 (United States of America)	Development and pilot test of a disease management program for low literacy patients with heart failure	Not specified	(1) Development of a disease management programme focusing key self-care skill building, particularly symptom and weight assessment and diuretic dose adjustment. The programme included a clear, picture-based educational booklet. The materials use simple language to make each point with associated graphics to reinforce understanding. The materials we tested for readability the Fry and (2) Flesch–Kincaid (Microsoft Word 2000), to ensure the readability was below third grade level. (2)A pilot study in the form of focus group	Clear pictures	Self-knowledge, behavior, efficacy, lower health related quality of life	Interview and medical indicators	No change in heart-failure related knowledge but an SSD in daily measurement weight.

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
				and cognitive response interviews to assess knowledge and self-efficacy				
16	Dowse & Ehlers, 2001 (United States of America)	(1) To evaluate and compare locally developed, culturally appropriate pharmaceutical pictograms in persons with low literacy (2) To investigate the effectiveness of pictograms in stimulating recall of medication instructions.	Multistage	Twenty-three pictograms from the USP-DI and a corresponding set of 23 locally developed, culturally sensitive pictograms for conveying medication instructions	Black and white pictograms (11.5 cm ×11.5 cm) and each (both sets).	Recall of medical instructions and preference of pictograms	Interviews and visual aid recognition	(1) 20/23 (87%) of the Local pictograms complied with the ANSI criterion of ≥85% comprehension, compared with 11/23 (47%) of the USP pictograms. (2)Respondents indicated preference for the locally developed pictograms
17	Dowse & Ehlers, 2005 (South Africa)	To design labels incorporating pictograms, to compare the understanding of these text + pictogram labels with conventional text-only labels, and to assess the influence of pictogram labels on adherence to therapy in patients with limited reading skills.	Randomized controlled trial	Pictograms printed on self-adhesive labels stuck on to the medicine bottle without obscuring any written information. The specific times for administration were filled on blank clock faces after consultation with each patient. Two groups (1) conventional text-only labels (2) labels containing instructions in both the written and pictogram form (text + pictogram labels).	Pictogram labels stuck on to the medicine bottle	Comprehension and adherence	Interviews (and pill counts)	Labels with text and pictograms had a positive influence on both comprehension of medication labels and adherence to therapy

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
18	Dowse, Barford, & Browne, 2014 (South Africa)	To investigate the influence of a pretested patient information leaflet (PIL) containing both text and illustrations on HIV- and ARV-related knowledge; and on self-efficacy in a limited literacy South African population.	Randomized controlled trial	(1)Intervention group (standard care plus illustrated PIL). (2)control (standard care)	Pictograms	Health knowledge and self-efficacy	Interview	A statistically significant increase from baseline knowledge, ARV, HIV/AIDS and side effect knowledge in the intervention group. No significant change in knowledge was found in the control group over six months
19	Dowse, Ramela, & Browne, 2011 (South Africa)	(1) To apply a visual/textual approach in developing and evaluating a medicine information leaflet with pictograms suitable for low-literate HIV/AIDS patients. (2) To identify and recommend best practices in this type of information design.	Not specified	Participants were required to locate and explain the information, and were questioned on their opinion of low-literate HIV/AIDS patients on the layout and contents of the leaflet	Pictograms	Comprehension	Visual aid recognition/interpretation	The average understanding of text and pictogram leaflet was only 60%, but 71,8% could interpret all the pictograms.
20	Dowse, Ramela, Barford, & Browne, 2010 (South Africa)	To develop information materials to facilitate the communication and recall of medicine-related information to culturally and linguistically diverse South African HIV/AIDS patients	Not specified	(1) individual interviews to examine sets of six side-effect pictograms and offer interpretation then; (2) to a group discussion on opinions about the problems and sizes of the images	Pictograms	Recall and comprehension of chronic illness health information	Questionnaire	Comprehension of the information presented varied according to the concrete or abstract nature of the information.

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
21	Gerber et al, 2005 (United States of America)	To evaluate a clinic-based multimedia intervention for diabetes education targeting individuals with low health literacy levels in a diverse population.	Randomized control trial	(1) Multimedia video audio (intervention) (2) Standard information (control): Audio/video sequences to communicate information, provide psychological support, and promote diabetes self-management skills without extensive text or complex navigation provided at a kiosk in the form of 19 lessons	Multimedia, audio and video sequences of health information	Self-management/efficacy	Not specified	Increased self-efficacy in the intervention group (multimedia). The multimedia programme resulted in greater level of perceived susceptibility to diabetes-related complications but without improvement in glycaemic control.
22	Gupta et al, 2009 (India)	To assess the impact of a health education intervention program about breast self-examination (BSE) among women in a semi-urban area in adult that have low literacy in Madhya Pradesh, India	Descriptive	Groups of participants shown lecture, pamphlets, flipcharts and audio-visuals (the intervention)	A short lecture, education film and flipcharts	Health education, awareness of the importance of breast self-examination	Not specified	Improvement in knowledge regarding all aspects of breast self-examination from pre- to post-test in the intervention group.
23	Hill et al., 2016 (United States of America)	(1)To evaluate the effect of standard vs pictograph-enhanced discharge instructions on patients' immediate and delayed recall of and satisfaction with their discharge instructions. (2)To evaluate the effect of automated pictograph	Pretest-post-test control group design	Participants presented with either (1) pictogram-enhanced or (2) standard the version of discharge instructions and reviewed the document for up to 15 min. Participants were then asked a series of free recall questions to assess their	Pictograms	Recall and satisfaction	Recall questions	Pictograph-enhanced discharge instructions were recalled 35% more at discharge were more satisfied with the understandability of their instructions at 1-week post-discharge than those who received standard discharge instructions

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
		enhancement on patient satisfaction with their discharge instructions.		immediate recall of the instructions				
24	Hoogwegt, Maes, & Van Wijk, 2009 (South Africa)	To investigate the effect of motion suggesting elements (arrow) in health-related static pictures aimed at low educated audiences in South Africa.	Not specified	Individual Interviews asking three questions about the pictures	Pictures displaying simples' actions by either zooming in on the hands or showing the hands together with a larger part of the body.	Recognition and interpretation of visual aid	Interview	Inclusion of arrows lead to stronger recognition of motion and intended motion but only for persons with higher education and not for persons with low literacy.
25	Hwang, Tram & Knarr, 2005 (Canada)	To determine whether the addition of illustrations to prescription medication instruction labels affects patients' comprehension of the accompanying written information.	Not specified	Individual Participant asked to interpret two sets of medication instruction labels (1) first with text only and (2) the second with text and illustrations.	Five black and white pharmaceutical labels enlarged from the original label size of 4 × 1 cm to a final size of 8 × 2 cm to enhance readability.	Visual aid interpretation and comprehension	Interview	Commonly-used illustrations were of little or no use in improving patients' comprehension of the accompanying written instructions
26	Kalichman, Cain, et al., 2005 (United States of America)	To test the pictographic colour visual analogue scale for assessing self-efficacy for medication adherence.	Not specified	Key informants asked to describe their experiences related to the situations in the pictographic colour scale as well as, what would make the situations more difficult and rated all the scenarios for	Pictograms of individuals of ambiguous ethnic backgrounds	Adherence to medication/prescriptions	Not specified	(1) Pictographic self-efficacy scores were associated with behavioral measures of medication adherence (2)The self-efficacy scale was not associated with potential confounding factors in medication adherence

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
				realism and personal relevance.				including reading and numerical literacy, education, and health status
27	Kalichman et al., 2013 (United States of America)	To test the efficacy of a pictograph-guided adherence skills building counseling intervention for limited literacy adults living with HIV	Randomized controlled trial	Marginal and lower literacy groups and randomly allocated to one of three adherence-counseling conditions: (1) pictograph-guided adherence counseling, (2) standard adherence counseling, or (3) general health improvement counseling.	Pictograms of humans, analogous objects and abstract objects	Adherence to medication/prescriptions	Interview, unannounced monthly record review	Participants with marginal literacy demonstrated greater adherence to pictograph-guided and standard adherence counseling conditions compared to the general health improvement counseling. Participants with lower-literacy in the general health improvement counseling condition demonstrated greater adherence than those in the pictograph-guided and standard adherence counseling. Among the participants marginal literacy, pictograph-guided counseling condition reported greater use of adherence strategies compared to the standard and health improvement counseling conditions.

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
28	Kalichman, Cherry, & Cain, 2005 (United States of America)	To develop and pilot a brief HIV treatment adherence improvement counseling intervention for people with lower health literacy taking antiretroviral medications.	Not specified	(1) Interviews with HIV positive men and women regarding barriers and challenges in adhering to their antiretroviral regimens. (2) Designing a pictographic treatment adherence intervention for people with lower health literacy skills. (3) Adherence instructions delivered partitioned into meaningful units.	Pictograms	Health knowledge/ education and adherence	Interview	Increased HIV/AIDS knowledge, intentions to improve adherence, and self-efficacy for adhering to medications was reported in the participants
29	Kandula et al., 2009 (United States of America)	To examine the effect of a multimedia diabetes education program's (MDEP) targeted to patients with low literacy on knowledge to determine the association between literacy and knowledge improvement.	Not specified	Five focus groups to refine, revise and modify the computer-based MDEP.	Multimedia programs combining text, sound, graphics, and video	Health knowledge	Interview	Participants with inadequate literacy had a lower increase in knowledge after the multimedia intervention compared to those with adequate literacy
30	Kandula, Malli, Zei, Larsen, & Baker, 2011 (United States of America)	To examine the stability of knowledge gains (retention) 2 weeks after viewing the MDEP in patients across literacy levels and to determine whether adding a	Group Design	Experiment 1: Adult primary care patients watched MDEP and answered knowledge-based questions about diabetes before and after watching the MDEP. Experiment 2: same	Computer based multimedia programme with 7 modules combine graphics, animation,	Health knowledge	Interview	All participants, regardless of literacy level had trouble remembering large amounts of new information, even when a teach-back approach was used.

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
		teach-back protocol immediately after the MDEP improved knowledge retention at 2 weeks' follow-up across literacy levels.		as experiment 1; except if participants answered incorrectly after watching the MDEP, they received teach-back session.	and spoken audio by a male narrator.			
31	Kheir et al 2013 (Qatar)	To develop pictograms depicting medicine label instructions. To compare comprehension of instructions provided in text and pictorial formats.	Randomized controlled trial	One of three interventions: (1) Text plus verbal instructions (2) Pictogram only medicine labels (3) Pictogram medical labels and verbal instructions.	Pictograms	Comprehension	Interview	Non- statistical significance in results: (1) Participants receiving pictogram plus verbal instructions had better results in interpreting most of the label instructions. (2) Pictorial and verbal instructions were better for persons with low literacy than written plus verbal instructions. (3) Pictogram only instructions were the least understood
32	Koops van't Jagt et al., 2017 (United States of America)	(1) To test the effects of reading a translated version of the fotonovela "Sweet Temptations" in peoples with varying levels of literacy in the Netherlands. (2) To investigate the processing and persuasive effects of the fotonovela through the Entertainment Overcoming	Group Designs	One of three conditions: (1) fotonovela condition, (2) traditional brochure (3) no intervention (control)	Fotonovella booklet that portrays a dramatic story using photographs and captions.	Health information	Questionnaire	Fotonovela group outperformed both the other group (traditional brochure) and all other groups in diabetes knowledge across both literacy levels

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
		Resistance Model (EORM)						
33	Kripalani et al, 2007 (United States of America)	Development, implementation and preliminary evaluation of an illustrated medication schedule to serve as a low-literacy patient education tool to promote appropriate use of prescription medications.	Randomized controlled trial	One of three conditions: (1) illustrated pill cards, reminder post cards (2) both or (3) no intervention	Digital pictorial pill images depicting medicine instructions and labelling	Efficacy and use of pill card	Survey	Mild improvements in self-efficacy between the baseline and follow-up evaluations, but not statistically significant and could not be tied to frequency of pill card use tied to appropriate use of prescriptions medicines.
34	Kripalani, Schmotze & Jacobson, 2012 (United States of America)	To test the effect of two low-literacy interventions on medication adherence	Randomized controlled trial	Two literacy interventions given over three conditions: (1) usual care, refill reminder postcards (2) illustrated daily medication schedules (3) both interventions	Image/icon of medications	Adherence to medication prescriptions	Medical record review	Non-statistically significant improvements in self-efficacy were identified using the visual aids.
35	Mansoor & Dowse, 2003 (South Africa)	(1) To design, develop, and evaluate a simple, understandable medicine label and patient information leaflet (PIL) for nystatin suspension (2) To assess the effect of incorporating pictograms on	Multistage iterative design	(1) the control group (text only) (2) the experimental group (text and pictograms)	United States Pharmacopeia pictograms	Comprehension	Interview and visual aid recognition	Pictograms enhanced comprehension of more complex information, resulting in significantly more participants in the experimental group obtaining a score for understanding >80% for both the medicine label and PIL. (2) A clear preference for the materials incorporating

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
		understanding in low-literate participants.						pictograms was expressed.
36	Mbuagbaw & Ndongmanji, 2012 (Cameroon)	To investigate the factors associated with patient comprehension of frequently used prescription patterns and explores patients' preferences for the various methods.	Cross sectional , cohort	All participants were shown four samples of different prescription modalities: (i) pictograms (ii)written (iii) pictograms (iv) and Latin abbreviations and then interviewed on understanding of the meaning of the pictographs	Prescription label pictograms	Comprehension	Interview	Understanding was best with pictograms and worst when Latin abbreviations were used. Higher levels of education were associated with better understanding of Latin abbreviations, written out prescriptions, pictograms and pictograms after controlling for confounding variables. Participants mostly preferred pictograms and written-out prescriptions.
37	Meppelink & Bol, 2015 (Netherlands)	To gain insight into how people with limited or adequate health literacy attend to online health information, and how attention to such information leads to adequate recall of information.	Not specified	(1) text-only (2) text with text-relevant illustration conditions	Illustrations	Attention and recall of health information	Eye tracking: recorded attention patterns on a health webpage	For people with limited health literacy, attention to online health information was positively related to recall, whereas attention to the text improved recall of information in the group with adequate health literacy

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
38	Meppelink et al., 2015 (Netherlands)	To investigate what features of health animations, improve information recall and attitudes and whether there are differences between health literacy groups.	A 2X2 factorial design	One of the four experimental messages, all providing the same information on colorectal cancer screening. A 2 (spoken vs written text) x 2 (illustration vs animation) comparison was made.	Illustrations and animations	Recall and attitudes	Not specified	Animations alone did not improve recall. When animations were combined with spoken text these were improved.
39	Negarandeh, Mahmoodi, Noktehdan, Heshmat, & Shakibazadeh, 2012 (Iran)	To explore the impact of pictorial image and teach back educational strategies on knowledge, adherence to medication and diet among patients with type 2 diabetes and low health literacy	Randomized controlled trial	3-way comparison: (1) pictorial (2) teach back method; education within three weekly sessions each lasting 20 minutes (3) no intervention (control).	Pictorial aids	Health education and adherence	Questionnaire (Morisky Medication Adherence Scale (MMAS-8-Item)	Pictorial images and teach back increased knowledge, adherence to medications and diet among patients with type 2 diabetes and low health literacy as compared to when con intervention was provided.
40	Poureslami et al., 2012 (Canada)	To explore the effectiveness of different formats of culturally relevant information and its impact on asthma patients' self-management within the Punjabi, Mandarin, and Cantonese communities.	Randomized controlled trial	Education videos (knowledge vs. community) on asthma self-management and pictorial pamphlets on asthma triggers	Educational videos; and a pictorial pamphlet .	Self-management and adherence	Interview	Pictorial aids statistically improved knowledge of asthma symptoms, inhaler use, and understanding of physician's instructions significantly from pre-test to post-intervention. Most notable improvement was seen in the participants who watched both the community and knowledge videos

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
41	Roberts et al., 2008 (United States of America)	To produce an understandable pictorial asthma action plan to Somali participants in two countries (United Kingdom & Malaysia).	Not specified	Pictorial representations of clinical scenarios used to explain the concept of self-management.	Pictorial representations	Comprehensibility of images and plans	Interview	Guessability and translucency were reported to be good for the pictures used in both countries.
42	Shea et al., 2008 (United States of America)	To compare responses on a printed patient satisfaction instrument with responses to two alternatives formats i.e. An illustration enhanced format and a telephone based interactive voice response format.	Group Designs	(1) A printed version or a patient satisfaction tool that used illustrations to support the central themes/ideas in the items. (2) An interactive voice response format, in which patients heard a recorded script on the telephone and entered their responses on the telephone keypad.	Not specified	Patient satisfaction	Questionnaire (Consumer Assessment of Healthcare Providers and Systems-CAHPS version 2.0)	Response rates for the illustrated and print formats were higher than for the interactive voice format and there were almost no invalid responses .However, the format was associated with lower CAHPS satisfaction scores
43	Smith et al., 2009 (Australia)	The development and preliminary evaluation of a bowel cancer screening decision aid for persons with lower education and literacy	Not specified	Various interviews assessing comprehensibility and acceptability of the decision aid	Illustrations and graphs	Comprehensibility and acceptability	Interview	The decision aid was positively reviewed by adults with higher and lower education and literacy, as well as general practitioners, adult literacy experts and experts in bowel cancer screening.

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
44	Terndrup et al., 2012 (United States of America)	To evaluate a multimedia education intervention as a method for informing independently living elders about emergency department care.	Group Design	Participants viewing a brief video that chronicled the key events after a hypothetical 911 call for chest pain	Video	Learning of emergency department care	Audience response system	Significant improvements seen in the number of tests expected, number of providers expected, communications and pre-hospital medical treatment the intervention as improving their ability to cope with an emergency department encounter.
45	Tsahakis, et al., 2014 (United States of America)	To evaluate the change in comprehension of diagnoses, treatment plans, and discharge instructions after orthopaedic trauma patients are given an informational document that includes pictorial representations at the time of discharge and at follow-up.	Prospective comparative cohort study	(1) First postoperative visit: treatment and discharge instructions before being seen by a physician. (2)Follow up visit: an additional informational sheet with both text and pictorial representations at discharge.	An image of a human skeleton on which the fractured bone is circled to highlight the information to be later tested for comprehension	Comprehension	Questionnaire	Increased patient questionnaire mean scores when both text and pictorial representations were used, than when treatment and discharge instructions only, were used.
46	Van Beusekom, Bos, Wolterbeek, Guchelaar, & van den Broek, 2015 (Netherlands)	To evaluate icons of organs with systematic variations in design to provide directions for the development of pictograms that support patient leaflets targeted at a low-literate audience	Cross sectional	Participants interviewed on four organs times three variables (12 questions) to select the visual aids that depicts the body organ most clearly	Visuals of bodily organs	Preference and clarity of visual aids depicting organs	Interview	Low-literate participants were more likely than literate participants to opt for less context in the form of the body. For the three internal organs, the intestines, lungs and kidneys.

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
47	Volandes, Barry, Chang & Paasche-Orlow, 2009 (United States of America)	To examine whether a video of a patient with advanced dementia could improve decision making at the end of life by decreasing uncertainty	Survey	After hearing a verbal description of advanced dementia, subjects were asked about their uncertainties for end-of-life care. Then after viewing and were against asked to rate the level of their uncertainty.	A video	Uncertainty in decision-making	Interview	The video decision aid improved end-of-life decision making by decreasing uncertainty regarding subjects' preferences, especially for those with limited literacy
48	Volk et al., 2008 (United States of America)	To evaluate an entertainment-based patient decision aid for prostate cancer screening among patients with low or high health literacy.	Randomized controlled trial	Group 1: entertainment-based decision aid for prostate cancer screening Group 2: an audio booklet-control aid with the same learner content but without the entertainment features.	An entertainment-based decision aid for prostate cancer screening or an audio booklet-control aid	Acceptability of visual aids	Questionnaire (decisional conflict scale, patient self-advocacy scale)	(1) Patients with low-literacy were more engaged with the entertainment-based aid than patients at the high-literacy site and associated the entertained based aid with lower decisional conflict and greater self-advocacy when compared to patients given the audio booklet. (2)No differences between the aids were observed for patients with high literacy.
49	Webb et al., 2008 (United States of America)	To use a patient-centred approach to refine warning labels promoting the safe use of prescription drugs among patients with different literacy levels.	Not specified	Group discussions to solicit feedback around improving language and content, and revision icons of 10 of the most commonly used warning labels to fit patient mental models	Pharmaceutical warning labels	Comprehension	Interview	Most warning labels were confusing and discordant, used difficult language, and text. Participants sought actionable language in the most simple and concise manner.

No.	Author, Year, Country	Aims of Study	Design	Method of intervention	Description of visual aids (IV)	Targeted Outcome/s	Measurement of Outcome	Findings in relation to targeted outcomes
				of specified behaviors.				
50	Yong et al., 2013 (Thailand)	(1) To examine the impact on smokers' reported awareness of and their cognitive and behavioral reactions following the change from text-only to pictorial warnings printed on cigarette packs. (2) To explore differences by type of cigarette smoked (roll-your-own [RYO] vs. Factory-made [FM] cigarettes)	Quasi-experimental and cohort	Individuals shown pictorial health warnings on cigarette packaging and then assesses on their cognitive and behavioral reactions	Pictorial warnings on cigarette packaging	Awareness of cognitive and behavioral actions	Interview	Increased awareness and behavioral change reported. Pictorial health warning labels have led to a greater impact than the text-only warning labels

Appendix C

The Brief Estimate of Health Knowledge and Action—HIV version (BEHKA-HIV)(Osborn, Davis, Bailey, & Wolf, 2010)

The Brief Estimate of Health Knowledge and Action—HIV version (BEHKA-HIV)

Part I: Knowledge—''We would like to know if patients are familiar with two HIV terms: a CD4 count and viral load. Would you mind if I ask you a few questions about that? Ok…'' 1a. What is a CD4 count?

Determine if correct

1b. If 1a is correct, is the goal of treatment to make the CD4 count go up or down?

UP [1] DOWN [0]

2a. What is a viral load?

Determine if correct

2b. If 2a is correct, is the goal of treatment to make the viral load go up or down?

UP [0] DOWN [1]

What medicines are you currently taking to treat HIV?

Respondent must identify all medications in HAART regimen to be correct

CORRECT [1] INCORRECT [0] DON'T KNOW [0]

Part II: Action—''Please tell me if you agree, are not sure, or disagree with these 5 statements…''

I don't take my medicines when they make me feel bad.	AGREE [0]	NOT SURE [0]	DISAGREE [1]
I don't take my medicines when I am too tired.	AGREE [0]	NOT SURE [0]	DISAGREE [1]
I don't take my medicines when I am feeling down or low.	AGREE [0]	NOT SURE [0]	DISAGREE [1]
I don't take my medicines because it tastes bad.	AGREE [0]	NOT SURE [0]	DISAGREE [1]
I don't take my medicines when I feel good.	AGREE [0]	NOT SURE [0]	DISAGREE [1]

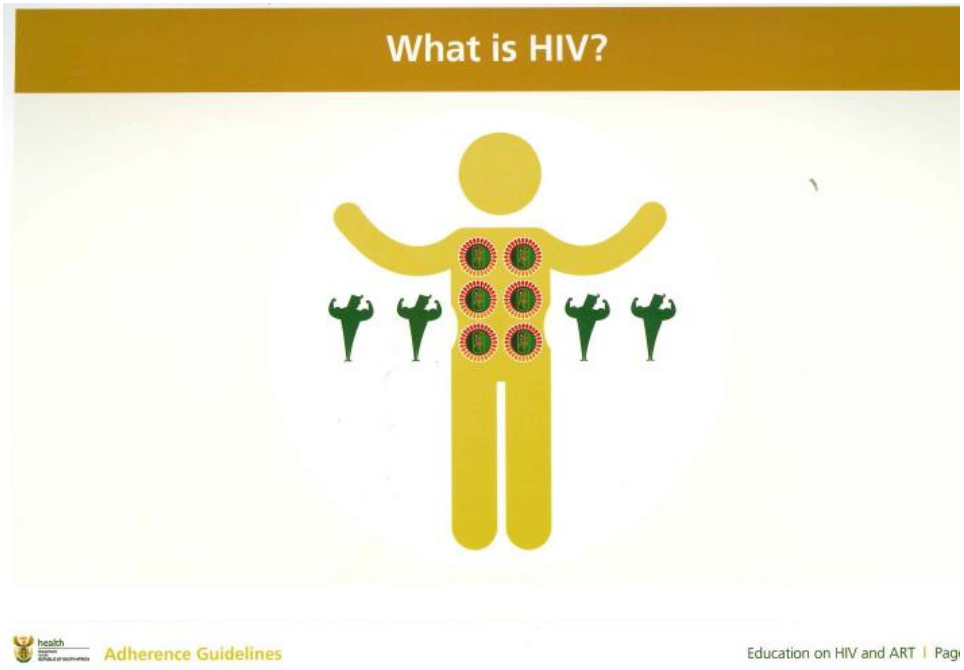
Part I score (0–3):

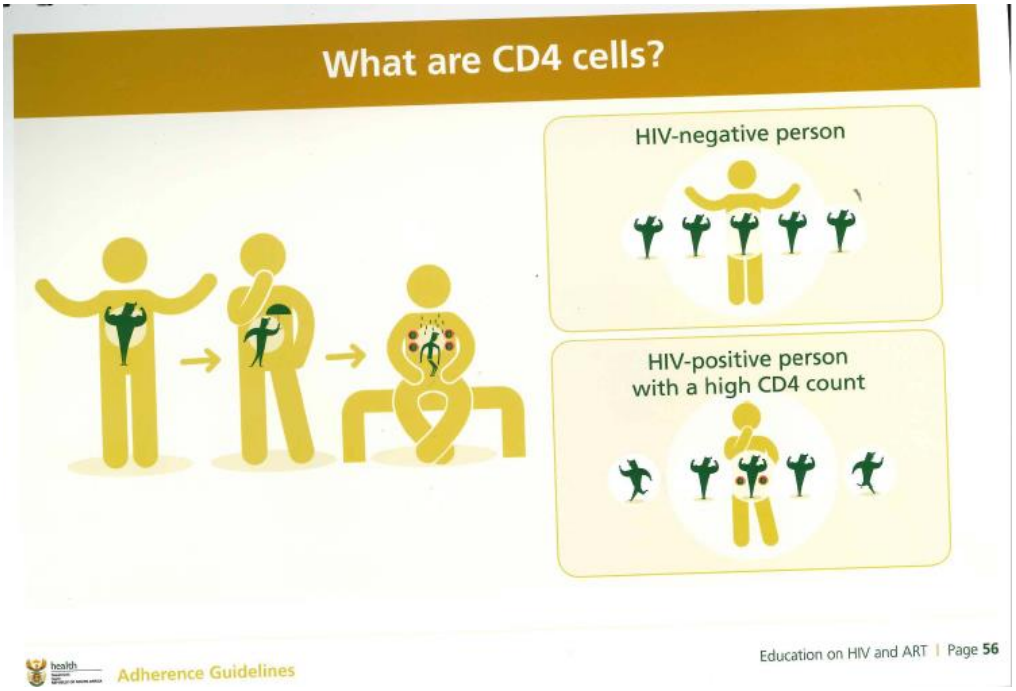
Part II score (0–5):

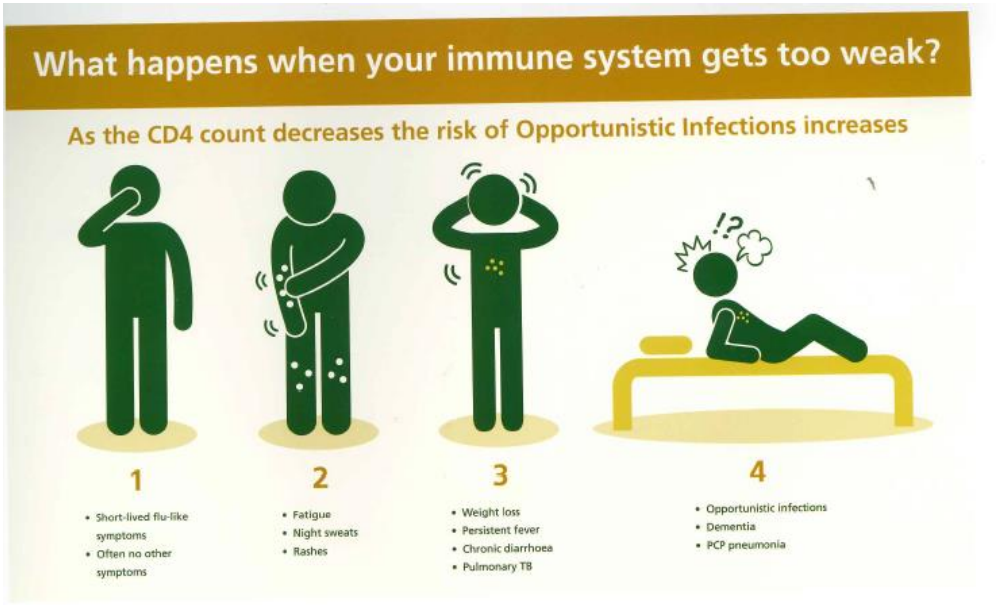
Total:

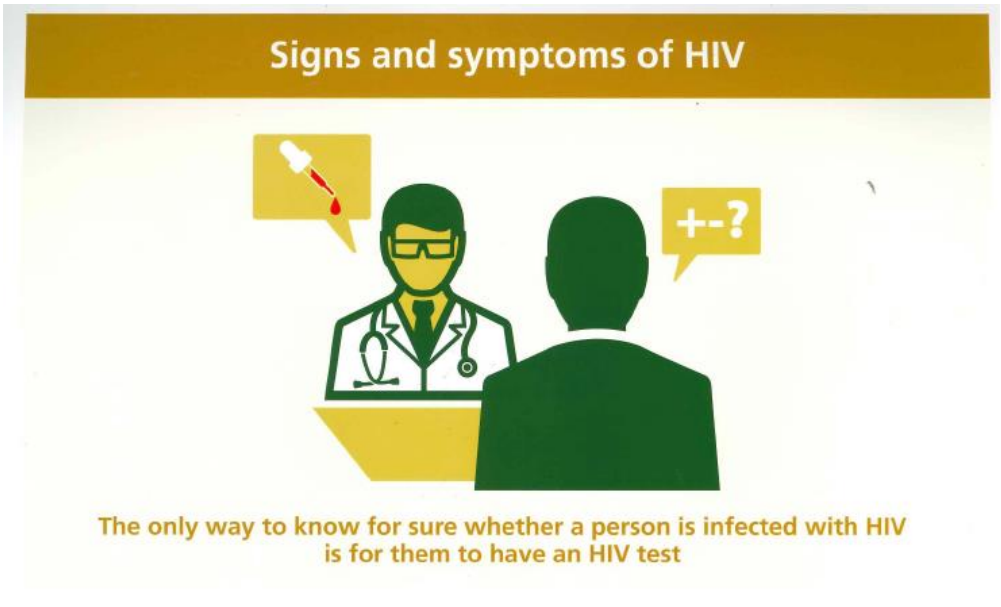
Appendix D

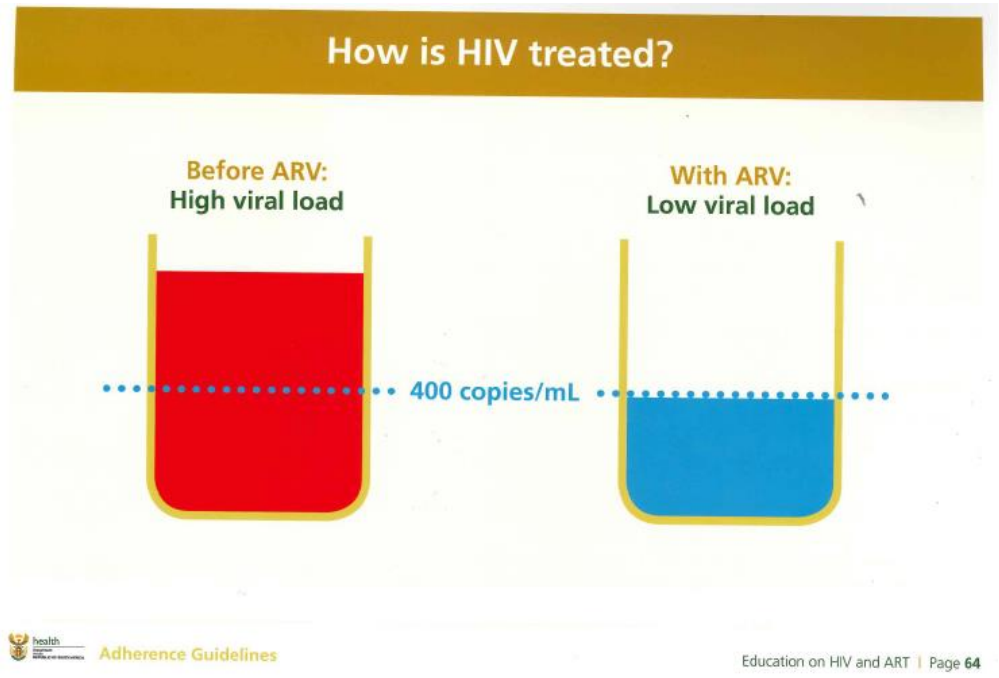
NDoH' s Health Education Programme

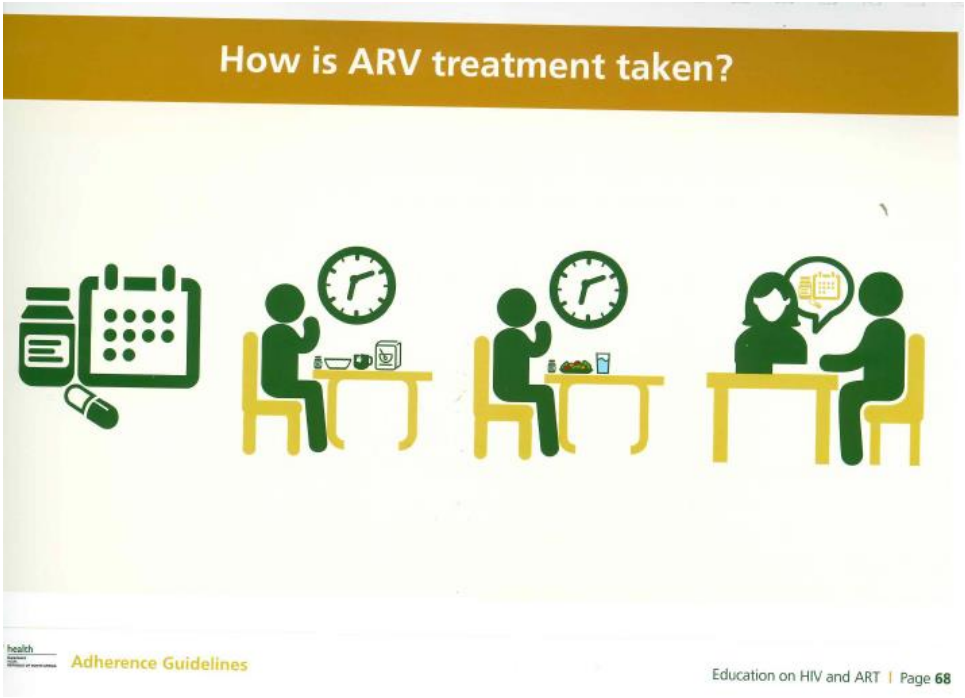


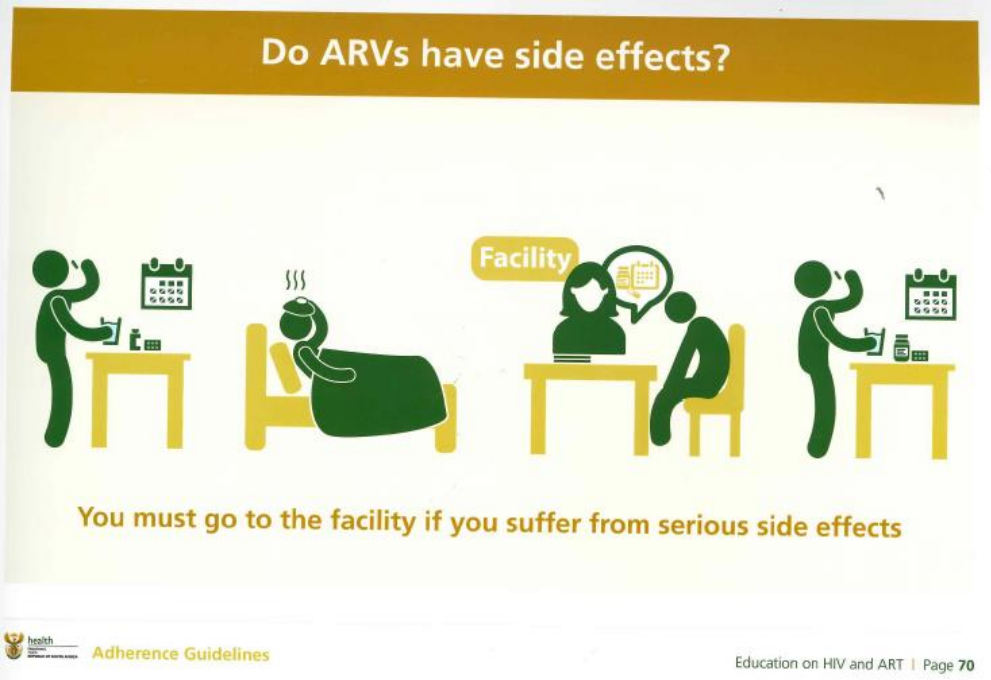








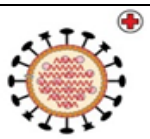
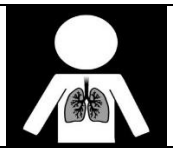
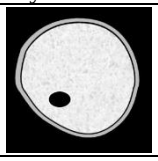
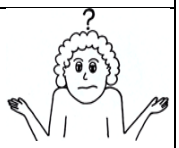
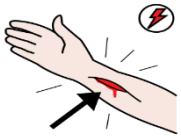
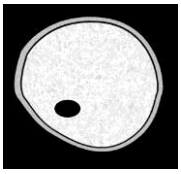
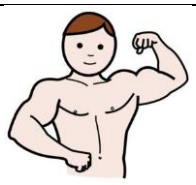


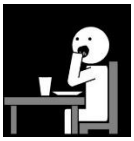
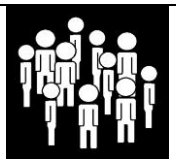
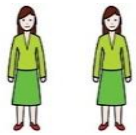
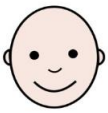
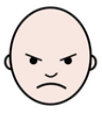
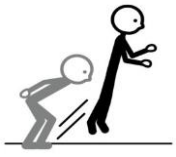


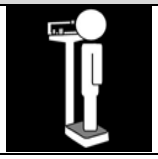
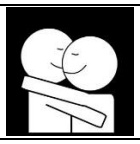
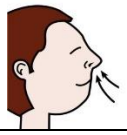
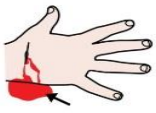
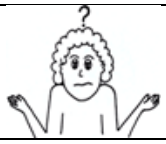
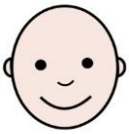
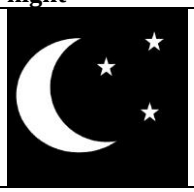
Appendix E1

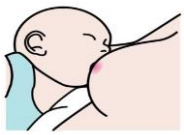
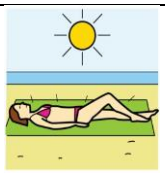
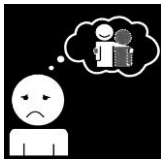
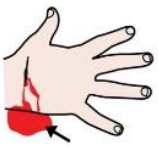
Multiple choice pre-test-post-test questionnaire (Version 1) with visual aids- English

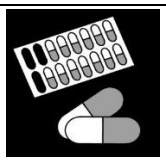
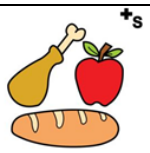
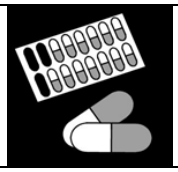
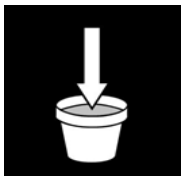
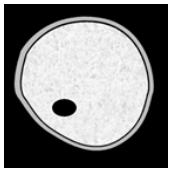
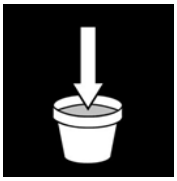
Participant Number____

Question		Choices					Answer
		1	2	3	4	5	
Q1	**What is HIV?**	HIV is **virus** that enters the body	HIV is found in the **lungs**	HIV makes you think of dying	HIV makes you feel **weak**	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q2	**What are CD4 cells?**	They are like **soldiers** of the body	They are found in one's **bones**	They are **cells** that are carry illness in the body	Cells that cause to get a very bad **cough**	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q3	**How do you see an HIV negative person?**	An HIV negative person will appear **thin**	An HIV negative person is **fat**	An HIV negative person has many **strong soldiers**	An HIV negative person doesn't get sick	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q4	**Why do we take viral load blood?**	Viral load blood shows how much HIV is in the **blood**	Viral load blood checks how **sick** a person is	Viral load blood shows if someone is **hurt**	Viral load blood shows if someone has a **fever**	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q5	**What does HIV do?**	HIV makes you depressed	HIV kills the CD4 cells	HIV causes a person faint	HIV makes the body stronger	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q6	**When do you take ARV's?**	ARV's are started you are getting old	ARV's are started anytime	ARV's are started when you eat	ARVs are started when you are told by the nurse	I am not sure of the answer	

Question		Choices					Answer
		1	2	3	4	5	
	Visual aids (also used in participant response sheet)						
Q7	**Who is at risk of contracting HIV**	**Everyone** is at risk of contracting HIV	Only people who drink **alcohol** are at risk of contracting HIV	Only **women** are at risk of contracting HIV	Only **men** are at risk of contracting HIV	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q8	**How do you know you have HIV?**	When one has contracted HIV they feel **happy**	When one has contracted HIV they may feel sad	When one has contracted HIV they may feel **sleepy**	When one has contracted HIV they may have itchy skin	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q9	**Wat do you do when ARV's make you sick?**	When ARV's make you feel sick you should **go to the doctor**	When ARV's make you feel sick you should drink **a lot of water**	When ARV's make you feel sick you consult a **traditional healer**	When ARV's make you feel sick you should **stop** taking them	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q10	**How can you know you have HIV?**	You can tell you might have contracted HIV when you **fall**	You can tell that you might have contarcted HIV if you **feel sad**	You can tell that you might have contarcted HIV if you like **jumping**	You can tell you have contracted HIV if you feel to **tired**	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q11	**How can you know if you have HIV?**	A person can know their HIV status through consulting a traditional	A **male who looks healthy** can know their HIV status through asking **their partner**	A person can know their HIV status through an **HIV test**	A person can know their HIV status through monitoring their weight	I am not sure of the answer	

Question		Choices					Answer
		1	2	3	4	5	
	Visual aids (also used in participant response sheet)						
Q12	**How is HIV transmitted?**	HIV is transmitted through **hugging** an HIV positive person	HIV is transmitted through **breathing the same air** as an HIV positive person	HIV is transmitted through sharing **eating utensils** with an HIV positive person	HIV is most commonly transmitted through **contact with HIV positive blood**	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q13	**How can you prevent infection your partner with HIV?**	You can prevent infecting your partner by **sleeping on the same bed**	You can prevent infecting your partner by giving them traditional muthi	You can prevent infecting your partner by **taking them to church**	You can prevent infecting your partner by practising safe sex	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q14	**When should ARV treatment be taken?**	ARV treatment is taken only when you have a **headache**	ARV treatment is only taken by those who are **sick**	ARV treatment is taken only if you want to feel **happy**	ARV treatment is taken **every day of your life**	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q15	**Must ARV's be taken at the same time?**	ARV's should be taken **at the same time**	ARV's should be taken at the **hospital**	ARV's should be taken at **night**	ARV's should be taken **in the morning**	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q16	**How can a mom infect her baby with HIV?**	An HIV positive mother could infect her new-born baby by **holding them** in her arms	An HIV positive mother could infect her new-born baby through **feeding them food**	A HIV positive mother could infect her new-born baby through **giving them a bath**	An HIV positive mother could infect her new-born baby through **breastfeeding**	I am not sure of the answer	

Question		Choices					Answer
		1	2	3	4	5	
	Visual aids (also used in participant response sheet)						
Q17	**How is HIV treated?**	HIV is treated through traditional medicine	HIV is treated through drinking lots of water	HIV is treated with medication called antiretroviral	HIV is treated with an injection	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q18	**How long should one take ARV's for?**	ARV's are to be taken only when you are at the beach	ARV are to be taken only when you have a **headache**	ARV's are to be taken when you **exercise**	ARV's are to be taken even if you feel strong and healthy	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q19	**What are ARV's**	Pills that prevent illness	Pills that give you energy	Pills that assist the body's soldiers	Pills that strengthen the bones	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q20	**How does family help a person who is HIV positive?**	It is helpful to share your ARV medicines with **family members**	It is helpful to have **family to support** you through your ARV journey	It is helpful to do the **ARV journey alone**	It is helpful to tell **the whole community** about your HIV status	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q21	**What is the immune system?**	A **virus** found in the body	An illness that causes your face to be **itchy**	**the blood**	A system that that makes up **the army** of the body	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						

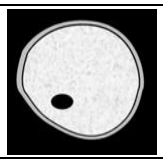
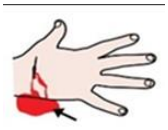
Question		Choices					Answer
		1	2	3	4	5	
Q22	**What do you do when you vomit in the 1st hour after taking ARV's**	You ignore that, it is normal	You take another dose immdiately after	You stop taking them	You go see a doctor	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q23	**What is the cure for HIV?**	Healthy food is the very cure ofr HIV	ARV's are the cure for HIV	There is no cure for HIV	There is no cure that beats exercise for HIV	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						
Q24	**What happens in your body when you take ARV's?**	When you take ARV's the virus should decrease in your blood	When you take ARV's your CD4 cells should die in your blood	When you take ARV's Your soldiers should decrease in your blood	When you take ARV's The virus should increase in your blood	I am not sure of the answer	
	Visual aids (also used in participant response sheet)						

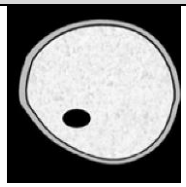
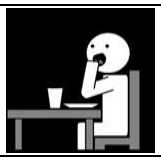
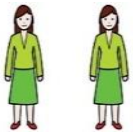
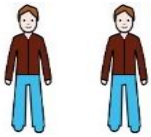
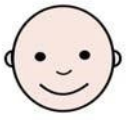
Appendix E2

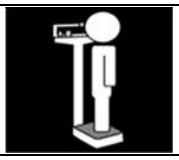
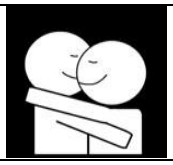
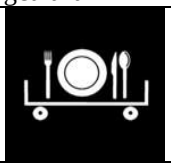
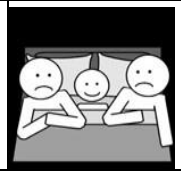
Multiple choice pretest-post-test questionnaire (Version 1) with visual aids- IsiZulu

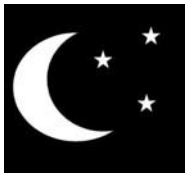
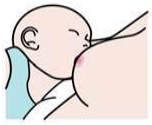
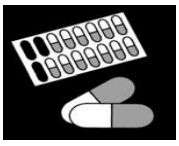
Ukukhetha okuningi kwimibuzo yangaphambili nasemuva (Inguqulo 1) enezithombe

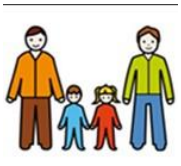
Inamba Yombambiqhaza___

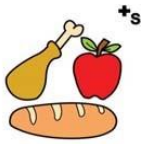
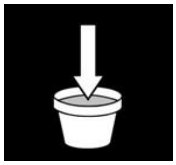
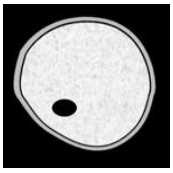
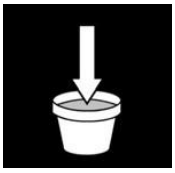
Umbuzo		Okungakhethwa					Impemdulo
		1	2	3	4	5	
Q1	**Yini isandulela ngculaza?**	Isandulela ngculaza igciwane elingena emzimbeni	Isandulela ngculaza sitholakala emaphashini	Isandulela ngculaza sikwenza ucabange ngokufa	Isandulela ngculaza sikwenza uzizwe ungenamandla	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo labambi qhaza)						
Q2	**Yini ama- CD4 cells?**	Amasosha omzimba	Atholakala emathanjeni omuntu	Ayizicubu ezithwala ukugula emzimbeni	Ayizicubu ezidala ukukhwehla	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo labambi qhaza)						
Q3	**Umbona kanjani umuntu ongenaso isandulelala ngculaza?**	Umuntu ongenaso isandulela ngculaza Ubukeka ezacile	Umuntu ongenaso isandulela ngculaza ukhuluphele	Umuntu ongenaso isandulela ngculaza unamsosha amaningi	Umuntu ongenaso isandulela ngculaza akaguli	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo labambi qhaza)						
Q4	**Kungabe lithathelwani igazi lezinga legciwane?**	igazi lezinga legciwane libonisa ukuthi singakanani isandulela ngculaza egazini	igazi lezinga legciwane lihlola ukuthi umuntu ugula kangakanani	igazi lezinga legciwane libonisa ukuthi Ngabe umuntu ulimele yini	igazi lezinga legciwane libonisa ukuthi Ngabe umuntu unayo yini imfiva	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo labambi qhaza)						
Q5	**Senzani isandulela ngculaza?**	Isandulela ngculaza sidala incindezi	Isandulela ngculaza sibulala ama-CD4 **cells**	isandulela ngculaza sidala ukuquleka	Isandulela ngculaza senza umzimba ube namandla	Anginaso isiqiniseko ngempendulo	

Umbuzo		Okungakhethwa					Impemdulo
		1	2	3	4	5	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						
Q6	**Iphuzwa nini imishanguzo?**	Imishanguzo iqalwa umuntu oseguga	Imishanguzo iqalwa noma inini	Imishanguzo iqalwa uma umuntu esedla	Imishanguzo iqalwa uma umuntu etshelwa umhlengikazi	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						
Q7	**Obani abasengcupheni yokuthola isandulela ngculaza?**	Wonke umuntu usengcupheni yokuthola isandulela ngculaza	Abantu abaphuzayo kuphela abasengcupheni yokuthola isandulela ngculaza	Abesimame kuphela abasengcupheni yokuthola isandulela ngculaza	Abesilisa kuphela abasengcupheni yokuthola isandulela ngulaza	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						
Q8	**Wazi kanjani uma unesandulela ngculaza?**	Uma unesandulela ngculaza uyajabula	Uma umuntu ethole isandulela kungenzeka uzizwe udangele	Uma umuntu ethole isandulela ngculaza bangazizwae zela	Uma umuntu ethole isandulela angalunyelwa isikhumba	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						
Q9	**Wenza njani uma imishanguzo ikugulisa?**	uma imishanguzo ikugulisa uya kwadokotela	uma imishanguzo ikugulisa uphuza amanzi amaningi	uma imishanguzo ikugulisa uhamba uyobona umuntu ophilisa ngokwesintu	uma imishanguzo ikugulisa uyama ukuyithatha	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						
Q10	**Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)**						

Umbuzo		Okungakhethwa					Impemdulo
		1	2	3	4	5	
	Wazi kanjani uma unesandulela ngculaza?	Ungabona ukuthi ungahle ube nesandulela ngculaza mawuwa	Ungabona ukuthi ungahle ube nesandulela ngculaza uma uzizwa udangele	Ungabona ukuthi ungahle ube nesandulela ngculaza uma uzwa kuthi gxuma	Ungabona ukuthi ungahle ube nesandulela ngculaza uma uzizwa ukhathele	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						
Q11	**Usazi kanjani isimo sakho sesandulela ngculaza?**	Usazi isimo sesandulela ngculaza ngokuyobona umuntu ophilisa ngokwesintu	Owesilisa obukeka enempilo usazi isimo sakhe sesandulela ngculaza ngomlingani wakhe	Usazi isimo sakho sesandulela ngculaza ngokuhlolela isandulela ngculaza	Usazi isimo sakho sesandulela ngculaza ngokubheka isisindo somzimba wakho	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						
Q12	**Sithelelana kanjani isandulela ngculaza?**	Isandulela ngculaza sithelelana ngokwanga umuntu onesandulela ngculaza	Isandulela ngculaza sithelelana ngokuphefumula umoya owodwa nonesandulela ngculaza	Isandulela ngculaza sithelelana ngokwabelana ngezinto zazekhishini nonesandulela ngculaza	Isandulela ngculaza sithelelana ngokuhlangana negazi elinesandulela ngculaza	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						
Q13	**Ungagwema kanjani ukuthelela umlingani wakho ngesandulela ngculaza?**	Ungagwema ukuthelela umlingani wakho Ngokulala embhedeni owodwa naye	Ungagwema ukuthelela umlingani wakho ngokumnikeza umuthi wesintu	Ungagwema ukuthelela umlingani wakho ngokumyisa esontweni	Ungagwema ukuthelela umlingani wakho ngokwenza ucansi oluphephile	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						

Umbuzo		Okungakhethwa					Impemdulo
		1	2	3	4	5	
Q14	**Iphuzwa nini imshanguzo?**	Imishanguzo iphuzwa kuphela uma uphethwe yikhanda	Imishanguzo iphuzwa kuphela yilabo abagulayo	Imishanguzo iphuzwa kuphela uma ufuna ukujabula	Imishanguzo iphuzwa zonke izinsuku impilo yakho yonke	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						
Q15	**Kumele imshanguzo iphuzwe kanjani?**	Imishanguzo kumele iphuzwe ngesikhathi esisodwa njalo	Imishanguzo Kumele iphuzwe esibhedlela	Imishanguzo kumele iphuzwe ebusuku	Imishanguzo kumele iphuzwe ekuseni	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						
Q16	**Umama angamthelela kanjani umntwana wakhe ngesandulela ngculaza ?**	Umama onesandulela ngculaza angamthelelaa umntwana wakhe osanda kuzalwa ngokumgona	Umama onesandulela ngculaza angamthelela umntwana wakhe osanda kuzalwa ngokumfunza ukudla	Umama onesandulela ngculaza angamthelela umntwana wakhe osanda kuzalwa ngokumgeza	Umama onesandulela ngculaza angamthelelaa umntwana wakhe osanda kuzalwa ngokumncelisa ibele	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						
Q17	**Silashwa kanjani isandulela ngculaza?**	Isandulela ngculaza silashwa Ngemithi yesintu	Isandulela ngculaza silashwa Ngokuphuza amanzi amaningi	Isandulela ngculaza silashwa Ngemithi ebizwa ngemishanguzo	Isandulela ngculaza silashwa ngomjovo	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						

Umbuzo		Okungakhethwa					Impemdulo
		1	2	3	4	5	
Q18	**Umuntu uyiphuza nini imishanguzo?**	Imishanguzo kumele iphuzwe uma usolwandle	Imishanguzo kumele iphuzwe njalo ngesikhathi esifanayo	Imishanguzo kumele iphuzwe Uma uzivozavoca	Imishanguzo kumele iphuzwe noma uzizwa ungumqemane	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						
Q19	**Yini Imishanguzo**	Amaphilisi avikela ukugula	Amaphilisa anikeza umdlandla	Amaphilisi alekelela amasosha omzimba	Amaphilisi aqinisa amathambo	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						
Q20	**Usiza ngani umndeni kumuntu onesandulela ngculaza?**	Kuyasiza ukwabelana imishanguzo yakho nabomndeni	Kuyasiza ukuhamba uhambo lwemishanguzo uwedwa	Kuyasiza ukuba nomndeni wakho ukweseke endleleni yakho yemishanguzo	Kuyasiza ukutshela uphakathi ngohambo lwakho lwemishanguzo	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						
Q21	**Yini amasosha omzimba?**	Ukugula okwenza ubuso bulume	Igciwane elitholakala emzimbeni	Igazi	Uhlelo olakha amabutho omziba	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						
Q22	**Wenza njani uma uphalaza emva kwehora elilodwa uphuze imishanguzo**	Uyakuziba lokho, kujwyelekile	Uphuza amanye ngokuphuthuma yo	Uyama ukuwaphuza	Uyahamba uyobona udokotela	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						

Umbuzo		Okungakhethwa					Impemdulo
		1	2	3	4	5	
Q23	**Ikhambi lesandulela ngculaza**	Ukudla okunempilo yikona ikhambi lesandulela ngculaza	Imishanguzo ikhambi lesandulela ngculaza	Alikho ikhambi lesandulela ngculaza	Alikho ikhambi eledlula ukuzivcavoca kwisandulela ngculaza	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						
Q24	**Ukwehla kwezinga lesandulela ngculaza emzimbeni**	Uma udla imishanguzo kumele igciwane lehle egazini	Uma udla imishanguzo kumele izicubu amaC4 zife egazini	Uma udla imishanguzo kumele amasosha ehle engazini	Uma udla imishanguzo kumele igcwane linyuke egazini	Anginaso isiqiniseko ngempendulo	
	Isithombe (esisetshenzisiwe futhi ephepheni lezimpendulo lababambi qhaza)						

Appendix F1

Multiple choice pretest-post-test questionnaire (Version 2) without visual aids- English

Participant number____

	Question	1	2	3	4
1	**What happens when HIV kills your CD 4 cells?**	You have more soldiers	You have more energy	You get sick more often	I am not sure of the answer
2	**Why is the CD4 blood test done?**	To find out how much HIV is in the blood	To find out how strong your immune system is	To find out how long you have had HIV	I am not sure of the answer
3	**How do you know if someone is HIV negative?**	The HIV negative person will be thin	The HIV negative person will be healthy	There is no way to tell if someone is HIV negative	I am not sure of the answer
4	**Why do we take viral load blood?**	To check how weak the blood is	To check how much CD4 cells are in the blood	To check if ARV medicines are working	I am not sure of the answer
5	**What does HIV do to your immune system?**	HIV makes the immune system faster	HIV makes the immune system weaker	HIV makes the immune system stronger	I am not sure of the answer
6	**What does HIV do when it enters the blood?**	HIV makes the blood becomes thick	HIV makes the blood become thin	HIV makes copies of itself in the blood	I am not sure of the answer
7	**What is the only way to be sure that you have HIV**	You suddenly lose weight	If you have a partner who has HIV	By having an HIV test	I am not sure of the answer
8	**How do ARV's work?**	They kill all the HIV in your body	They kill some of the HIV in your body	They kill CD4 cells in your body	I am not sure of the answer
9	**How does family help a person who is HIV positive?**	You can share your ARV's with family	Family can support you	Family must not be involved	I am not sure of the answer
10	**What is the immune system?**	A virus found in the body's system	The blood found in the body's system	The body's defence system	I am not sure of the answer
11	**What do you do when you vomit within the 1st hour after taking ARV's?**	You ignore that, it is normal	You take the ARV's again	You stop taking ARV's	I am not sure of the answer

Question		1	2	3	4
12	**What do ARV's do to HIV in the body?**	ARV's kill CD4 cells in the body	ARV's can cure HIV in the body	ARV's stop the multiplication of HIV in the body	I am not sure of the answer
13	**What will happen if you do not take your ARV's?**	You will have less HIV in the blood	You will have more soldiers in the blood	You will have more HIV in the blood	I am not sure of the answer
14	**What does HIV do to CD 4 cells?**	HIV hides CD4 cells	HIV kills CD4 cells	HIV multiplies CD4 cells	I am not sure of the answer
15	**What is a common illness in HIV positive people?**	A common illness HIV positive people is skin diseases	A common illness HIV positive people is high blood pressure	A common illness HIV positive people is diabetes	I am not sure of the answer

Open-ended Questions:

1. What are the most common illnesses an HIV positive person can get?
2. What are some of the symptoms that one might have contracted HIV?
3. What are CD4 cells?
4. Why is a viral load blood test done?
5. How do ARV's work in the body?
6. What does HIV do to CD 4 cells?
7. If there is a cure for HIV what is it?

Appendix F2

Multiple choice pretest-post-test questionnaire (Version 2) without visual aids- IsiZulu

Ukukheka okuningi kwimibuzo yangaphambi-nasemuva (Inguqulo 2) engenazo izithombe

Inamba Yombambiqhaza_____

Umbuzo		1	2	3	4
1	**Kwenzakalani uma isandulela ngculaza sibulala izicubu ama CD4?**	Uba namashosha amaningi	Uba nomfutho omningi	Ugula njalo	Anginaso isiqiniseko ngempendulo
2	**Kwenziwelani ukuhlolwa kwegazi kwe zicubu zeCD4?**	Ukuthola ukuthi singakanani isandulela ngculaza egazini	Ukuthola ukuthi lunamandla angakanani uhlelo lwakho lokuzivikela	Ukuthola ukuthi usube nesandulela ngculaza isikhathi esingakanani	Anginaso isiqiniseko ngempendulo
3	**Wazi kanjani uma umuntu engenaso isandulela ngculaza?**	Ongenaso isandulela ngculaza uyazaca	Ongenaso isandulela ngculaza uba nempilo	Ayikho indlela yokubona ukuthi umuntu kaanaso isandulela ngculaza	Anginaso isiqiniseko ngempendulo
4	**Silithathelani igazi lezinga lesandulela ngculaza?**	Ukuhlola ukuthi libuthaka kangakanani igazi lakho	Ukuhlola ukuthi zingakanani izicubu amaCD4 egazini	Ukuhlola ukuthi kungabe imishanguzo iyasebenza.	Anginaso isiqiniseko ngempendulo
5	**Senzani isandulela ngculaza ohlelewni lakho lokuzivikela?**	Isandulela ngculaza senza uhlelo lokuzivikela lusheshe	Isandulela ngculaza senza uhlelo lokuzivikela lube buthaka	Isandulela ngculaza senza uhlelo lokuzivikela lube namandla	Anginaso isiqiniseko ngempendulo
6	**Senzani isandulela ngculaza uma singena egazini?**	Isandulela ngculaza senza igazi lijiye	Isandulela ngculaza senza igazi libe lula	Isandulela ngculaza senza esinye esifana naso egazini	Anginaso isiqiniseko ngempendulo
7	**Iyiphi indlela eyodwa vo yokuqiniseka ukuthi unaso isandulela ngculaza?**	Uvele unciphe ngesisindo You suddenly lose weight	Uma unomlingani onesandulela ngculaza	Ngokuhlolelwa isandulela ngculaza	Anginaso isiqiniseko ngempendulo
8	**Isebenza kanjani imishanguzo?**	Ibulala sonke isandulela ngculaza emzimbeni wakho	Ibulala esinye sesandulela ngculaza emzimbeni wakho	Ibulala izicubu ama CD4 cells emzimbeni wakho	Anginaso isiqiniseko ngempendulo
9	**Umsiza kanjani umndeni umuntu onesandulela ngculaza?**	Ungabelana ngemishanguzo yakho nomndeni	Umndeni ungakweseka	Umndeni kumele ungangeni	Anginaso isiqiniseko ngempendulo
10	**Yini uhlelo yokuzivikela?**	Igciwane elitholakala ohlelweni lomzimba	Igazi elitholakala ohlewleni lomzimba	Uhlelo lomzimba lokuzivikela	Anginaso isiqiniseko ngempendulo
11	**Wenza njani uma uphalaza ngehora lokuqala uphuze imshanguzo?**	Uyakuziba lokho, kujwayelekile	Uyayiphuza imishanguzo futhi	Uyama ukuthatha imshanguzo	Anginaso isiqiniseko ngempendulo

Umbuzo		1	2	3	4
12	**Yenzani imishanguzo kwesandulela ngculaza emzimbeni?**	Imishanguzo ibulala izicubu ama-CD4 emzimbeni	Imishanguzo ingasilapha isandulela ngculaza emzimbeni	Imishanguzo imisa ukuphindaphinde ka kwesandulela ngculaza emzimbeni	Anginaso isiqiniseko ngempendulo
13	**Kuyokwenzakalani uma ungayithathi imishanguzo yakho?**	Uyoba nesandulela ngculaza esincane egazini	Uyoba namasosha amaningi egazini	Uyoba nesandulela ngculaza esiningi egazini	Anginaso isiqiniseko ngempendulo
14	**Senzani isandulela ngculaza kuzicubu ama CD4?**	Isandulela ngculaza sifihla izicubu ama CD4	Isandulela ngculaza sibulala izicubu ama CD4	HIV siphindaphinda izicubu ama CD4	Anginaso isiqiniseko ngempendulo
15	**Yikuphi ukugula okujwayelekile kubantu abanesandulela ngculaza?**	Ukukula okujwayelekile kubantu abanesandulela ngculaza isifo esiskhumba	Ukukula okujwayelekile kubantu abanesandulela ngculaza I hayihayi	Ukukula okujwayelekile kubantu abanesandulela ngculaza isifo sikashukela	Anginaso isiqiniseko ngempendulo

Imibuzo evulelekile:

1. Yiziphi izifo ezijwayelekile ezingatholwa umuntu onesandulela ngculaza?
2. Yiziphi ezinye izinkomba zokuthi umuntu kungahle kube uthole isandulela ngculaza?
3. Yini izicubu ama CD4?
4. Kungani ukuhlolwa kwegazi lezinga lesandulela ngculaza kwenziwa?
5. Isebenza kanjani Imishanguzo egazini?
6. Senzani isandulela ngculaza ezicubini ama CD4?
7. Uma ngabe likhona ikhambi lesandulela ngculaza, liyini?

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Appendix G

Letter of consent for expert panel reviewers: Face Validity of the Multiple-Choice pre-test-post-test questionnaire (Version 1)

Re: Request for permission to conduct research at the health facility

My name is Njabulo Mbanda and I am currently a Ph.D. candidate at the Centre for Augmentative and Alternative Communication, Faculty of Humanities University of Pretoria. I am writing to request your participation as an expert panel reviewer in the study.

Title

My research is titled "The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy"

Objective of the research

This research aims to investigate the effect of the NDoH HIV health education programme (with and without visual aids) on understanding of health information in persons with low literacy levels. The study will focus on the "Education on HIV and ART" section of the health education programme

What is expected of the panel member?

If you agree to participate you will be required to comment on the content and the structure of the questionnaire which will be used during the intervention; and whether the questions will be able to assess the understanding of health information before and after the health education session about HIV health education. This should take about 30-45 minutes to complete.

What are the potential benefits and risks?

There is no direct benefit or financial gain to participating in this research. However, the information gathered from you and other expert reviewers will be valuable in an establishing an appropriate measuring instrument for the research objectives and one that is suitable for the target audience. There are no risks involved in taking part in this study.

What are your rights as a participant in this study?

Your participation in this study is voluntary and you have the right to withdraw from the study at any time without any consequences. Your responses will be kept confidential. If you

choose to participate in this study, you will be required to sign the consent form to show your agreement.

Research Results

The data obtained will be securely stored for the purposes of research and archived for a period of 15 years at the Centre for Augmentative and Alternative Communication, University of Pretoria.

Who can be contacted if you further questions?

Please do not hesitate to contact the researcher or supervisor for more information

Thank you for taking time to consider this request.

Kind Regards

PhD Student
Njabulo Mbanda

Supervisor
Prof. Shakila Dada

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Fakulteit Geesteswetenskappe
Lefapha la Bomotho

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Permission Reply Slip: Panel Reviewer

Project title:	The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy		
Researcher:	Ms. Njabulo Mbanda Cell: [redacted] email[redacted]	**Supervisor:**	Prof. Shakila Dada Tel[redacted] email: [redacted]

I, _____
(name and surname)

Official Stamp

☐ I agree to take part in the study as outlined above

OR

☐ I do not agree to take part in the study

Signature _____ Date _____

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Lefapha la Bomotho

Appendix H1

Informed Consent Letter Experimental Task Participants (English)

Dear Participant

INFORMATION ABOUT THE RESEARCH STUDY

My name is Njabulo Mbanda and I am a student, conducting research. The topic of my research is, "The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy"

Why am I doing this research?

I want to find out what ways can help people with low literacy to understand health information. In other words, to find out if using word or both pictures and words is the best method in providing health information. To take part in this study you need to speak isiZulu, be between the ages of 18-50 years and have not completed grade 7 at school.

What do you need to do first?

The aim of this letter is to give you information about the study, the procedures that will take place and your rights as a participant. Your participation in the study is your choice. You choose if you want or do not want to participate in this study. You may also choose to stop being part of the study at any time. If you agree to take part in the study, you will be required to show your agreement or disagreement by making a thumb print on the form.

Participation in the session

If you agree to participate you will meet me at a place convenient to you. First, I will ask you a few questions about yourself and HIV. After that, I will give you some health information about HIV. You will have a short 45-minute break where you can have some tea and sandwiches. Thereafter I will ask you some more questions about the HIV health information and then you can leave. It will take approximately 2 hours of your time to participate. Everything we do will be videoed. We will use the video recording to check that I do not miss out any steps in our sessions.

Time

For your time to participate in the study, the researcher will provide you with you with bus/ taxi fare to get to the place where the study will take place. This will be to the value of approximately R100 Rands.

Confidentiality

Your responses and the recordings made during the discussion will be kept confidential and your name will not be written on any of the documents.

Research Results

The results of all the people in the study will be combined and shared at conferences and in articles. The data will be securely stored for the purposes of research and archived for a period of 15 years at the Centre for Augmentative and Alternative Communication, University of Pretoria. If you would like to know the results of the study, please provide your cell number_____ so I can send you a short video explanation of the results.

Thank you for taking time to consider this request. Please do not hesitate to contact the researcher or supervisor for more information.

Sincerely,

PhD Student
Njabulo Mbanda

Supervisor
Prof. Shakila Dada

Fakulteit Geesteswetenskappe
Lefapha la Bomotho

Centre for Augmentative and Alternative Communication, Room 2-36, Com path Building, Lynnwood
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UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities

Informed Consent: Reply Slip: Participants (Intervention)

Project title:	The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy		
Researcher:	Ms. Njabulo Mbanda Cell [redacted] email: [redacted]	**Supervisor:**	Prof. Shakila Dada Tel: [redacted] email: [redacted]

I, _____ (Name and surname)

☐ I agree to participate in this study as explained in the consent letter. I understand that my consent is voluntary and that I may withdraw my participation from the study at any time without consequences. I understand that the data will be kept confidential and stored for 15 years at the University of Pretoria. I understand that the interviews will be audio-taped for the purposes of data collection and analysis at a later stage.

OR

☐ I do not agree to participate in this study.

_____ _____

Signature (Researcher) Date

Appendix H2

Informed consent- Experimental task-(IsiZulu)

Ukunikeza imvume unolwazi kubabambe iqhaza

Kumbambiqhaza

Imininigwane mayelana nocwaningo

Igama lami nguNjabulo Mbanda ngingumfundi, ngenza ucwaningo. Isihloko socwaningo lwami “Imithelela yezinsiza ezibonakalayo ekuqondeni Igciwane Lesandulela Ngculazi (HIV) kubantu abafunde ngokusezingeni eliphansi”

Ngilwenzelani lolucwaningo?

Ngifuna ukwazi yiziphi izindlela ezingasiza abantu abafunda ngokusezingeni eliphansi ukuthi baqonde ulwazi lwezempilo. Ngamanye amazwi ukuthola ukuthi uma usebenzisa amagama noma kokubili amagama nezithombe iyona ndlela ehamba phambili ukuhlinzeka ulwazi lwezempilo. Ukubamba iqhaza kulolucwaningo udinga ukuthi ukhulume isiZulu, ubephakathi kweminyaka ewu 18-50 yobudala futhi ungaqedanga ibanga lesi-7 esikoleni.

Udinga ukwenzani kuqala?

Inhloso yalencwadi ukukunikeza ulwazi mayelana nocwaningo, ingqubo mgomo ezosetshenziswa kanye namalungelo akho njengozobamba iqhaza. Ukubamba iqhaza kungukuzikhethela kwakho. Uyazikhethela ukuthi uyafuna noma awufuni ukubamba iqhaza kulolucwaningo. Ungaphinda ukhethe ukushenxa ukuba yingxenye yocwaningo noma yinini. Uma uvuma ukubamba iqhaza kulolucwaningo, kuyodingeka ukuthi ukhombise ukuvuma noma ukungavumi kwakho ngokufaka isigxivizo sesithupha kwifomu.

Ukubamba iqhaza esihlandleni

Uma uvuma ukubamba iqhaza uyohlangana nami endaweni ekuzoba lula ukufika kuyona. Okokuqala ngizokubuza imibuzo embalwa emayelana nawe kanye nangegciwane lesandulela ngculazi (HIV). Emva kwalokho, ngiyokucobelela ngolwazi mayelana ne-HIV. Uyoba nekhefu elifishane eliyimizuzu ewu-45 ongaphuza ngalo itiye udle namasamishi. Emva kwalokho ngiyokubuza futhi eminye imibuzo mayelana nolwazi lwezempilo nge-HIV bese uyahamba. Kuzothatha isikhathi esiyofinyelela emahoreni awu-2 esikhathini sakho. Yonke into iyoqoshwa

nge-vidiyo. Siyosebenza i-vidiyo ukubheka ukuthi azikho izinyathelo engizishiyile esihlandleni sethu.

Isikhathi

Ngesikhathi sakho ubambe iqhaza kulolucwaningo, umcwaningi ukuyokuhlinzeka ngemali yokugibela ukuthi ufike la ucwaningo lwenzeka khona. Lokhu kuyoba yinani oliyocela ku-R100.

Ubumfihlo

Izimpendulo zakho kanye nokuqoshiwe ngesikhathi kudingidwa kuyogcinwa kuyimfihlo futhi igama lakho angeke libhalwe ndawo emaphepheni.

Imiphumela Yocwaningo

Ulwazi oluyotholakala luyobekwa ngokucophelela ukuze lusetshenziselwe ucwaningo futhi luyogcinwa isikhathi esiyiminyaka ewu-15 Esikhungweni se- Augmentative and Alternative Communication, eNyuvesi yasePitoli. Uma ungathanda ukwazi imiphumela yocwaningo ucelwa ukuthi uhlinzeke inombolo kamakhalekhukhwini wakho _____ ukuze ngingakwazi ukukuthumelela i-vidiyo emfushane ezobe ichaza imiphumela.

Ngiyabonga ukuthi uthathe isikhathi ukuthi ucabange ngalesi sicelo sami. Ucelwa ukuthi ungananazi ukuthi uthinte umcwaningi noma unsumpa uma udinga ulwazi olunzulu.

Ozithobayo,

Umfundi we-PhD
Njabulo Mbanda

Unsumpa
UProf. Shakila Dada

Centre for Augmentative and Alternative Communication, Room 2-36, Com path Building, Lynnwood
University of Pretoria, Private Bag X20
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UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities

Ukunikeza Imvume Unolwazi: Iphepha Lokuphendula: Ababambe iqhaza

Isihloko seProject:	Imithelela yezinsiza ezibonakalayo ekuqondeni Igciwane Lengculazi (HIV) kubantu abafunde ngokusezingeni eliphansi		
Umcwaningi:	Nks. Njabulo Mbanda Cell: [redacted] email: [redacted]	**Unsumpa:**	Unsumpa. Shakila Dada Tel: [redacted] email: [redacted]

☐ Mina, _____ (igama nesibongo)

Ngiyavuma ukubamba iqhaza kulolucwaningo njengokuchazwe encwadini yemvume.

NOMA

☐ Angivumi ukubamba iqhaza kulolucwaningo.

_____ _____

Sayina (Umcwaningi) Usuku

Fakulteit Geesteswetenskappe
Lefapha la Bomotho

Centre for Augmentative and Alternative
Communication, Room 2-36, Com path
Building, Lynnwood
University of Pretoria, Private Bag X20
Hatfield 0028, South
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Appendix I1
Pretest-post-test questionnaire (Version 3) open-ended questions- English

Participant Number_____

Instruction to researcher: Ensure that the video recorder is switched on

QUESTIONS	(PLEASE WRITE THE RESPONSES HERE)	RESPONSE CODE (0; 1)
1. What happens to you when the "HIV" (virus) kills the soldiers of the body?		
2. Why do we test for the CD4 count (in the blood)?		
3. Apart from TB, what is another common illness an HIV positive person can get?		
4. What is one of the symptoms that could indicate that someone has contracted HIV?		
5. What are CD4 cells?		
6. Why is a viral load test done?		
7. Why is the HIV virus clever?		
8. How can an HIV positive pregnant mother reduce the chances of infecting her unborn baby with HIV?		
9. What would happen if you don't take ARV medicines as you should?		
10. After how many months on ARV's should one have their 1st viral load test done?		

QUESTIONS	(PLEASE WRITE THE RESPONSES HERE)	RESPONSE CODE (0; 1)
11. Why is it helpful for a breastfeeding mother to be on ARV medicines?		
12. What should you do if you vomit within the 1st hour after taking your ARV medicines		
13. How do ARV medicines suppress the HIV virus?		
14. How much the HIV virus must be in the body if your ARV medicines are working?		
15. What is one of the ways in which family can assist an HIV positive person?		
16. How are symptoms of a person infected with HIV different to symptoms of any other illness?		
17. When should you have another viral load test after you have had your very 1st one?		
18. What happens when the HIV virus encounters few ARV's in the blood?		

Appendix I2

Pretest-post-test questionnaire (Version 3) open-ended questions- IsiZulu

Imibuzo yangiphambi-nasemuva- (Inguqulo 3) IsiZulu

Inamba Yombambiqhaza_____

Umyalezo kumcwaningi: Qinisekisa ukuthi isiqopha mazwi sivuliwe

IMIBUZO	(BHALA IZIMPENDULO)	INOMBOLO YEMPENDULO (0;1)
1. Kwenzekani kuwena uma igciwane i-“HIV” libulala amasosha omzimba		
2. Kungani kuhlolwa ubungako beCD4 egazini (i-CD4 count)?		
3. Ngaphandle kwe-TB, yisiphi isifo esijwayelekile esingatholwa umuntu one-HIV?		
4. Iyiphi enye yezimpawu ezingakhomba ukuthi umuntu angahle abe ne-HIV?		
5. Yini ama CD4?		
6. Kungani kuhlolelwa ubungako begciwane elisemzimbeni (i-viral load test)?		
7. Kungani igciwane i-HIV lihlakaniphile?		
8. Owesimame okhulelwe one-HIV angawehlisa kanjani amathuba okuthelela umntwana wakhe ongakazalwa nge-HIV?		
9. Kungenzakalani egciwaneni i-HIV uma ungase ungayidli imishanguzo yakho ngendlela?		
10. Kumele uhlolelwe emva kwezinyanga ezingaki izinga legciwane (viral load) emva kokuthi uqale imshanguzo amaARV?		
11. Kusiza ngani ukuthi umama oncelisa ibele adle imishanguzo ama-ARV?		

IMIBUZO	(BHALA IZIMPENDULO)	INOMBOLO YEMPENDULO (0;1)
12. Kumele wenze njani uma uphalaza lingakapheli ihora uphuze imshanguzo ama-ARV?		
13. Imishanguzo ama-ARV's ilicindezela kanjani igciwane elisemzimbeni?		
14. Kumele libe ngakanani igciwane elisemzimbeni uma imishanguzo yakho ama-ARV esebenza?		
15. Iyiphi eyodwa yezindlela umndeni ongamsiza ngayo umuntu oneHIV?		
16. Kungabe izinkomba zomuntu otheleleke nge-HIV zihluke ngani kunezokunye ukugula okujwayelekile?		
17. Kumele uphinde nini ukuhlolelwe izinga legciwane (viral load) emva kokuthi usuhlolile okukuqala?		
18.Kwenzakalaniuma igciwane-HIV lihlangabezana nemishanguzo emincane egazini?		

Appendix J1

Procedural Script and Checklist Experimental Task - English

(Instruction to rater: Please watch the videos carefully and tick (√) if the researcher has done the required step. If the step has not been done, please place a (x) in the inter rater column)

Step	Researcher Script	Inter rater √ done/ X not done
Introduction	Hi, I am _____ and I am going to be conducting our discussion for today. Our discussion will last approximately 2 hours. I going to ask you a few questions then you will get some health information and then ask more questions towards the end. The questions will be read out loud to you, so you do not have to write anything. I will ask you then you can answer according to how much you know. Please feel free to take your time and be as honest as you want. Remember this is not an exam and your responses will be kept confidential.	
	Does the researcher greet and introduce herself?	
	Does the researcher explain the procedures of the day?	
	Does the researcher mention the recording of the session and reassure the participant why this is done?	
	Does the researcher check to see if the participant had any questions?	
	Does the researcher let the participant know that the session is about to start?	
Pre-test	**Instruction to rater: Please see Pre-test-post-test questionnaire**	
	Has the researcher read out each question out loud?	
	Does the researcher give the participant enough time to respond?	
	Does the researcher paraphrase the response of the participant (where necessary)?	
	Does the researcher probe when the participants response if not clear?	
	Does the researcher reassure the participant and give contingent feedback such as, you are doing well, remember it's not an exam, its ok if you don't know the answer, just try your best etc.	

Step	Researcher Script	Inter rater √ done/ X not done
Post-test	**Instruction to rater: Please see Pre-test-post-test questionnaire (v3)**	
	Has the researcher read out each question out loud?	
	Does the researcher give the participant enough time to respond?	
	Does the researcher paraphrase the response of the participant (where necessary)?	
	Does the researcher probe when the participants response if not clear?	
	Does the researcher reassure the participant and give contingent feedback like, you are doing well, remember it's not an exam, its ok if you don't know the answer, just try your best etc.?	
Closure	Has the researcher closed the session by thanking the participant?	
	Has the researcher given taxi fare to the participant and obtained their thumb print as proof of receipt of payment?	

Appendix J2

Procedural script and checklist- Experimental task (IsiZulu)
Umbhalo ngenqubo yababambe iqhaza ocwaningweni

Umyalezo kohlolayo: Uyacelwa ubuke ama-vidiyo ngokuqaphela bese uyafaka uphawu (√) uma umcwaningi enze isinyathelo esifanelekile. Uma isinyathelo singenziwanga uyacelwa ubeke u (x) ohlwini lomhloli

Isigaba	Umbhalo Wocwaningi	Ohlolayo √= kwenziwe/ X=akwenziwanga
Ukuzethula	Sawubona, ngingu_____Ngizobe ngeza ingxoxo yethu yanamhlanje. Ingxoxo isiyonke izoba cishe amahora amabili. Ngizokubuza imibuzo embalwa, bese uthola ulwazi lwezempilo, bese futhi ngikubuza eminye imibuzo ngasemaphethelweni. Imibuzo izofundwa ngokuzwakalayo kuwena khona ungeke kumele ubhale lutho. Sizosebenzisa izithombe ukuze zikusize uphendule Imibuzo. Umbuzo ngamunye uyokwazi ukuwuphendula ngokukhetha ezimpendulweni ezinhlanu eziyobe zitshengiswa yizithombe. Uyotshengisa impendulo yakho ngokukhetha isithombe esisodwa. Ngicela ukhululeke ukuthatha isikhathi sakho futhi wethembeke ngendlela ofuna ngayo. Khumbula lokhu akusiko ukuhlolwa futhi izimpendulo zakho ziyogcinwa ziyimfihlo.	
Ukuqoshwa	Sizosiqopha isihlandla sethu. Ikhamera iyobheka kuphela ezandleni zethu, esithombeni nasolwazini ukuze ilandele esikukhombayo sisaxoza. Kungabe unayo imibuzo ngesizokwenza namhlanje? *(Uma ingekho, umcwaningi bese eyaqinisekisa)* "Singaqala?"	
Imibuzo yangaphambi Imibuzo	**Umcwaningi ulandela imibuzo yangaphi -nasemuva (U-Appendix G). Ufunda umbuzo ngamunye bese ekhomba esithombeni imizuzwana emibili. Uthi , "***Ngicela uphendule lemibuzo elandelayo ngokukhetha isithombe esisodwa esiyohambisana nempendulo oyikhethayo"*. **Umcwaningi ulinda imizuzwana emithanthu ukuze umbambiqhaza akhethe impendulo. Umcwaningi ubhala impendulo yombambiqhaza ku-Appendix G. Lokhu kuyaphindwa ize iyophela yonke imibuzo.**	
Isihlandla	Ngizokunika ulwazi lwezempilo futhi ngikutshele ngempilo okuhlanganise nesandulela. Ngizokhomba *(izithombe)* yikhona uzokwazi ukulandela ngesikhathi ngisakhuluma. Siyobe sixoxa ngolwazi olwahlukahlukene ngesandulela ngculaza nangokulashwa kwaso. Ngesikhathi ngaba ulwazi ngiyocela uzizwe ukhululekile ukubuza Imibuzo uma ungaqondi engikushoyo noma uma ungathanda ngiphinde okuthize.	
	Umcwaningi ulandela Isihlandla sohlelo u- Appendix I. Umcwaningi ufunda isitatimende ngasinye bese ekhomba isithombe imizizwana emibili. Umcwaningi ulinda imizuzwana emithanthu ngaphambi kokudlulela esitatimendeni esilandelayo	
	Ngiyabonga ukuthatha isikhathi ukulalela ulwazi. Siyothatha ikhefu elingangemuzu ewu-30. Ngingathanda ukunika i-juice/itiye nesamishi. Ngiyobuya ngikubizele Imibuzo yokugcina. Bese siyaseqeda isihlandla sethu.	
Imibizo yangasemuva	Manje ngizophinda ngikubuze imibuzo futhi, emva kwalokho siyobe sesiqedile futhi usungahamba. **Imibuzo efanayo nemibuzo yangaphambi iyosetshenziswa futhi nohlelo olufanayo luyalandelwa**	
Ukuvalwa	Ngiphinde ngibonge futhi ngesikhathi sakho. Ukubamba kwakho iqhaza kulolucwaningo kusabongwa futhi kuyongwengeza enanini locwaningo. Sesiqedile ngesihlandla sethu (Umnika imali yokugibela ubhale igama nenani lemamli enikiwe ohlahleni)	

Appendix K1

Demographic Questionnaire - English

☐☐

Participant Number

The questions asked on this form are about things that describe you right now. Remember your answers will be kept confidential, your name will not be revealed.

1. Gender Male ☐ Female ☐
2. How old are you? _____
3. What is your home language? _____
4. Are you currently employed?
   - 4.1 ☐ Yes
   - 4.2 ☐ No
5. Which one best describes your type of employment?
   - 5.1 ☐ Full time
   - 5.2 ☐ Part time
   - 5.4 ☐ Self employed
   - 5.5 ☐ Unemployed
   - 5.6 ☐ Other (please specify) _____
6. What is the highest level of education that you have obtained?
   - 6.3 ☐ Grade 5- 7
   - 6.4 ☐ Grade: 0 (never attended) - 4
7. What is your family's total household income per month?
   - 7.1 ☐ Less than R4500
   - 7.2 ☐ Between R4501- R7 500
   - 7.3 ☐ Between R7501- R 12 500
   - 7.4 ☐ Above R12 501

Appendix K2

Demographic Questionnaire –IsiZulu

☐☐

Inombolo yombambiqhaza

Imibuzo ebuzwa kulelifomu ingezinto ezichaza ngawe njengamanje. Khumbula izimpendulo zakho zizogcinwa ziyimfihlo, igama lakho ngeke likhishwe. Imininingwane yakho iyosetshenziswa kanye neminye, futhi hhayi iyodwa.

1. Ubulili Owesifazane ☐ Owesilisa ☐

2. Uneminyaka emingaki? _____

3. Luthini ulwimi lwasekhaya? _____

4. Kungabe uyasebenza njengamanje?
   - 4.1 ☐ Yebo
   - 4.2 ☐ Cha

5. Iyiphi echaza kahle kakhulu uhlobo lomsebenzi wakho?
   - 5.1 ☐ Okuphelele
   - 5.2 ☐ Ingxenye yesikhathi
   - 5.3 ☐ Ngiyazisebenza
   - 5.4 ☐ Angisebenzi
   - 5.5 ☐ Okunye (sicela ucacise) _____

6. Kungabe yiliphi izinga lemfundo eliphezulu owagcina kulo?
   - 6.1 ☐ Ibanga 5-7
   - 6.2 ☐ Ibanga ongakaze - 4

7. Kungabe ekhaya lakho kuholwa malini ngenyanga sekukonke
   - 7.1 ☐ Ngaphansi kuka R4500
   - 7.2 ☐ Phakathi kuka R4501 kuya ku R7500
   - 7.3 ☐ Phakathi kuka R7501 kuya ku R 12 500
   - 7.4 ☐ Okungaphezu kuka R12500

Appendix L

Approval from University of Pretoria Ethics Committee

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Research Ethics Committee

7 May 2018

Dear Ms Mbanda

Project:	**The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy**
Researcher:	**N Mbanda**
Supervisor:	**Prof S Dada**
Department:	**Centre for Augmentative and Alternative Communication**
Reference number:	**29651353 (GW20180318HS)**

Thank you for your response to the Committee's correspondence of 4 April 2018.

I have pleasure in informing you that the Research Ethics Committee formally **approved** the above study at an *ad hoc* meeting held on 7 May 2018. Data collection may therefore commence.

Please note that this approval is based on the assumption that the research will be carried out along the lines laid out in the proposal. Should your actual research depart significantly from the proposed research, it will be necessary to apply for a new research approval and ethical clearance.

We wish you success with the project.

Sincerely

[redacted]

Prof M[redacted]
Deputy Dean: Postgraduate and Research Ethics
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail: PGHumanities@up.ac.za

cc: Prof S Dada (Supervisor)
[redacted]

Fakulteit Geesteswetenskappe
Lefapha la Bomotho

Research Ethics Committee Members: Prof MME Schoeman (Deputy Dean); Prof KL Harris; Mr A Bizos; Dr L Blokland; Dr K Booyens; Dr A-M de Beer; Ms A dos Santos; Dr R Fasselt; Ms KT Govinder Andrew; Dr E Johnson; Dr W Kelleher; Mr A Mohamed; Dr C Puttergill; Dr D Reyburn; Dr M Soer; Prof E Taljard; Prof V Thebe; Ms B Tsebe; Ms D Mokalapa

Appendix M1

Permission to use the Health Education Programme of the National Department of Health (NDoH)

The National Department of Department Civitas Building
Cnr Thabo Sehume and Struben Streets,
Pretoria
0001

Permission to use the NDoH HIV health education programme

My name is Njabulo Mbanda and I am currently a Ph.D. student at the Centre for Augmentative and Alternative Communication, Faculty of Humanities, University of Pretoria. I am writing to request for permission use the National Department of Health's HIV health education programme which is taken from the Adherence Guidelines for HIV, TB and non-communicable diseases, of 2016 in my study. I am interested in determining if and how visual aids help persons with low literacy understand health information.

Title

My research is titled "The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy".

Objective of the research

This research aims to investigate the effect of visual aids on the understanding of HIV health information in persons with low literacy. This study aims to compare the effect of the NDoH HIV health education programme (with and without visual aids) on understanding of health information in persons with low literacy. The study will focus on the "Education on HIV and ART" section of the health education programme (see attached proposal).

What is required of the Department of Health?

Permission is required from the National Department of Health to use the health education flip chart in this study specifically the section on "Education on HIV and ART" which will be blind back translated to isizulu. This study seeks to employ quasi experimental a multi-group pre-test-post-test design (Schlosser, 2003) illustrated in Table 1. Purposively selected participants will be allocated to randomly to three different conditions. This design is selected due its ability to show effects of one intervention over another (relative effects) as well as absolute effects as it includes a control group (Schlosser, 2003). Participants will be randomly allocated to three groups and a pre-test will be conducted. Group 1 will receive the NDoH HIV health education programme with visual aids. Group 2 will receive the NDoH HIV health

education programme without visual aids. Group 3 will not receive any program between the pre-test and post-test.

However, due to ethical reasons Group 3 will receive the NDOH HIV Education program with visual aids to ensure all groups receive information. The independent variable (IV) will be the NDoH HIV health education programme (with and without visual aids) and the dependent variable (DV) will be the understanding of health information as measured by the pre-test; post-test questionnaire in this study. In addition, stakeholders' perspectives on the iconicity of visual aids will be determined by another group of participants. Iconicity may provide valuable information on understanding the role visual aids played in understanding the health information.

Table 1: Research Design: Multigroup Pretest-Post-test Design (Schlosser, 2003)

Group	Pre-test	Treatment	Time lapse	Post-test	Treatment
1	O	X^1	30 minutes	O	
2	O	X^2		O	
3	O		30 minutes	O	X^1
			Time lapse (within 1 day)		

X^1= NDoH HIV Education programme with visual aids
X^2= NDoH HIV Education programme without visual aids

Permission to use these materials is voluntary and may be withdrawn at any time.

Who will be the participants?

Participants recruited in this study will: i) be persons with low literacy who have grade 7 or less and ii) speak isiZulu (see Appendix E1 in the attached proposal). The informed consent letter will read to participants and they will be given full details on the purpose of the study including the benefits and risks of participation. They will be advised about the voluntary nature of the study and that they have the right to withdraw from the study without any consequences. Confidentiality will be maintained at all times. The study will take place in agreed upon venue which will be communicated to potential participants.

Fakulteit Geesteswetenskappe
Lefapha la Bomotho

Centre for Augmentative and Alternative Communication, Room 2-36, Com path Building, Lynnwood
University of Pretoria, Private Bag X20
Hatfield 0028, South
Tel +27 (0)12 420
Fax +27 (0) 86
Email
www.caac.up

Research Results

The research results will only be treated confidentially. The data obtained will be securely stored for the purposes of research and archived for a period of 15 years at the Centre for Augmentative and Alternative Communication, University of Pretoria. The results will be shared through scientific articles, a lay article and conference presentations. A copy of the completed dissertation will be sent to the NDoH upon completion of the study.

Thank you for taking time to consider this request. Please do not hesitate to contact the researcher or supervisor for more information

Kind Regards

PhD Student
Njabulo Mbanda

Supervisor
Prof. Shakila Dada

Centre for Augmentative and Alternative Communication, Room 2-36, Com path Building, Lynnwood
University of Pretoria, Private Bag X20
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Tel +27 (0)12 420
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<banda.njabulo@gmail.com>

Appendix M2
Approval from National Department of Health

(to use the NDoH health education programme)

2/27/2019 Gmail - Re: Fwd: Permission for Permission Letter

M Gmail Njabulo Banda

Re: Fwd: Permission for Permission Letter

[redacted] Mon, Jun 18, 2018 at 9:45 AM
To: banda.njabulo@gmail.com, Salome Masenya <Salome.Masenya@health.gov.za>

Dear Colleagues

I have noted the request and would like to re confirm that NDOH material can be utilised there is no need for a letter of permission. The list [redacted] can do is to draft such a letter for my signature, a process I deem unnecessary in my view.

An acknowledgment of NDOH is sufficient,

Regards

[redacted]

Director. Care and Support National Department of Health HIV/AIDS AND TB

email:[redacted]

Tel: [redacted]

>>>[redacted]2018/06/15 2:12 PM >>> Good afternoon[redacted]

Kindly advise the writer on the developments for this

request. Regards [redacted]

Office of the Chief Nursing Officer
National Department of Health

Tel: [redacted]

Fax to Email: [redacted]

Room no: S0727 Civitas Building

Email:[redacted]

>>> Njabulo Banda <[redacted]/06/15

2:06 PM>>> Dear [redacted],

I'm just following up on my request above. Would you kindly let me

know? Regards

On Tue, Apr 24, 2018 at 10:03 AM, Salome Masenya <Salome.Masenya@health.gov.za> wrote:

> Good morning Njabulo
>
> Kindly be informed that your email is acknowledged with thanks. It has been forwarded to [redacted] Director: Care and Support copied in this email, for her attention.
>
> I can assure you that it is thus receiving attention. Thanks

Appendix N1

Permission letter to the KwaZulu Natal Department of Health

The Head of Department
Department of Health- KwaZulu Natal
Durban
Postal Code

RE: Permission to Conduct Research in Department of Health Facilities

My name is Njabulo Mbanda and I am currently a Ph.D. student at the Centre for Augmentative and Alternative Communication, Faculty of Humanities, University of Pretoria. I am writing to request for permission to conduct a research study in the health facilities in your province.

Title

My research is titled "The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy".

Objective of the research

This research aims to investigate the effect of visual aids on the understanding of HIV health information in persons with low literacy. This study aims to compare the effect of the NDoH HIV health education programme (with and without visual aids) on understanding of health information in persons with low literacy. The study will focus on the "Education on HIV and ART section of the health education programme (see attached proposal).

What is required of the Department of Health?

Permission is required for the Department of Health to conduct the study in health facilities. Participation in this study is voluntary and the Department of Health has the right to withdraw from the study at any time. Upon receiving the permission, the researcher will contact and visit the clinics/hospital in order to get permission from the clinic/hospital.
he letter will introduce the study and explain the recruitment process (see Appendix D in the attached research proposal). Once identified, prospective participants will be given information about the study (See Appendix E1 in the attached proposal).

Participant criteria

Participants recruited in this study will: i) be persons with low literacy who have grade 7 or less and ii) speak isiZulu (see attached letter of informed consent). The informed consent letter will read to participants and they will be given full details on the purpose of the study including the benefits and risks of participation. They will be advised about the voluntary nature of the study and that they have the right to withdraw from the study without any consequences. Confidentiality will be maintained at all times. Usually, we ask for a separate a room within the hospital/facility where the researcher can give all potential participants information about the study and if possible, use the room to also collect data.

Research Results

The research results will only be treated confidentially. The data obtained will be securely stored for the purposes of research and archived for a period of 15 years at the Centre for Augmentative and Alternative Communication, University of Pretoria. The results will be shared through scientific articles, a lay article and conference presentations.

Thank you for taking time to consider this request. Please do not hesitate to contact the researcher or supervisor for more information

Kind Regards

PhD Student
Njabulo Mbanda

Supervisor
Prof. Shakila Dada

Fakulteit Geesteswetenskappe
Lefapha la Bomotho

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UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Humanities 100.
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Centre for Augmentative & Alternative Communication

Permission Reply Slip: Kwa Zulu Natal Department of Health

Project title:	The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy		
Researcher:	Ms. Njabulo Mbanda Cell: [redacted] email: [redacted]	**Supervisor:**	Prof. Shakila Dada Tel: [redacted] email: [redacted]

I, _____ (Name and surname)

☐ I give permission for this study to take place in KwaZulu Natal DoH health facilities.

OR

Official Stamp

☐ I do not permission for this study to take place in KwaZulu Natal DoH health facilities

Signature _____ Date _____
Researcher _____ Date _____

Fakulteit Geesteswetenskappe
Lefapha la Bomotho

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Approval from the KZN Department of Health

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

DIRECTORATE:
[redacted]
Health Research & Knowledge Management

HRKM Ref: 292/18
NHRD Ref: KZ_201807_034

Dear Ms M. Mbanda

Approval of research

1. The research proposal titled **'The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy'** was reviewed by the KwaZulu-Natal Department of Health.

   The proposal is hereby **approved** for research to be undertaken at Umbumbulu and Magabheni clinic.

2. You are requested to take note of the following:
   a. Make the necessary arrangement with the identified facility before commencing with your research project.
   b. Provide an interim progress report and final report (electronic and hard copies) when your research is complete.

3. Your final report must be posted to **HEALTH RESEARCH AND KNOWLEDGE MANAGEMENT,** [redacted] and e-mail an electronic copy to [redacted]

For any additional information please contact Mr [redacted]

Yours Sincerely

[redacted]
Chairperson, Health Research Committee
Date: 23/08/18

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

[redacted]

DIRECTORATE: CORPORATE SERVICES
ETHEKWINI HEALTH DISTRICT OFFICE

Appendix O

Recommendation from eThekwini District Manager

25 June 2018

Dear Ms. N Mbanda

Re: Permission To Conduct Research at eThekwini District Facilities.

This letter serves to confirm that your application to conduct the research study titled "The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy "in the eThekwini district at the following health care facilities has been recommended:

[redacted]

Please also note the following:

1. This research project should only commence after final approval by the KwaZulu-Natal Health Research and Knowledge Unit, and full ethical approval, has been granted
2. That you adhere to all the policies, procedures, protocols and guidelines of the Department of Health with regards to this research.
3. All research activities must be conducted in a manner that does not interrupt clinical care at the health care facility,
4. Ensure that this office is informed before you commence your research
5. The District Office/Facility will not provide any resources for this research
6. All logistical details must be arranged with the CEO/medical manager /operational manager of the facility,
7. You will be expected to provide feedback on your findings to the District Office/Facility

Yours sincerely

[redacted]

Dr. A. [redacted]
Chief Director eThekwini Health District

Appendix P

Letter to the Research Site (DoH Clinics)

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Centre for Augmentative
& Alternative Communication

The Hospital CEO/Facility Manager
Facility Name
Address
Postal Code

REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT THE HEALTH FACILITY

My name is Njabulo Mbanda and I am currently a Ph.D. student at the Centre for Augmentative and Alternative Communication, Faculty of Humanities University of Pretoria. I am writing to request permission to recruit participants at your health facility.

Title

My research is titled "The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy"

Objective of the research

This research aims to investigate the effect of the NDoH HIV health education programme (with and without visual aids) on understanding of health information in persons with low literacy. The study will focus on the "Education on HIV and ART section of the health education programme.

What does this entail for the health facility?

The researcher has been granted permission by the provincial department of health (see attached). We require permission to recruit participants for the study from your clinic/clinics. We also require a separate room where the researcher can give all potential participants information about the study, and if possible, also use the room to collect data.

Participants

Participants recruited in this study will be persons with low literacy, have grade 7 or less and speak isiZulu. Participation is voluntary and participants will be informed of this during recruitment (see attached letter of informed consent).

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YUNIBESITHI YA PRETORIA

Faculty of Humanities

The informed consent letter will be read to participants and they will be given full details on the purpose of the study including the benefits and risks of participation. They will be advised about the voluntary nature of the study and that they have the right to withdraw from the study without any consequences. Participants will also be informed that a video recording will be made and used for data and procedural reliability. Confidentiality will be maintained at all times. The study will take place in an agreed upon venue which will be communicated to potential participants.

Research Results

The data obtained will be securely stored for the purposes of research and archived for a period of 15 years at the Centre for Augmentative and Alternative Communication, University of Pretoria.

Thank you for taking time to consider this request. Please do not hesitate to contact the researcher or supervisor for more information.

Kind Regards

PhD Student
Njabulo Mbanda

Supervisor
Prof. Shakila Dada

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UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

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Centre for Augmentative & Alternative Communication

Permission Reply Slip: Research Site (Health facility/Hospital)

Project title:	The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy		
Researcher:	Ms. Njabulo Mbanda Cell: [redacted] email: [redacted]	**Supervisor:**	Prof. Shakila Dada Tel: [redacted] email: [redacted]

I, _____ (name and surname)

☐ I give permission to I give permission for the researcher to recruit participants for this research study, as outlined in the letter

OR

☐ I do not permission for the researcher to recruit participants for this study.

Official Stamp

_____ _____
Signature Date

_____ _____
Researcher Date

Fakulteit Geesteswetenskappe
Lefapha la Bomotho

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University of Pretoria, Private Bag X20
Hatfield 0028, South
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Fax +27 (0) 86
Email
www.caac.u

Appendix Q

Template for Research Support

health

Department:
Health
PROVINCE OF KWAZULU-NATAL

Facility Name:
Postal Address

Physical Address

Fax.:
Email.:

Date: 20-07-2018
Enquiries:

Principal Investigator
Njabulo Mbanda
18 Arbour Sands
50 Arbour Road
Umbogintwini
Amanzimtoti
4126

I have pleasure in informing you that I support your conduct of the research study entitled "*The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy*"

Please note the following:

1. Please ensure that you adhere to all the policies, procedures, protocols and guidelines of the Department of Health with regards to this research.
2. This research will only commence once this office has received confirmation from the Provincial Health Research Committee in the KZN Department of Health.
3. Please ensure this office is informed before you commence your research.
4. The District Office/Facility will not provide any resources for this research.
5. You will be expected to provide feedback on your findings to the District Office/Facility.

Thanking you.

Sincerely

District/Facility Managers Name
District/Facility Nam

uMnyango Wezempilo . Departement van Gesondheid

Fighting Disease, Fighting Poverty, Giving Hope

Appendix R1

Informed Consent Letter Iconicity Task Participants-English

Dear Participant

My name is Njabulo Mbanda and I am conducting research that is titled, "The effect of visual aids health education programme on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy"

Aim of the research

This research aims to investigate the effects of using visual aids to portray health information in order to make it easier to understand the health information. The researcher is interested in exploring your view on the types of visual aids that are the most appropriate to represent this health information. The findings from this study will help us to understand how to enhance health education to help people to improve their lives.

What will your involvement be?

As a participant in the study will be provided with information about the study and thereafter required to give formal consent that you agree to participate in the study. Once you have provided consent you will be given the date and venue where the discussion will take place. You will be asked to attend a discussion with 5 other people. The discussion will last for about 1 hour and you will be given an opportunity to ask questions before and after the session. You will be provided with light refreshment after the session. The researcher will also assist you with bus/taxi fare so as to make it easier that you arrive at the venue on the said date. In order to make sure that all your information is captured accurately, the researcher will be recording the discussion on an audio recorder. The recording will only be used by the researcher for analysis of information from the discussion.

Your rights as a participant

Participation in this study is voluntary. Please note that you can withdraw whenever you like from the study and this will not affect you in any way. The discussion will be held in a neutral venue in order to help avoid any unplanned or accidental disclosure of any of your personal information including your HIV status.

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Confidentiality/Anonymity

Your responses and the recordings made during the discussion will be kept confidential, your name will not be attached to any of the documents and data will be kept safely.

Research results

The research results will only be viewed by the PhD student and supervisors. The data obtained will be securely stored for the purposes of research and archiving for a period of 15 years at the Centre for Augmentative and Alternative Communication, University of Pretoria

Thank you for considering participating in this study. We ask that you kindly indicate your decision to participate or not to participate by issuing a thumb print on the permission slip provided at the bottom of this letter. If you cannot provide a thumb print the researcher is willing to assist record your agreement through a witness signing on your behalf. If there are any more questions of clarity, please do not hesitate to contact the researcher for more information.

Kind Regards

PhD Student
Njabulo Mbanda

Supervisor
Prof. Shakila Dada

Centre for Augmentative and Alternative Communication, Room 2-36, Com path Building, Lynnwood
University of Pretoria, Private Bag X20
Hatfield 0028, South
Tel +27 (0)12 420
Fax +27 (0) 86
Email
www.caac.up

Informed Consent: Reply Slip

Project title:	The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy		
Researcher:	Ms. Njabulo Mbanda Cell: [redacted] email: [redacted]	**Supervisor:**	Prof. Shakila Dada Tel: [redacted] email: [redacted]

I, _____ (Name and surname)

(Please make a right-hand thumb print in a block below that goes with your response)

☐ I consent to participate in this study. I understand that my consent is voluntary and that I may withdraw my participation from the study at any time without consequences. I understand that the data will be kept confidential and stored for 15 years at the University of Pretoria. I understand that the interviews will be audio-taped for the purposes of data collection and analysis at a later stage.

OR

☐ I do not give consent to participate in this study.

_____ _____

Signature (Researcher) Date

_____ _____

Signature (Witness) Date

Appendix R2

Informed Consent- Iconicity task participants (IsiZulu)

Incwadi Yokunikeza Imvume Unolwazi Kwababambe iqhaza (Ukusebenza ngezithombe)

Kumbambiqhaza

Imininingwane mayelana nocwaningo

Igama lami nguNjabulo Mbanda ngingumfundi, ngenza ucwaningo. Isihloko socwaningo lwami “Imithelela yezinsiza ezibonakalayo ekuqondeni Igciwane Lesandulela Ngculazi (HIV) kubantu abafunde ngokusezingeni eliphansi”

Ngilwenzelani lolucwaningo?

Ngifuna ukwazi yiziphi izindlela ezingasiza abantu abafunde ngokusezingeni eliphansi ukuthi baqonde ulwazi lwezempilo. Ngamanye amazwi ukuthola ukuthi uma usebenzisa amagama noma kokubili amagama nezithombe iyona ndlela ehamba phambili ukuhlinzeka ulwazi lwezempilo. Ukubamba iqhaza kulolucwaningo udinga ukuthi ukhulume isiZulu, ubephakathi kweminyaka ewu 18-50 yobudala futhi ungaqedanga ibanga lesi-7 esikoleni.

Udinga ukwenzani kuqala?

Inhloso yalencwadi ukukunikeza ulwazi mayelana nocwaningo, ingqubo mgomo ezosetshenziswa kanye namalungelo akho njengozobamba iqhaza. Ukubamba iqhaza kungukuzikhethela kwakho. Uyazikhethela ukuthi uyafuna noma awufuni ukubamba iqhaza kulolucwaningo. Ungaphinda ukhethe ukushenxa ukuba yingxenye yocwaningo noma yinini. Uma uvuma ukubamba iqhaza kulolucwaningo, kuyodingeka ukuthi ukhombise ukuvuma noma ukungavumi kwakho ngokufaka isigxivizo sesithupha kwifomu.

Ukubamba iqhaza esihlandleni

Uma uvuma ukuba iqhaza, okokuqala ngizokubuza imibuzo embalwa emayelana nawe. Emva kwalokho, uzobheka izithombe. Ngiyokutshengisa isithombe bese ungitshela ukuthi kungabe siqondeni. Ngiyobe sengikubuza ukuthi isithombe sihambisana kangakanani nolwazi oluthile.

Uyophendula “kwasanhlobo, kancane, cishe kakhulu, kakhulu” ngokubeka ipheshana elinamathelayo kulokhu okucabangayo ngezithombe. Yonki into iyoqoshwa nge-vidiyo. Siyosebenza i-vidiyo ukubheka ukuthi azikho izinyathelo engizishiyile esihlandleni sethu.

Isikhathi

Ngesikhathi sakho ubeiqhqza yocwaningo, umcwaningo ukuyokuhlinzeka ngemali yokugibela ukuthi ufike la ucwaningo lwenzeka khona. Lokhu kuyoba yinani oliyocela ku-R100.

Ubumfihlo

Izimpendulo zakho kanye nokuqoshiwe ngesikhathi kudingidwa kuyogcinwa kuyimfihlo futhi igama lakho angeke libhalwe ndawo emaphepheni.

Imiphumela Yocwaningo

Ulwazi oluyotholakala luyobekwa ngokucophelela ukuze lusetshenziselwe ucwaningo futhi luyogcinwa isikhathi esiyiminyaka ewu-15 Esikhungweni se- Augmentative and Alternative Communication, eNyuvesi yasePitoli. Uma ungathanda ukwazi imiphumela yocwaningo ucelwa ukuthi uhlinzeke inombolo kamakhalekhukhwini wakho _____ ukuze ngingakwazi ukukuthumelela i-video emfushane ezobe ichaza imiphumela.

Ngiyabonga ukuthi uthathe isikhathi ukuthi ucabange ngalesi sicelo sami. Ucelwa ukuthi ungananazi ukuthi uthinte umcwaningi noma unsumpa uma udinga ulwazi olunzulu.

Ozithobayo,

Umfundi we-PhD
Njabulo Mbanda

Unsumpa
UProf. Shakila Dada

Fakulteit Geesteswetenskappe
Lefapha la Bomotho

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University of Pretoria, Private Bag
Hatfield 0028, South
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Ukunikeza Imvume Unolwazi: Iphepha Lokuphendula: Ababambe iqhaza

(Ukusebenza ngezithombe)

Isihloko seProject:	Imithelela yezinsiza ezibonakalayo ekuqondeni Igciwane Lengculazi (HIV) kubantu abafunde ngokusezingeni eliphansi		
Umcwaningi :	Nks. Njabulo Mbanda Cell: [redacted] email: [redacted]	**Unsumpa:**	Unsumpa. Shakila Dada Tel: [redacted] email: [redacted]

☐ Mina, _____ (igama nesibongo)

Ngiyavuma ukubamba iqhaza kulolucwaningo njengokuchazwe encwadini yemvume.

NOMA

☐ Angivumi ukubamba iqhaza kulolucwaningo.

_____ _____

Sayina (Umcwaningi) Usuku

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Appendix S

Letter to the community- based organisations (CBO's)

The Project Coordinator

RE: Request for assistance with recruitment of participants

My name is Njabulo Mbanda and I am currently a Ph.D. student at the Centre for Augmentative and Alternative Communication, Faculty of Humanities University of Pretoria. I am writing to request for your assistance with my research study.

Title

My research is titled "The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy"

Objective of the research

This research aims to investigate the effect of visual aids on the understanding of HIV health information in persons with low literacy. This study aims to compare the effect of the NDoH HIV health education programme (with and without visual aids) on understanding of health information in persons with low literacy. The study will focus on the "Education on HIV and ART section of the health education programme. As part of this study, I need to obtain the perspectives of persons with low literacy on the iconicity of the visual aids.

What does this entail for the CBO?

Permission is required for the CBO to conduct the study. Participation in this study is voluntary and the CBO's has the right to withdraw from the study at any time. Upon receiving the permission, the researcher will visit the CBO in order to introduce the study and explain the recruitment process. The role of the CBO will be to assist with the identification and recruitment of participants for the study, and the use of your venue to meet with the participants and to conduct interviews with participants regarding their views on the iconicity of the visual aids (See Appendix E2 in the attached proposal).

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Lefapha la Bomotho

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Who will be the participants?

Participants recruited in this study will: i) be persons with low literacy who have grade 7 or less and ii) speak isiZulu. The informed consent letter will read to participants and they will be given full details on the purpose of the study including the benefits and risks of participation. They will be advised about the voluntary nature of the study and that they have the right to withdraw from the study without any consequences. Participants will also be infoemd that a video recording will be made and used for data and procedural reliability. Confidentiality will be maintained at all times. The study will take place in agreed upon venue which will be communicated to potential participants.

Research Results

The data obtained will be securely stored for the purposes of research and archived for a period of 15 years at the Centre for Augmentative and Alternative Communication, University of Pretoria.

Thank you for taking time to consider this request. Please do not hesitate to contact the researcher or supervisor for more information

Kind Regards

PhD Student
Njabulo Mbanda

Supervisor
Prof. Shakila Dada

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Permission Reply Slip: Community based organisation (CBO)

Project title:	The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy		
Researcher:	Ms. Njabulo Mbanda Cell: [redacted] email: [redacted]	**Supervisor:**	Prof. Shakila Dada Tel: [redacted] email: [redacted]

I, _____ (name and surname) of _____ (name of CBO)

Official Stamp

☐ I give permission to assist with the study as outlined in the letter.

OR

☐ I do not permission to assist this study.

_____ _____
Signature (……) Date

_____ _____
Researcher Date

Fakulteit Geesteswetenskappe
Lefapha la Bomotho

Centre for Augmentative and Alternative Communication, Room 2-36, Com path Building, Lynnwood
University of Pretoria, Private Bag X20
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Fax +27 (0) 86
Email
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Appendix T

Permission Letter to the Ward Counsellor/Induna

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Humanities 100.
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& Alternative Communication

Name of Counsellor/Induna
Name of Area/Ward
Address
Postal Code

REQUEST FOR TO CONDUCT RESEARCH IN YOUR COMMUNITY

My name is Njabulo Mbanda and I am currently a Ph.D. student at the Centre for Augmentative and Alternative Communication, Faculty of Humanities University of Pretoria. I am writing to request for permission to conduct my research in your community.

Title

My research is titled "The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy"

Objective of the research

This research aims to investigate the effect of visual aids on the understanding of HIV health information in persons with low literacy. This study aims to compare the effect of the NDoH HIV health education programmes (with and without visual aids) on understanding of health information in persons with low literacy. The study will focus on the "Education on HIV and ART" section of the health education programme.

What does this entail for the community?

Permission is required from you in order to conduct the research in your community. Participation in this study is voluntary and the community has the right to withdraw from the study at any time. Upon receiving the permission, the researcher will visit the CBO's that work in the community in order to introduce the study and explain the recruitment process. The role

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of the CBO will be to assist with the identification and recruitment of participants for the study. The CBO will also be requested for the use of their venue to meet with the participants to conduct interviews with participants regarding their view on the iconicity of the visual aids.

Who will be the participants?

Participants recruited in this study will: i) be persons with low literacy who have grade 7 or less and ii) speak isiZulu. The informed consent letter will be read to participants and they will be given full details on the purpose of the study including the benefits and risks of participation. They will be advised about the voluntary nature of the study and that they have the right to withdraw from the study without any consequences. Participants will also be informed that a video recording will be made and used for data and procedural reliability. Confidentiality will be maintained at all times. The study will take place at the CBO or an alternative agreed upon venue which will be communicated to potential participants.

Research Results

The data obtained will be securely stored for the purposes of research and archived for a period of 15 years at the Centre for Augmentative and Alternative Communication, University of Pretoria.

Thank you for taking time to consider this request. Please do not hesitate to contact the researcher or supervisor for more information.

Kind Regards

PhD Student
Njabulo Mbanda

Supervisor
Prof. Shakila Dada

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Humanities 100.
1919 - 2019
Centre for Augmentative & Alternative Communication

Permission Reply Slip: Counsellor/ Induna

Project title:	The effect of visual aids on the understanding of Human Immunodeficiency Virus (HIV) health information in persons with low literacy		
Researcher:	Ms. Njabulo Mbanda Cell: [redacted] email: [redacted]	**Supervisor:**	Prof. Shakila Dada Tel: [redacted] email: [redacted]

I, _____ (name and surname) of _____ (name of CBO)

☐ I give permission to for the study to take place in my community as outlined in the letter.

OR

☐ I do not permission for the study to take place in my community.

Official

_____ Signature (…….)

_____ Date

_____ Researcher

_____ Date

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Appendix U1

Procedural Script Iconicity Task
Procedural script and checklist for the iconicity task (English)

Step	Researcher Script	Inter rater √= done/ X= not done
Introduction	Welcome to our discussion. My name is Njabulo Mbanda and today we will be talking about how pictures can be used in health education to assist people to understand the information better. This discussion aims to investigate the effect of pictures on the understanding of HIV health information in people with low literacy. This exercise might help those who don't always have access to written health materials at home or may forget information they are told at the clinic, after some time.	
Instructions	For this discussion I would like for us to look at a couple of pictures and discuss what they mean. We will be using the DoH health education programme. Although the information will be about HIV, the purpose of the exercise is just to share information, and you are not required to disclose your HIV status. We are simply sharing information and thinking about the meaning of the pictures and information.	
	I will be asking you two questions about each picture. I will show you the picture then ask you a question about it. After that I would you to show me how much you think the picture looks like a certain thing which I will tell you. I will ask you to show me what you think by indicating, "a lot, a little or not at all". You will do this by selecting one of these boxes. Box 1, with two full blocks, stands for "*a lot*", box 2 with 1 block full, stands for "*a little*", box 3 with no blocks full, stands for "*not at all*". I will be video recording the session so that I don't miss what we are doing. The camera will only focus on our hands and the pictures that we discuss. Do you have any questions about what we are going to do today? (Takes a 3 second pause) then if no questions, confirms, "May we start?"	
The exercise	I am now going to ask you some questions about these pictures in this file ***Places file in front of the participant and shows Appendix N.*** I will be recording your responses on this form ***(shows participant appendix O)***	
Question 1	The researcher asks, "what do you think this picture means/what do you see when you look at this picture?" The researcher records the participants responses on Appendix O	
Question 2	The researcher reveals the meaning of the visual aid and then asks the participant, "If I told you this is……how much you say would say this picture looks like (e.g. a virus / being sick/blood?) (Participants select their option according to the scale which they have been taught. Then the researcher places a cross on their choice)	
Closure	I would like to thank you again for your time. We are finished with our session. Your participation in this discussion is appreciated and will add value to the lives of many people receiving health information. I would like to offer you some juice/tea and a sandwich. After that you may leave	

Appendix U2

Procedural script and checklist Iconicity task (IsiZulu)
Umbhalo ngokusebenza ngezithombe

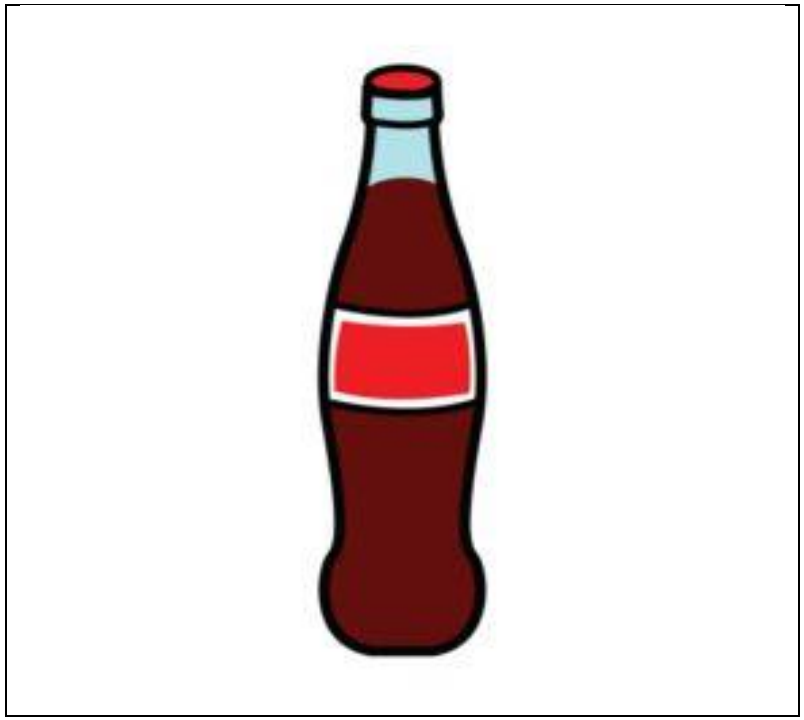
Isigaba	Umbhalo Womncwaningi	Ohlolayo √= kwenziwe/ X= akwenziwanga
Ukuzethula	Wamkelekile engxoxweni yethu. Igama LMICs ngingu-Njabulo Mbanda futhi namahlanje sizobe sikhuluma ngokuthi izithombe zingasetshenziswa kanjani ekuhlinzekeni ulwazi lwezempilo ukusiza abantu ukuthi baqonde ulwazi kangcono. Lengxoxo ihlose ukuphenya umthelela wezithombe ekuqondeni ulwazi lwezempilo nge-HIV, kubantu abafunde ngokusezingeni eliphansi. Lesisihlandla singahle sisize labo abangakwazi ukufinyelela njalo ezinsizeni zezempilo ezibhaliwe ekhaya, noma okungenzeka balukhohlwe ulwazi abalutshelwe emtholampilo, emva, kwesikhashana.	
Imiyalezo	Kulengxoxo, ngizothanda sibheke izithombe ezimbalwa futhi sixoxe ngokuthi ziqondeni. Sizobe sisebenzisa uhlelo lomnyango wezempilo lokufundisa ngempilo. Nakuba ulwazi luzobe lumayelana nesandulela ngculaza, inhloso yalesisihlandla ukucobelelana nje ngolwazi, futhi awulindelekile ukuphumela obala ngesimo Sakho sesandulela ngculaza. Kuphela, sicobelelana ngolwazi futhi sicabange ngokuqondwe izithombe nolwazi	
	Ngizokubuza imibuzo emibili ngesithombe sisinye. Ngizokutshengisa isithombe bese ngibuza umbuzo ngaso. Emva kwalokho, ngzokucela ungitshengise ukuthi ucabanga ukuthi sifana kangakanani isithombe nokuthize engizokutshela kona. Ngizocela ungitshengise ukuthi ucabangani ngokutshengisa, *"Kahului, cancan Noma hobo*". Uzokwenza lokhu ngokukhetha elinye lalawa mabhokisi. Ibhokisi lokuqala, elinezitini ezimbili ezigcwele, limele u "*kakhulu*", ibhokisi lesibili, elinesitini esisodwa esigcwele, limele u"*kancane*", ibhokisi lesithathu elingenazo izitini ezigcwele, limele u "*nhlobo*". Ngizosiqopha isihlandla ukuze ngingashiyi lutho kulokhu esikwenzayo. Ikhamera izobheka ezandleni zethu kuphela nasezithombeni esizobe sikhuluma ngazo Ngabe unayo imibuzo ngalokhu esizokwenza namhlanje? (Thatha ikhefu elimizuzwana ewu-3) bese, uma ingekho imibuzo, uqinisekise, "Singaqala?"	
Isihlandla	Manje sengizokubuza imibuzo mayelana nezithombe ezikulefayela. ***Abeke ifayela phambi kombambiqhaza (uAppendix N).*** Ngizoqopha izimpendulo zakho kulelifomu ***(Atshengise umbambiqhaza u- Appendix O)***	
Umbuzo 1	Umcwaningi uyabuza, " ngabe ucabanga ukuthi siqonde ukuthini lesisithombe/Ubonani uma ubheka lesisithombe?" ***Umcwaingi uqopha izimpendulo zombambiqhaza ku-Appendix O***	
Umbuzo 2	Umcwaningi ubeseveza okuqondwe yisithombe abese ebuza umbambiqhaza, "Uma ngingase ngikutshele ukuthi lokhu yi (……), ungathi lesisithombe sifana kangakanani ne (isib. igciwane / ukugula/igazi) (Ababambiqhaza bakhetha impendulo ngokwesikali abasifundisiwe. Ebese umcwaningi ebeka isiphambano kulokho okukhethiwe.	

Ukuvalwa	Ngithanda ukukubonga futhi ngesikhathi sakho. Sesiqedile ngesihlandla sethu. Ukubamba kwakho iqhaza kulengxoxo kuyathokozelwa futhi kuzokwandisa ikhethelo ezimpilweni zabantu abaningi abathola ulwazi lwezempilo. Ngingathanda ukunikeza i juice/ noma itiye nesamishi. Emva kwalokho usungahamba.	

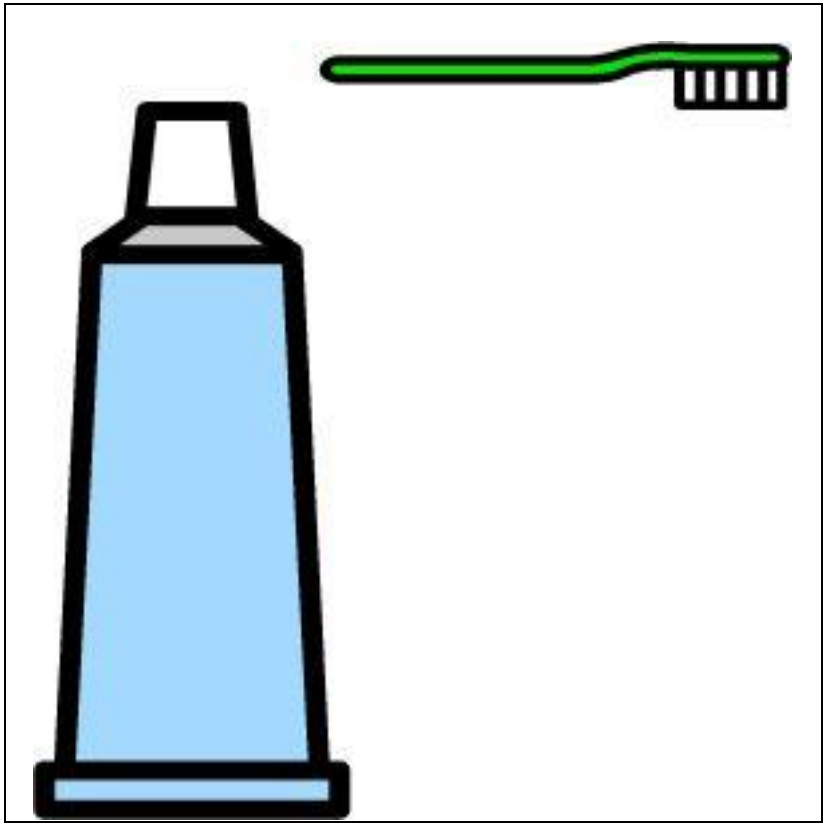
Appendix V

Participant Response Booklet: Iconicity Task

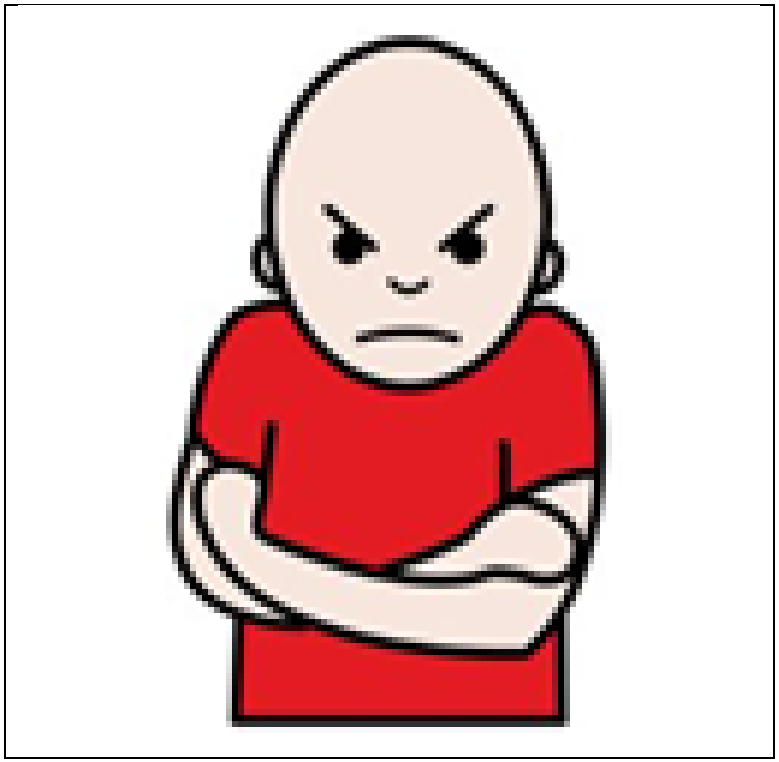
Izithombe zokubuzwa kwabanthintekayo ngokuqondakala kwezithombe ezeyizinsisa ezibonakalayo)



Kakhulu	Kancane	Nhlobo
		

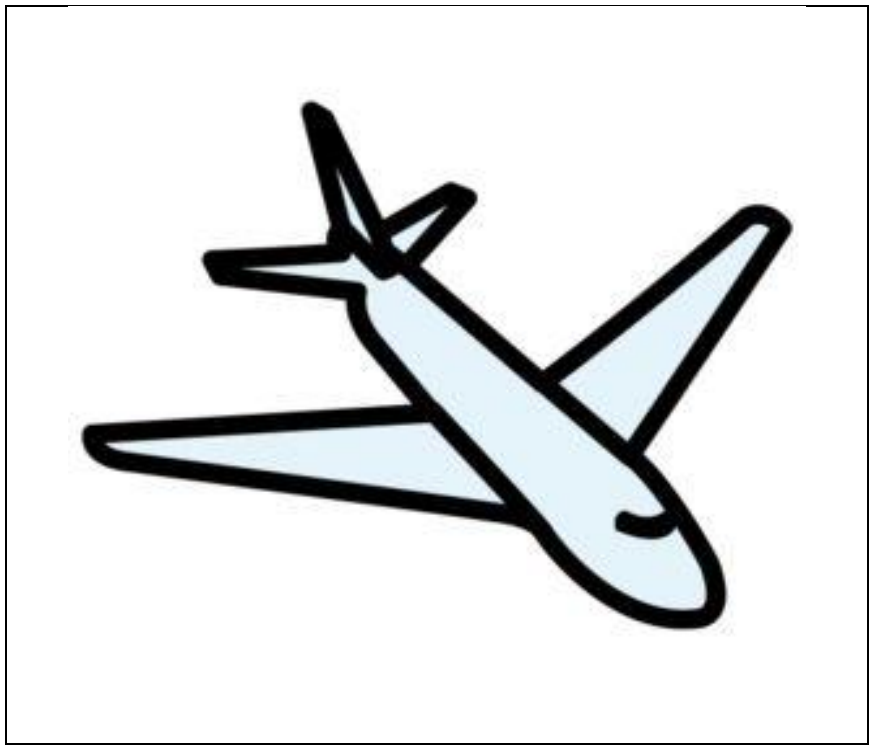


Kakhulu	Kancane	Nhlobo
■■	■□	□□

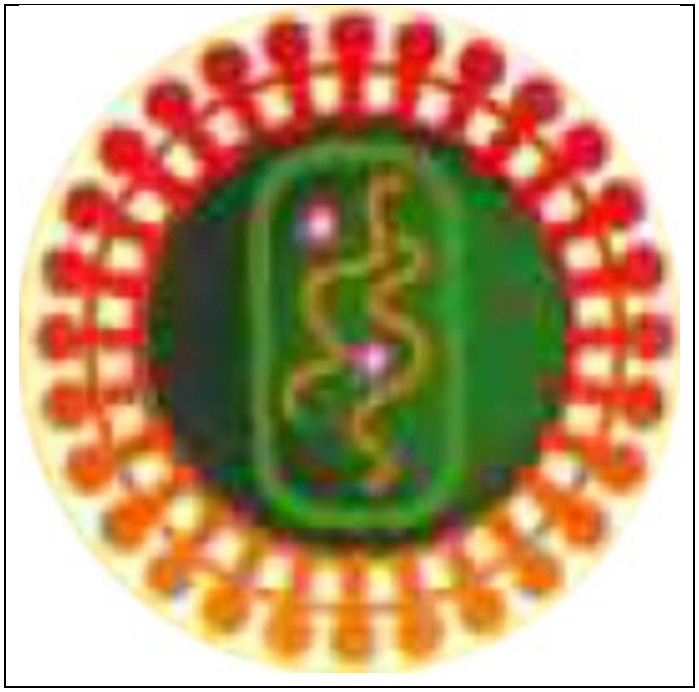


Kakhulu	Kancane	Nhlobo
■■	■□	□□

Kakhulu	Kancane	Nhlobo
■■	■□	□□



Kakhulu	Kancane	Nhlobo
■ ■	■	



Kakhulu	Kancane	Nhlobo
		

Kakhulu	Kancane	Nhlobo
		

Kakhulu	Kancane	Nhlobo
		

Kakhulu	Kancane	Nhlobo
■■	■□	□□

Kakhulu	Kancane	Nhlobo
■■	■□	□□

Kakhulu	Kancane	Nhlobo
■■	■□	□□

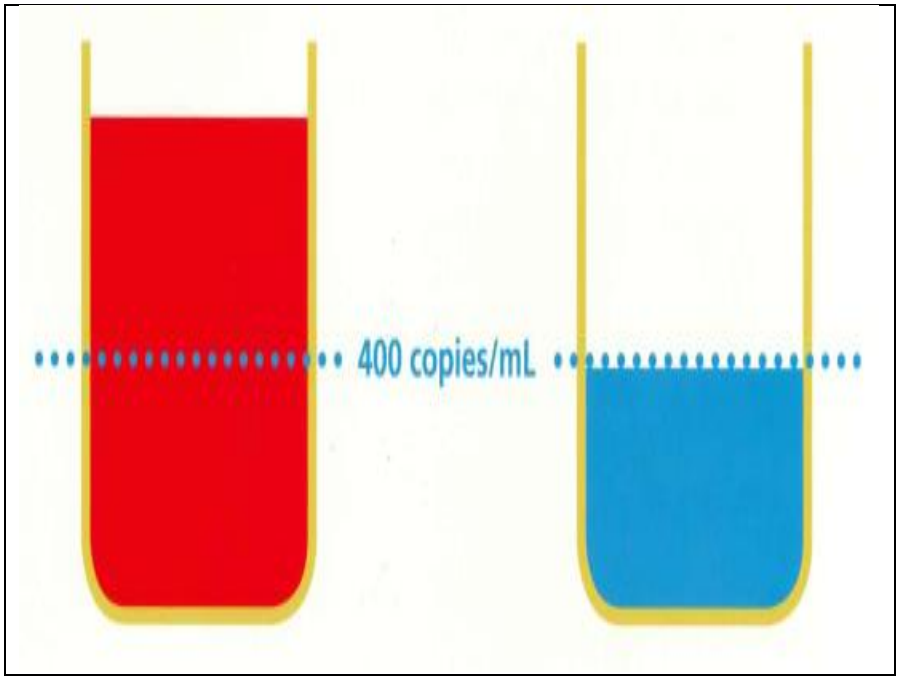
Kakhulu	Kancane	Nhlobo
■■	■□	□□

Kakhulu	Kancane	Nhlobo
■■	■	

Kakhulu	Kancane	Nhlobo
		

Kakhulu	Kancane	Nhlobo
■■	■□	□□

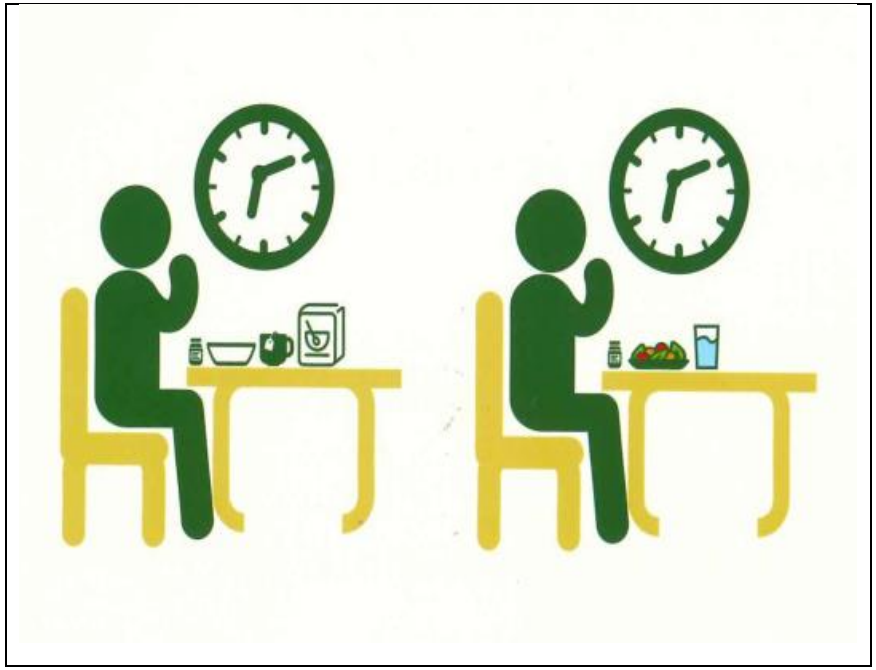
Kakhulu	Kancane	Nhlobo
■■	■□	□□



Kakhulu	Kancane	Nhlobo
		

Kakhulu	Kancane	Nhlobo
■■	■□	□□

Kakhulu	Kancane	Nhlobo
■■	■□	□□

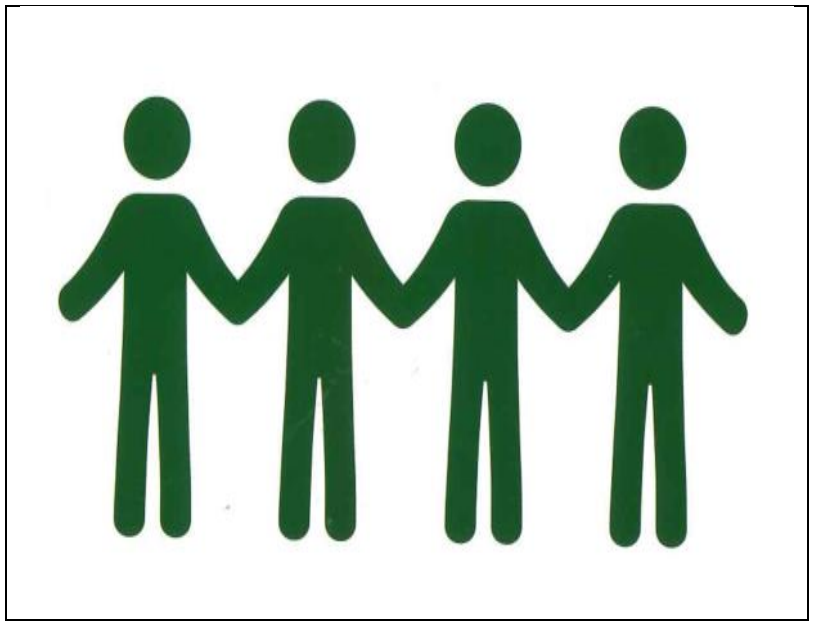


Kakhulu	Kancane	Nhlobo
■■	■□	□□

Kakhulu	Kancane	Nhlobo
■■	■□	□□

Kakhulu	Kancane	Nhlobo
■■	■	

Kakhulu	Kancane	Nhlobo
■■	■□	□□

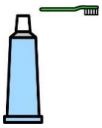


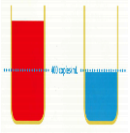
Kakhulu	Kancane	Nhlobo
■■	■□	□□

Appendix W

Participant Response Sheet for stakeholder engagement on iconicity of visual aids

Participant Number ____

Number	Idea	Visual Aid	Question 1 (answer in words)	Question 2 (Choose a response by placing an 'X')		
				A lot	A little	Not at all
	Coke bottle					
	Toothpaste					
	One who is angry					
	Road sign					
	Aeroplane					
1	Virus					
2	CD4 cell/soldier of the body					
3	HIV negative person					
4	HIV positive person					
5	Flu					

Number	Idea	Visual Aid	Question 1 (answer in words)	Question 2 (Choose a response by placing an 'X')		
				A lot	A little	Not at all
6	Fatigue					
7	Fever					
8	Testing (for HIV)					
9	Blood					
10	Unprotected sex					
11	Mother breastfeeding a child					
12	High or low					
13	Time for taking medicines					
14	A person taking medicine					
15	Taking medicine at the same time					
16	Sick					

Number	Idea	Visual Aid	Question 1 (answer in words)	Question 2 (Choose a response by placing an 'X')
17	You must go to the doctor			A lot ▮▮ | A little ▮□ | Not at all □□
17	Taking medicine			A lot ▮▮ | A little ▮□ | Not at all □□
18	Family			A lot ▮▮ | A little ▮□ | Not at all □□