

**Children's attitudes toward interaction with an
unfamiliar peer with little or no functional speech:
Comparing high- and low- technology devices**

by

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Abstract

Augmentative and Alternative Communication (AAC) provides many individuals with little or no functional speech (LNFS) with a means to function within their daily environments and lives. AAC comprises the use of either or both unaided (the individual with LNFS's body) and aided (high- and low-technology devices) methods for communicating. High-technology non-dedicated devices like the iPad™ with Proloquo2Go have changed the future of augmentative and alternative communication.

This study aimed to determine and compare the attitudes of typically developing children towards an unfamiliar peer with LNFS who uses a high-technology non-dedicated communication device, namely the iPad™ with Proloquo2Go (Video 1), and the same unfamiliar peer with LNFS using a low-technology communication board (Video 2). Seventy-eight (78) children between the ages of 9; 00 -12; 11, participated in the study. The participants were divided into two groups and a 2 x 2 crossover design was utilized. Group 1 was required to watch two videos in a specific sequence, one video of an unfamiliar peer with LNFS communicating with the high-technology non-dedicated iPad™ with Proloquo2Go, followed by a video of the same unfamiliar peer with LNFS in a communication interaction using a low-technology communication board. Participants were required to complete a Communication Aid/Device Attitudinal Questionnaire (CADAQ) after viewing each video. Participants in Group 2 watched the same videos in an alternating sequence in order to counterbalance effects of order. Results revealed that the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go was perceived more positively by the participants within certain dimensions of the CADAQ and the possible reasons are described. This is followed by a critical evaluation of the study and recommendations for future research.

Key terms:

Augmentative and alternative communication; inclusion; attitudes; peers; dedicated devices; non-dedicated devices; low-technology devices

Opsomming

Aanvullende en alternatiewe kommunikasie (AAK) voorsien baie individue met min of geen funksionele kommunikasie met 'n middel om in hulle alledaagse omgewing en lewens te funksioneer. AAK bestaan uit die gebruik van 'n ongesteunde toestel (die individu se liggaam) en/of gesteunde (hoë of lae tegnologie) metodes vir kommunikasiedoeleindes. Hoë tegnologie nie-toegewyde toestelle soos die iPad™ met Proloquo2Go, is besig om die toekoms van aanvullende en alternatiewe kommunikasie te verander.

Die doel van die studie was om kinders wat tipies ontwikkel se houdings teenoor 'n onbekende maat met min of geen funksionele kommunikasie wat 'n hoë-tegnologie nie-toegewyde toestel, soos die iPad™ met Proloquo2Go (Video 1), en 'n lae kommunikasietoestel soos 'n kommunikasiebord (Video 2) gebruik, te bepaal en te vergelyk. Agt-en-sewentig (78) deelnemers tussen die ouderdomme van 9;00 en 12;11 het aan die studie deelgeneem. Die deelnemers is in twee groepe verdeel, met 'n 2 x 2 oorkruis ontwerp wat gebruik is. Groep 1 het na twee video-opnames gekyk; een video opname was van 'n kommunikasie-interaksie van 'n individu met min of geen funksionele kommunikasie wat 'n hoë-tegnologiese nie-toegewyde toestel gebruik, gevolg deur 'n ander video van dieselfde individu in 'n kommunikasie-interaksie, terwyl 'n lae-tegnologie kommunikasiebord gebruik word. Die deelnemers is versoek om 'n "Communication Aid/Device Attitudinal Questionnaire (CADAQ)" in te vul nadat hulle elkeen van die video-opnames gesien het. Groep 2 het dieselfde videos besigtig, maar in 'n ander orde. Resultate het getoon dat die hoë-tegnologie nie-toegewyde toestel, naamlik die iPad™ met Proloquo2Go, meer positief in sekere dimensies van die CADAQ is; moontlike redes vir dié bevinding word bespreek. Vervolgens is 'n kritiese evaluasie van die studie aangebied, waarna voorstelle vir toekomstige studies gemaak is.

Terms:

Aanvullende en alternatiewe kommunikasie; inklusiewe onderwys; houding; portuurgroep; toegewyde toestelle; nie-toegewyde toestelle; lae-tegnologie toestelle

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Chapter 1: Introduction

1.1 Introduction

This chapter presents an introduction to and a rationale for the study. The problem statement, outlining the justification for this study, is discussed. An outline of the chapter is provided, as well as a discussion of terminology and abbreviations used throughout this study.

1.2 Problem statement

In South Africa, the education policy has undergone a major paradigm shift since 1994 (Lomofsky & Lazarus, 2001). The education policy recognises the need to move away from a twofold (special and general) education system towards an education system that acknowledges and addresses the diverse needs of all learners (Lomofsky & Lazarus, 2001). The Constitution of the Republic of South Africa (1996) indicated that children with disabilities had the same rights to schooling as typically developing children. The Education White Paper 6 (2001) stated that children with disabilities, including those with little or no functional speech (LNFS), have the right to unrestrictive school environments.

Inclusive education, however, is challenging in part because negative peer attitudes displayed towards children with disabilities create barriers towards the successful integration of these children into mainstream schools (Moore & Nettelbeck, 2013). Typically developing peers often alter their behaviour when in the presence of a child with disabilities; they may become anxious and reduce their amount of social interactions with these children (Bender, 1980).

Despite the complexities of attitudes, it has been found that attitudes can be trained and shifted to a more positive attitude towards children with disabilities (Moore &

Nettelbeck, 2013). Understanding and knowing the variables that influence attitudes may enable interventionists to manipulate the actions and reactions of typically developing children (Beck, Kingsbury, Neff, & Dennis, 2000b; Rosenbaum, Armstrong, & King, 1988). Knowledge about attitudinal influences could mean better peer acceptance which, in turn, could encourage better inclusion of children with disabilities into mainstream school environments (Beck, Bock, Thompson, & Kosuwan, 2002).

Several advantages come to the fore with the integration and inclusion of children with LNFS into mainstream schools. For a child with LNFS who participates within his/her school environments, such participation assists with the development of social relationships, increases mental and physical health and encourages the development of skills needed for inclusion (Raghavendra, Olsson, Sampson, McInerney, & Connell, 2012). The inclusion of children with LNFS in mainstream schools holds the benefit for them to learn and develop various sensory skills, motor skills and communication behaviours (Gilmore, Campbell, & Cuskelly, 2003). Inclusion of children with LNFS in mainstream schools not only allows the development of essential skills needed for today and tomorrow, but also assists with skills that are necessary for their future in a post-school community environment (Towfighty-Hooshyar & Zingle, 1984; Alant, 2007; Voeltz, 1980).

Children with LNFS who use AAC communication devices for interaction and communication purposes in their school environment, face many challenges regarding the use and implementation of these devices. This may be partly due to the attitudinal barriers towards such devices. Attitudes displayed towards high-technology dedicated and low-technology devices have been studied extensively. Most studies, with the exception of Lilienfeld and Alant (2002), did not find a difference between peers' attitudes towards an AAC user communicating with high-technology dedicated devices and one with low-technology devices.

However, the recent widespread technology explosion has created greater awareness within the AAC field of high-technology non-dedicated devices, such as the

iPad™ with AAC software. This raised the question as to whether typically developing children would display an attitudinal difference towards an AAC user who uses a high-technology non-dedicated device, like the iPad™ with Proloquo2Go, and a low-technology device, like the communication board. This study therefore aims to investigate the attitudes that typically developing children hold towards an unfamiliar peer with LNFS who uses a high-technology non-dedicated AAC device, like the iPad™ with Proloquo2Go compared to the low-technology communication board, since the iPad™ with AAC software might encourage improved peer interaction and inclusion.

1.3 Outline of chapters

Chapter 1 provides a brief introduction and rationale for this study. This is followed by an outline of each chapter, an explanation of important terminology and abbreviations that are used in this report.

Chapter 2 presents a comprehensive discussion of the literature related to this study, culminating in a motivation for the study. It discusses the importance of inclusion for children with LNFS and the attitudinal barriers that these children face. It defines attitudes and describes the influence that negative attitudes may have on children with LNFS; furthermore, it provides detailed descriptions of previous studies done on attitudes towards children with LNFS. This chapter also discusses the impact that AAC devices have had on attitudes and the opportunities that high-technology non-dedicated devices might hold for children with LNFS.

Chapter 3 presents a detailed description of the methodology of the study. The main aim, sub-aims and research design implemented within the study are discussed. The results of the pilot study are presented, including the recommendations made for the implementation of the main study. Subsequently, the main study is discussed in terms of the selection criteria for participants', the data collection procedures and the equipment and materials utilized for the study. Finally, data analysis and the reliability and validity of the study are described.

Chapter 4 illustrates and discusses the results. The results are graphically presented in accordance to the sub-aims set out within the study and followed by a discussion of the results.

Chapter 5 provides a summary of the clinical and theoretical implications of the study. It provides a critical overview of the study, highlighting its strengths and limitations. Recommendations for future research are also made.

1.4 Terminology

Augmentative and alternative communication (AAC)

In this study, the term *augmentative and alternative communication (AAC)* means: “The supplementation or replacement of natural speech and/or writing using aided and/or unaided symbols. The use of aided symbols requires a transmission device whereas the use of unaided symbols requires only the body. The field or area of clinical/educational practice to improve the communication skills of individuals with Little or No Functional Speech (LNFS)” (Lloyd, Fuller, & Arvidson, 1997, p. 524).

Little or no functional speech (LNFS)

Little or no functional speech (LNFS) refers to individuals who are unable to produce intelligible speech or who are only able to produce 15 or less intelligible words (Cantwell & Baker, 1985).

Attitudes

An *Attitude*, as defined by Triandis (1971, p2), is an “idea charged with emotions which predisposes a class of actions to a particular class of social situations”. *Attitudes* are a way of thinking and may be conceptualized as a learned tendency to respond either positively or negatively to certain objects, situations, institutions, concepts, or persons. As implied by this definition, *attitudes* possess cognitive, affective, and behavioural components (Aiken, 1996). The cognitive component refers to the beliefs, knowledge

and expectations of an individual; the affective component refers to the motivational and emotional factors of attitudes; and the behavioural component refers to the behaviour and action created by the cognitive and affective components.

High-technology AAC devices

High-technology AAC devices are systems that use batteries, electricity and electronics to function. These devices can either be dedicated (designed for communication purposes only) or non-dedicated (multiple purposes and not designed for communication alone). *High-technology AAC devices* are also referred to as speech generating devices (SGD) which consist of various voice outputs (Baxter, Enderby, Evans, & Judge, 2012). These devices are usually computerised and have storage and retrieval capabilities of messages (Beukelman & Mirenda, 2013).

Low-technology AAC devices

Low-technology AAC devices are defined as AAC systems that do not require batteries, electricity or electronics. They include communication books or boards with written letters, words, phrases, symbols or pictures (Baxter et al., 2012).

Communication board

A *communication board* is a non-electronic device. It is a commonly used low-technology device without voice output. A *communication board* may have letters, words, phrases, pictures, symbols or line drawings, depending on the individual with LNFS (McGregor, Young, Gerak, Thomas, & Vogelsberg, 1992; Wood, Lasker, Siegel-Causey, Beukelman, & Ball, 1998).

Dedicated AAC devices

Dedicated AAC devices are usually high-technology devices and are known as communication devices designed for the sole purpose of communication. They usually have speech generation and do not have any other application purposes other than for communication (Wilkinson & Hennig, 2007; Beck, Thompson, Kosuwan, & Prochnow, 2010; Beukelman & Mirenda, 2013).

Speech generating devices (SGD)

Speech generating devices (SGDs) are devices that provide speech in either a synthetic (computer generated) or digital (pre-recorded voice) format and are also known as a voice output communication aids (VOCA) (Beukelman & Mirenda, 2013). They have text-to-speech capabilities in which alphabets, numbers, words and graphic symbols are entered from an input such as a keyboard. Software can be used on standard, personal computers and laptops that provide speech output. *SGDs* allow messages to be created and spoken when selecting the required symbols (Koul, 2003; Gonzales, Leroy, & De Leo, 2009; Baxter et al., 2012).

Non-dedicated AAC devices

Non-dedicated AAC devices are not solely designed for communication purposes. These devices could, through adaptations, such as loading AAC communication software onto it, be used as an AAC communication system. The hardware of the *non-dedicated AAC devices* is often a desktop, laptop or tablet computer that is used as a multi-purpose system (Glennen & DeCoste, 1997).

iPad™

The Apple *iPad™* is a multi-functional mobile technology device and can offer options, not for communication only, but also for Internet access, education, social interaction, entertainment, gaming, and information (Light & McNaughton, 2014). The *iPad™* with AAC software is an example of a high-technology non-dedicated AAC device.

Proloquo2Go

Proloquo2Go is an AAC software application programme that can be downloaded onto the iPhone™, iPod™ and iPad™ (Niemeijer, Leopold, Marden, de Wit, Barnick, & Harris, 2008-2013). *Proloquo2Go* is highly customizable and has a vocabulary of 7000 words organized into various categories. It has a message/text window and a variety of voice options for the synthesised voice output (Vass, 2010). It was designed for use on high-technology non-dedicated devices, such as the iPad™ in order to provide an easy to

use, affordable and portable communication solution for persons with LNFS.

1.5 Abbreviations

AAC Augmentative and alternative communication

CADAQ Communication Aid/Device Attitudinal Questionnaire

CATCH Chedoke-McMaster Attitudes toward Children with Handicaps scale

LNFS Little or No Functional Speech

VOCA Voice output communication aid

1.6 Summary

This chapter outlined the problem statement and rationale for the study. It provided a justification for this study by highlighting the need for attitudinal studies. The content of each chapter was outlined, terminology defined and abbreviations used in this study were provided.

Chapter 2: Literature review

2.1 Introduction

This chapter provides an orientation and review of the literature related to this study. It describes the inclusion of children with little or no functional speech (LNFS) in schools and the role that attitudes play regarding such inclusion. It provides a definition of attitudes and a discussion of its components. The role that negative attitudes may have on successful inclusion of children with LNFS in schools is discussed. This is followed by a discussion of attitude studies on children with disabilities and studies that specifically focus on attitudes towards children who use AAC. The significance of technology is described in terms of its application to AAC. The rationale for investigating the attitudes of typically developing children towards children with LNFS who use high-technology non-dedicated communication devices, in particular the iPad™ with Proloquo2Go versus a low-technology communication board, is discussed.

2.2 Inclusion

Inclusion can be described as the situation where children with disabilities, including those with little or no functional speech (LNFS) (children who are only able to produce 15 or fewer intelligible words), are integrated into a mainstream school environment. Inclusive education implies including children with disabilities full-time in an age appropriate, regular classroom and providing them with the support needed for full participation in all teaching and learning activities, similar to that of their typically developing peers (Soto, Müller, Hunt, & Goets, 2001). Farrell (2004) stated that an educationally inclusive school is a school where learning and teaching success, attitudes and the well-being of every child matters. A key outcome of inclusion would be participation in both academic and non-academic activities.

The Participation Model is one model that can be used as a framework to assess the participation of individuals with LNFS who use Augmentative and Alternative

Communication (AAC) (Beukelman & Mirenda, 2013). This framework can be implemented as a useful tool to determine appropriate targets for the participation of individuals who use AAC. It guides decision making regarding the participation patterns, access and opportunity barriers and communication needs within the everyday lives of children with disabilities. The Participation Model provides a systematic process for conducting AAC assessment and for designing intervention that is based on the functional participation requirements of typically developing peers (Beukelman & Mirenda, 2013). All aspects included in the Participation Model contribute to an integrated intervention plan, based on the current and future needs of the child with LNFS (Beukelman & Mirenda, 2013).

The Participation Model highlights numerous factors that play a critical role in the participation of children with LNFS in school activities. Attitudinal barriers, where the attitudes and beliefs held by an individual present a barrier to participation, has been identified as one of the important factors influencing the inclusion and interaction of children with LNFS (Beukelman & Mirenda, 2013). The negative beliefs held by others towards individuals with LNFS may result in reduced expectations and less communication opportunities for an individual with LNFS (Beukelman & Mirenda, 2013).

2.3 Attitudes

Attitude is defined by Triandis (1971, p.2) as an “idea charged with emotions which predisposes a class of actions to a particular class of social situations”. Attitudes represent a way of thinking that is established through experiences; this in turn influences an individual’s response towards a certain situation, object or person (Aiken, 1996). The tendency to respond either positively or negatively towards a circumstance, an individual, a notion or an entity typically indicates an individual’s attitude (Aiken, 1996).

Aiken (1996) discussed three components of attitudes, namely values, opinion and beliefs. Values are seen as the feelings held towards ideals or customs; it is indicative of

the worth attached to a particular activity or objects and can be seen as a motivator of collective or individual behaviours (Aiken, 1996). Opinion is the judgment of a person or entity with respect to character. It is the conscious expression of attitudes; these may be learned through direct personal experience or from family members and friends who affect the way in which an individual responds (Aiken, 1996). The third component, beliefs, is the confidence in the truth or the existence of something; it is less certain than knowledge, but more certain than opinions (Aiken, 1996).

Other researchers discussed attitudes as comprising the cognitive, affective and behavioural components (Eagly & Chaiken, 1993; Nowicki & Sandieson, 2002; Trandis, 1971; Saxe, Carey, & Kanwisher, 2004). The cognitive component of an attitude refers to the beliefs, knowledge and expectations of an individual and it governs one's perception and influences one's behaviour (Muran, 1991). The behavioural component of attitude includes the individual's behaviour, action or response towards his/her beliefs (Kuiper & MacDonald, 1983). The cognitive component of attitudes determines an individual's overall emotional reaction (Beck, Fritz, Keller, & Dennis, 2000a), whereas the affective component of attitude expresses the motivational and emotional state that is created within an individual.

Theorists who have studied attitude, and the action or behaviour exhibited due to an attitude and the impact that it has on the success of inclusion (Silinger, Sherrill, & Jankowski, 2000) have reached a general consensus that attitude studies should be based on certain concepts. Attitudes are learned through complex experience with multiple components. They are stable and resistant to change, they have a specific social object as a referent, they have varying degrees of motivation and direction and attitudes are manifested through behaviour (Anthonak & Livneth, 1988).

Attitudes may be blatant at times, but are usually more subtle because they may not always be acceptable in mainstream society (Beukelman & Mirenda, 2013). Attitudes of typically developing children towards children with disabilities are often learned stereotypes. The beliefs of the peers of typically developing children are found to

be very strong predictors and influencers of attitudes (Rosenbaum et al., 1988) that creates a barrier towards successful inclusion (King, Rosenbaum, Armstrong, & Milner, 1989; Voeltz, 1980). Stereotyping is the product of the beliefs concerning the personal characteristics of a group of people; it facilitates prejudice and serves as a precursor and supporter of discrimination (Aiken, 1996).

The roles of negative attitudes, has an adverse effect on children with disabilities, since these children respond to the behaviour and the expectations of others (Bender, 1980). Children with disabilities who feel rejected are at risk for academic failure, have a low self-esteem and experience problems in the area of interpersonal relationships (Beck et al., 2000a). Negative attitudes create limitations for interventionists who endeavour to integrate children with disabilities into mainstream schools (Blockberger, Armstrong, O'Connor, & Freeman, 1993; King et al., 1989).

2.4 Attitudes towards children with disabilities

Various studies have investigated the attitudes of typically developing children towards their peers with disabilities (Beck et al., 2000a; Beck et al., 2000b; Blockberger et al., 1993; King et al., 1989; Voeltz, 1980). In a study conducted by Voeltz (1980), the researcher determined typically developing children's attitudes towards their peers with a disability in an integrated classroom setting. A sample of 2,392 Grade two to Grade seven students was gathered to conduct an attitude survey and a factor analysis using an acceptance scale on the responses (Voeltz, 1980). Results revealed that upper-elementary children, girls and peers with the most contact with children with disabilities expressed the most accepting attitudes (Voeltz, 1980). These results also suggested that children's attitudes should be modified and intervention programs developed to facilitate social acceptance in integrated school settings (Voeltz, 1980).

Another study examined the attitudes and behaviour of children toward peers with physical disabilities (Roberts & Smith, 1999). One-hundred-and-eighty-eight (188) participants aged 8 to 12 years were involved. Interactional behaviour was assessed

using self-reported measures (Roberts & Smith, 1999). Results indicated that children's attitudes and perceived behavioural control were significant predictors of their intention to interact with a child with a physical disability (Roberts & Smith, 1999). Studies done on the attitudes towards children with disabilities revealed that the attitudes of typically developing children and their values are strong predictors of their behavioural intentions, which are usually similar to that of their parents and teachers (Rosenbaum et al., 1988; King et al., 1989).

In order to investigate the determinants of the attitudes and behavioural intentions of primary school children towards a peer with a physical disability, the researchers found (Roberts & Lindsell, 1997), through the completion of an attitude questionnaire and a behavioural intention scale, that children's beliefs governed their attitudes and that their attitudes guided behaviour. This behaviour predicted their behaviour towards children with physical disabilities.

A synopsis is provided by Bender (1980) of typically developing children who altered their behaviour in the presence of children with disabilities. It was noted that typically developing children displayed anxiety, were self-conscious, reduced their eye contact and had shorter conversations. This behaviour displayed by typically developing children restricts children with disabilities in terms of opportunities to learn new behaviours and adaptive roles (Bender, 1980).

Various factors have been found to influence attitudes, including the type or nature of disability, gender, age, familiarity and communication abilities (Beck & Dennis, 1996; Beck et al., 2000b; Blockberger et al., 1993; King et al., 1989; Moore & Nettelbeck, 2013). Children who had intellectual disabilities without a physical disability (Beck & Dennis, 1996; Roberts & Lindsell, 1997) were perceived more positively than children with physical disabilities were. In contrast, however, Nowicki (2006) reported that students were least positive towards peers with intellectual disabilities than towards peers with physical disabilities. Children who had a higher level of reading comprehension (Blockberger et al., 1993) were also perceived more positively than

children who had a lower level of reading comprehension.

Numerous studies found that girls held more positive attitudes towards children with disabilities than boys did (Blockberger et al., 1993; Beck et al., 2002; Beck & Dennis, 1996; Beck et al., 2000a; Beck et al., 2000b; Gorenflo & Gorenflo, 1997; Lilienfeld & Alant, 2002; Rosenbaum et al., 1988; Voeltz, 1980). In addition, younger children were more positive than older children were (De Boer et al., 2012; Swaim & Morgan, 2001). Beck et al. (2000a) noted that acceptance, which is related to cognitive growth and greater consideration towards others, was the reason that age related to attitudes followed a developmental trend.

Negative attitudes displayed towards children with LNFS are not limited to typically developing peers only; it has been found that teachers also display a more negative attitude towards children with LNFS (Bornman & Donohue, 2013) when compared to children with attention-deficit and hyperactivity disorder respectively. A multitude of factors may influence participation of children with LNFS within a mainstream environment, such as the characteristic of the individual who uses AAC, the characteristics of the communication partner and the AAC system that is implemented (McCarthy & Light, 2005).

2.5 Attitudes towards the use of AAC devices

The characteristics of an AAC system vary due to the uniqueness of the AAC users. Children with LNFS communicate using a variety of aided (relying on systems outside the body) and unaided AAC (relying on the body to convey a message, facial expressions, gestures and signs) systems (Baxter et al., 2012). The multimodal approach is the combination of aided and unaided communication modalities to facilitate communication competence in an AAC user.

Communicative competence has been defined by Light (1989) as being functional in daily communication and having sufficient knowledge, judgment and skills to

communicate. Communication competence for AAC users involves the operational (the understanding and appropriate use of an AAC device), strategic (understanding the need for repair following a communication partner's expressed difficulty with comprehending a response), linguistic (understanding words and phrases needed during a conversation) and social (understanding turn taking when in a conversation) competencies (Light, 1989; Light & McNaughton, 2014). These researchers further argued that AAC users who were communicatively more competent were able to partake within the communication process.

Children who were perceived as being more communicatively competent, were perceived more positively than children who were not perceived as being communicatively more competent (Beck & Dennis, 1996; Beck et al., 2002; Blockberger et al., 1993; King et al., 1989; Schlosser, 2003). Communication competence is likely to contribute to more frequent and diverse opportunities for participation in everyday life (Clarke, Newton, Griffiths, Price, Lysley, & Petrides, 2011).

Research indicates that communication competence is influenced by contextual variables, partner variables and variables in the AAC systems employed (Light, 1988). Aspects that may influence communication interaction include the features of an AAC device, the characteristics and attitudes of the individual using an AAC device and the characteristics of the communication partner, comprising their attitudes and perceptions (Calculator, 1999). It has been found that communication partners often dominated conversations, indicating a critical need to increase knowledge about the interaction processes and the features of an AAC system (Lilienfeld & Alant, 2002).

The features of high-technology dedicated AAC devices, for e.g. synthesized or digital voice output and message length, influence attitudes. It has also been noted that communication partners' perception of an AAC user usually become more positive as the conversational rate increases (Todman, 2000). Research on attitudes towards the characteristics of AAC systems used by children with LNFS, found that typically developing peers were more positive towards high-technology dedicated AAC devices

that record or display longer messages, phrase lengths and sentences (Beck et al., 2000b; Beck et al., 2002; McCarthy & Light, 2005; Schlosser, 2003), rather than single words.

The use of SGDs (synthetic or digital voice output) holds numerous advantages for children with LNFS. SGDs' synthetic or digital voice output assists with communicating more effectively and decrease the effect of developmental delays (Wendt & Lloyd, 2011); they also improve the communication skills of children with LNFS (AAC-RERC, 2011; Blischak, Lombardino, & Dyson, 2003; Drager, Light, & McNaughton, 2010; Ronski, 2005); and results in fewer self-injurious behaviours or acting out behaviours with the implementation of SGDs (Blockberger et al., 1993; Drager et al., 2010; Flores, Musgrove, Renner, Hinton, Strozier, Franklin, & Hil, 2012; Law, Plunekett, & Stinger, 2012; Light & Drager, 2007). SGDs increased the range of communication and allowed a more flexible means of implementation, such as communicating over the telephone or from another room (Bunning, Heath, & Minnion, 2009; Raghavendra & Allan, 1993). SGDs are functional and meaningful, it improved these children's ability to be involved in family life and social environments and in situations that allowed the development of intimate relationships and improved their confidence and self-esteem (Beukelman & Mirenda, 2013; Granlund, Björk-Åkesson, Wilder, & Ylven, 2008; Johnston, Reichle, & Evans, 2004; Light & McNaughton, 2012; Sellwood, Wood, & Raghavendra, 2012; Sigafos, 2010).

Studies investigating the influence of SGDs found that communication partners' perceptions of the individual with disabilities were positively influenced with the use of SGDs and that increased communication initiations were encouraged (Blischak et al., 2003; Blockberger et al., 1993; Flores et al., 2012; Lilienfeld & Alant, 2002; Schepsis & Reid, 1995; Schlosser, 2003). A study on the influence of digital voice output found that the digitised voice could facilitate higher cognitive language functioning and that, with voice output, there were more frequent—and a greater variety of—questions initiated by the communication partner (Bornman, Alant, & Meiring, 2001). The influence of speech generating devices (SGD) on the attitudes of typically developing children has also been investigated by Lilienfeld and Alant (2002), who found that typically developing children

had more positive attitudes towards a synthesized speech generating device (high-technology dedicated AAC device) when compared to a low-technology device without voice output.

2.5.1 Attitude towards the use of dedicated AAC devices

Many research studies have been conducted on adults' and children's attitudes towards children with LNFS who use AAC devices. A literature search was conducted to identify studies investigating attitudes towards AAC devices. The platform used for article searches were EbscoHost and the databases used were Google Scholar and Tailor and Francis Online.

Parameter searches used for the articles included: AAC, device*, child*, disab* and attitude* (10 articles found), child*, attitude*, AAC (34 articles found) were used for alternative means to display, typical* child* attitude* towards disab* (22 articles found), high- technolog* device* and AAC (14 articles found), attitude* towards AAC device* (13 articles found). Extensive searches where used with no limitations placed at first on publication dates. Later, searches were limited to publication dates from 1993 to 2014. From these studies, articles were selected that (a) were published in peer review journals; (b) quantitative in nature (excluding reviews); (c) compared two or more AAC devices; (d) used alternative means to display the person with LNFS; and (e) used a measurement instrument to determine attitudes. Studies excluded were (a) qualitative in nature; (b) those older than 1993; and (c) those that were repeated. Table 2.1 outlines the studies that were identified during the search.

Table 2.1

Summary of Attitudinal Studies in AAC

Title and author	Aim	Participants	Measurement	Devices/Strategy	Procedure/Design	Findings
Children's attitudes towards a non-speaking child using various AAC techniques Blockberger, Armstrong, O'Connor, and Freeman, (1993)	Attitudes of children towards a non-speaking child using three different AAC devices were explored.	249 students, 124 males and 125 females	Chedoke-McMaster Attitudes towards Children with Handicaps (CATCH) scale.	1)Unaided: Signed English, Finger Spelling and Vocal Verbal Approximations; 2)Low-technology: Alphabet Board; 3)High-technology: Talking Computer (ACS Epson HX-20 with digital voice output)	In this descriptive research design, fourth-grade children viewed videotapes showing a child communicating using either an aided electronic technique, an aided non-electronic technique, or an unaided technique.	Attitudes that were more positive were exhibited by girls and children who have had experience with disabled children. No difference in attitudes was found between groups viewing the three different AAC communication techniques. Children with high reading levels were viewed more positively than those with low reading level.
Attitudes of children towards a similar aged child who uses AAC Beck and Dennis, (1996)	To assess the attitudes of fifth graders towards a similar aged child who used augmentative communication	186 children in Grade five	CATCH	1)Low-technology: Alphabet Board; 2)High-technology: Touch Talker	In this descriptive survey, one group watched a video of a non-electronic device and the other group watched the high-technology device video.	Children in integrated schools were more positive than those in that were not integrated. Girls were found to be more positive. Results indicated that there was no attitude difference between the uses of the two devices.
Effects of synthetic speech, gender, and perceived similarity on attitudes towards the augmented communicator Gorenflo and Gorenflo, (1997)	To investigate the effects of gender of augmented communicator, listener gender, and perceived similarity on the attitudes of non-disabled individuals towards an augmented communicator	95 students (69 females and 26 males)	Attitudes Toward Nonspeaking Persons Scale (ATNP)	Voice Synthesizer: DECTalk™	A 2x2 factorial design was implemented. Subjects were randomly assigned to one of the four cells created by the factorial combination of gender of augmented communicator and gender of synthetic voice. For analysis, gender of participant was included as a third variable.	Greater perceived similarity had a more positive impact towards the augmented communicator. Greater similarity produced attitudes that were more favourable when the gender of the listener and augmented communicator matched. There were no effects regarding gender of synthetic voice on the attitude scale.
Attitudes of school-aged	To develop a	174 children,	Assessment of Attitudes	1)Low-technology:	Groups watched a video on	Developmental trends with age

<p>children towards their peers who use augmentative and alternative communication Beck, Fritz, Keller, and Dennis, (2000^a)</p>	<p>reliable and valid tool for measuring the attitudes of elementary school-aged children in Grades 1 to 5 towards their peers who used AAC. The developed tool was used to determine the influence of the type of AAC technique used and the physical ability status of the AAC user on children's attitudes. To determine if developmental trends were apparent in children's attitudes</p>	<p>Grade 1 (24 boys, 34 girls), Grade 3 (27 boys, 36 girls) and Grade 5 (23 boys, 30 girls) 2nd study: 128 children, Grade 1 (16 boys, 24 girls), Grade 3 (15 boys, 30 girls) and Grade 5 (20 boys, 23 girls)</p>	<p>Toward Augmentative/Alternative Communication (AATAAC)</p>	<p>Non-Electronic: Picture Communication Board; 2)High-technology: Electronic Voice Output Device: DeltaTalker™</p>	<p>assistive technology which portrayed children using AAC techniques in school and community. Some AAC users in video had physical disabilities and others not in order to portray the diversity of AAC users. Children completed a series of questionnaires. Same experimenter procedures were used as in Study 1 and Study 2; with the exception that one classroom at each grade level was randomly chosen to view the non-electronic videotape and the other classroom viewed the electronic videotape.</p>	<p>were apparent. Grade 1 boys were more positive than girls, Grade 3 and 5 girls more positive than boys were.</p>
<p>Influence of length of augmented message on children's attitudes towards peers who use AAC Beck, Kingsbury, Neff, and Dennis, (2000b)</p>	<p>The influence of conversational phrase length on the attitudes of two groups of grade-school children (i.e., those familiar and unfamiliar with children with LNFS) was studied.</p>	<p>172 children divided into 2 groups</p>	<p>AATAAC</p>	<p>Electronic Voice Output: DeltaTalker™</p>	<p>In this descriptive design, unfamiliar children viewed a videotape of a child communicating with two-to four word augmented messages.</p>	<p>Girls were found to be more positive than boys were. The unfamiliar children who saw a video with a child communicating with two – to four word messages displayed a more positive attitude than the children who only saw the video tape of a child communicating with one-word messages.</p>
<p>Influence of communicative</p>	<p>How components of communicative</p>	<p>Children, 67: Two groups of</p>	<p>The AATAAC.</p>	<p>1)Low-technology: Communication</p>	<p>A 2x2 factorial design between groups of fourth- and</p>	<p>There was no significant effect found within grade levels</p>

<p>competence and AAC technique on children's attitudes towards a peer who uses AAC Beck, Bock, Thompson, and Kosuwan, (2002)</p>	<p>competence and AAC technique used by a child who used AAC influenced the self-reported attitudes of peers.</p>	<p>Grade 4 children (18 boys and 17 girls) and two groups of Grade 5 children (13 boys and 19 girls)</p>		<p>Board; 2)High-technology: Static Screen Voice Output Device namely the DeltaTalker™</p>	<p>fifth grade children. Groups observed videotapes of a child using AAC. Children were assigned to four videotape conditions which varied according to the AAC technique used and the child's competence.</p>	<p>regarding devices used or communication competence of children who use AAC. Significant effect found for gender, with girls being more positive than boys were. There was no significant effect found within grade levels with devices used or on communication competence. No significant interaction between variables found. Low-technology device no different that high-technology. High competence not different from low competence.</p>
<p>A comparative study of the attitudes of teachers at special and educationally inclusive schools towards learners with little or no functional speech using communication devices Dada and Alant, (2001, 2002)</p>	<p>To determine and compare educationally inclusive and special school teachers' attitudes towards learners with little or no functional speech using two augmentative and alternative communication devices, namely a digital speaker and a communication board</p>	<p>Teachers (28), from four schools</p>	<p>After each viewing, teachers' attitudes were measured using the TAS.</p>	<p>1)Low-technology: Communication Board; 2)High-technology: AlphaTalker™</p>	<p>Teachers were divided into two random groups. Group 1 viewed a video showing a learner communicating using a low-technology communication device, followed by watching the same video of the communication board a week later. Group 2 teachers watched a video of a learner communicating first with the low-technology communication device and the high-technology communication device.</p>	<p>Results indicated that teachers were generally more positive towards the learner using the AAC device, irrespective of the type of device. There was no significant difference in teachers' perceptions of the devices. Both technologies were perceived as appropriate indicating the possibility of such technologies being used in the classroom.</p>
<p>Attitudes of children towards an unfamiliar peer using an AAC</p>	<p>To determine the impact of voice output and the</p>	<p>115 children</p>	<p>CADAQ</p>	<p>1)Low-technology communication board.</p>	<p>In this descriptive research design children were divided into 2 groups, with each</p>	<p>Girls were found to be more positive than boys. Attitudes were found to be more</p>

<p>device with or without voice output Lilienfeld and Alant, (2002)</p>	<p>characteristics of a child using an AAC system on the attitude of unfamiliar peers. Describing the CADAQ that was used to measure the attitudes towards an unfamiliar peer using an AAC device</p>			<p>2)High-technology DeltaTalker with VOCA.</p>	<p>group viewing the same video and the only variable is the voice output from the one device.</p>	<p>favourable towards the DeltaTalker with voice output.</p>
<p>South African Teachers' Attitudes toward Learners with Barriers to Learning: Attention-deficit and hyperactivity disorder and little or no functional speech Bornman and Donohue (2013)</p>	<p>To examine teachers' attitudes toward learners with two types of barriers to learning: a learner with attention-deficit and hyperactivity disorder (ADHD), and a learner with little or no functional speech (LNFS).</p>	<p>118 teachers</p>	<p>Modified Teachers Attitudinal Scale (TAS)</p>	<p>Two written vignettes were developed for the purpose of this study. One depicts a learner with ADHD and the other a learner with LNFS who uses a communication board. The vignettes were constructed to highlight the differences in communication and classroom interaction between these two types of learners.</p>	<p>A comparative cross-over design was used to address the aims of this study. Participants first completed a biographical questionnaire, and then were given the vignettes along with the Modified Teacher Attitude Scale. A separate Modified Teacher Attitude Scale was completed after each vignette. Participants were randomly assigned to receive Vignette A or Vignette B first in order to counterbalance potential order effects.</p>	<p>The results indicated that although teachers reported that, the learner with ADHD would be more disruptive in class and have a more negative effect on the classroom climate, they overwhelmingly favoured inclusion of this learner over the learner with LNFS.</p>

The seminal studies that focused solely on determining the attitude of children towards a similar aged non-speaking peer with a physical disability who uses AAC devices was conducted on a sample of 186 Grade five children (Beck & Dennis, 1996). These children were divided into two groups. Attitudes towards a similar aged non-speaking peer with a physical disability who used AAC technology were determined after the viewing of two videos. The first group of participants viewed a video of a child using a low-technology communication device, namely an alphabet board, after which the second group viewed a video of a child using a high-technology dedicated AAC device, namely an electronic Touch Talker. The participants subsequently completed a Chedoke-McMaster Attitudes towards Children with Handicaps scale (CATCH) (Beck & Dennis, 1996). Results revealed that there was no significant attitudinal difference between the two groups of participants who viewed the high-technology dedicated and low-technology devices (Beck & Dennis, 1996).

Beck et al. (2002) notes that a possibility exists that typically developing children view the communicative competence of a peer who uses AAC more favourably when he/she implements a sophisticated SGD (synthetic or digital voice output) communication device. Therefore, sophisticated high-technology non-dedicated AAC devices could compensate for the typically developing peers negative perceptions and lack of communicative competence.

In another study on the influence of communication competence and AAC techniques on children's attitudes towards a peer who used AAC (Beck et al., 2002), 67 children from Grades four and five were divided into two groups. These groups viewed videos of a child using a low-technology communication board and a high-technology voice output device, a DeltaTalker™ (Beck et al., 2002). After viewing these videos, the children completed an Assessment of Attitudes toward Augmentative/Alternative Communication (AATAAC) (Beck et al., 2002). The results of this study revealed no attitudinal difference or a preference displayed towards a specific high-technology dedicated device and a low-technology device (Beck et al., 2002).

The two previously mentioned studies were conducted in the USA. A similar study was conducted in South Africa in which the attitudes of 127 children aged 11;00 – 13;00 towards an unfamiliar peer with LNFS who used a high-technology dedicated device and a low-technology communication board (Lilienfeld & Alant, 2002) were determined. The children were divided into two groups. One group viewed a video of a child with LNFS using a low-technology communication board and the other group viewed a video of the same child using a high-technology dedicated device, the DeltaTalker™ (Lilienfeld & Alant, 2002). After viewing the videos, the children completed the Communication Aid/Device Attitudinal Questionnaire (CADAQ). The findings of this study indicated that there was a more positive attitude towards the unfamiliar peer using the high-technology dedicated AAC device when compared to the low-technology communication board (Lilienfeld & Alant, 2002).

From the studies outlined and discussed in Table 2.1 it is evident that high-technology dedicated devices and low-technology devices did not show any attitudinal differences among typically developing peers towards a child with LNFS, with the exception of the findings of Lilienfeld and Alant (2002). Possible reasons for Lilienfeld and Alant's (2002) findings could be that a) the measuring instrument (CADAQ) which was implemented was more sensitive for the measurement of attitudes towards AAC devices in typically developing children; and b) high-technology dedicated AAC devices were relatively new in South Africa.

High-technology dedicated devices naturalness, intelligibility and individualization have been further cited as challenges (Patel & Roden, 2008). In addition, high-technology dedicated AAC devices were found to not have the necessary computing power; they have low volume sales, making them costly and there is always a risk of the high-technology dedicated AAC device being discontinued resulting in inadequate maintenance services (AAC RERC, 2011).

High-technology dedicated AAC devices are found to be large, heavy, and expensive and some even label them as being socially awkward (Hayhoe, 2012). High-

technology dedicated AAC devices pose special challenges in the field of AAC in developing countries like South Africa. Inadequate resources, limited support for these technologies, lack of human resources for training and for the maintenance of high-technology dedicated AAC devices are some of the limitations reported (Alant, 2007). There is a need for AAC devices that are affordable, relevant and adequate in a developing country (Alant, 2007), like South Africa. Limitations of an AAC device come to the fore when AAC users find that the device does not provide equal communication opportunities (Gonzales et al., 2009). It was found that children with disabilities were more interested in devices that fit in with them and their peers (Gonzales et al., 2009).

Recently developed technologies opened novel opportunities for education and learning as a social process (Solomon & Almog, 1998). There is a need for a highly appealing and integrated device with multiple functions and dynamic features that is visually appealing and that enhances social integration (Soto et al., 2001). Technology needs to address a wide range of needs for children who require AAC (Higginbotham, Shane, Russel, & Caves, 2007), because it may shape or inhibit interactions, shape perceptions of communication competence, enable social accomplishments and facilitate social interactions (Bedrosian, Haog, & McCoy, 2004). Children who use AAC are exposed to technology that is creating a rapidly increasing acceptance of high-technology non-dedicated AAC devices (Abbot, Brown, Evett, Standen, & Wright, 2011).

2.5.2 High-technology non-dedicated AAC devices

Apple™ is at the forefront when it comes to high-technology non-dedicated communication devices that are affordable and easy to purchase off the shelf (Hager, 2010). With the iPad™ and the implementation of the Proloquo2Go, which is a portable AAC application with voice output applications that can be downloaded onto the iPad™ (Vass, 2010), a high-technology non-dedicated AAC communication device is created. Proloquo2Go is an AAC software programme that assists with the communication process for individuals with LNFS. Proloquo2Go has also been found to be an AAC

application that encourages verbal communication for individuals with LNFS due to its available verbal prompt delay settings (Gavrilis, 2014).

This high-technology non-dedicated device allows the freedom of a cost effective, light, mobile and socially accepted high-technology non-dedicated communication device that enables communication anywhere and at anytime without drawing unwanted attention to the communication device (Watson Hyatt, 2011). The iPad™ with AAC software, is reported to be ground breaking educational tool and might be an acceptable form of AAC for AAC users.

The recent introduction of the iPad™ with AAC software has resulted in a rapid and widespread impact on communication (McNaughton & Light, 2013). McNaughton and Light (2013) reported that the availability and the portability of the iPad™ has made it a powerful high-technology device which is changing how we learn and work. This revolution not only impacts on typically developing children, but has also had a tremendous and dramatic effect on children who require AAC (McNaughton & Light, 2013). McNaughton and Light (2013) stated that mobile technologies, like the iPad™ with AAC software hold a number of potential benefits, including an increased awareness and social acceptance of AAC, greater consumer empowerment in accessing AAC solutions and an increased adoption of AAC technology. It is becoming more visible, particularly with speech synthesis that is currently providing an opportunity for meeting the needs of children with LNFS (Arthanat, Curtin, & Knotak, 2013).

High-technology non-dedicated communication devices, like the iPad™ with various software applications, can be implemented within the educational process allowing better learning (Rodrigues-Fortis, Fernandes-Lopez, & Rodriguez, 2011). Furthermore, its mobile capabilities enable the use of this technology anywhere and at anytime (Rodrigues-Fortis et al., 2011). These researchers also found that it assisted with integration into social environments and that AAC users were taking ownership of the use of their high-technology non-dedicated communication devices (Rodriquez-Fortis et al., 2011). With greater consumer empowerment and increased social awareness and

acceptance of high-technology non-dedicated AAC devices by children who require AAC, the iPad™ with AAC software has the potential to motivate and enhance social interaction (McNaughton & Light, 2013).

For people who use AAC, this shift towards the use of the iPad™ with Proloquo2Go means affordability (Flores et al., 2012; Hayhoe, 2012; McNaughton & Light, 2013) and usefulness (Chappel, 2011; Hayhoe, 2012), portability (Chappel, 2011; Flores et al., 2012; Hayhoe, 2012; Hu, 2011). It is easy to use, regardless of location or time (Flores et al., 2012; Rodriguez-Fortis et al., 2011). These are important considerations in developing countries, like South Africa, where high-technology dedicated devices face specific challenges. This system has the potential to affect AAC and the field of assistive technology significantly, because the iPad™ with AAC software fits into the current technological society (Hayhoe, 2012). It is attractive, empowering and appealing to peers (Chappel, 2011) and can guide the future course of AAC (Higginbotham & Jacobs, 2011; Zang & Betts, 2012). With the implementation of the iPad™ with AAC software, researchers found that more communication behaviour was initiated (Arthanat et al., 2013; Flores et al., 2012); it was also found to be appealing (Flores et al., 2012; Hayhoe, 2012; Hu, 2011), it met a variety of needs (Vass, 2010), it was convenient (Flores et al., 2012) and could be customized (Zang & Betts, 2012). The iPad™ with Proloquo2Go is accepted by peers (Flores et al., 2012; Hayhoe, 2012), has a variety of settings (including white on black writing) (Hayhoe, 2012), zoom capabilities (Hager, 2010; Hayhoe, 2012; Hu, 2011), cognitive simplicity, an intuitive touch interface (Hu, 2011) and a ‘cool’ aspect (Hu, 2011; Johnson, 2013).

However, caution is necessary before jumping onto the ‘technology train’. The AAC RERC White Paper (2011) noted that it is important not to lose sight of an AAC perspective, meaning that one should embrace new technologies, but not lose sight of customizability, learnability and durability, including support and training for high-technology non-dedicated communication devices. For the purposes of AAC, the iPad™ with AAC software, lack of ruggedness and risks of water damage or breakage when dropped is a major factor to consider (Gonzales et al., 2009). The lack of technological

support and quality control also influence the use of the iPad™ with AAC software for children with LNFS (AAC RERC, 2011). McNaughton and Light (2013) noted that perhaps the greatest danger of the iPad™ with AAC software is that the excitement may result in an isolated focus on technology only, while the true end goal of AAC, namely communication and increased interaction of individuals with LNFS through the use of high-technology non-dedicated AAC devices, may be neglected.

The iPad™ with Proloquo2Go can play a tremendous role in the acceptance of AAC users, since it redefines communication for children who use AAC (Higginbotham & Jacobs, 2011). It is still important to conduct further research regarding attitudes towards AAC devices, since technology is continually changing and rapidly becoming more sophisticated (Abbot et al., 2011). Therefore, this study aims to determine the attitude of typically developing children towards an unfamiliar peer with LNFS who uses a high-technology non-dedicated communication device, namely the iPad™ with Proloquo2Go, and a low-technology communication board.

2.8 Summary

This chapter provided an orientation and review of the literature related to this study. It described the inclusion of children with little or no functional speech (LNFS) in schools and the important role of attitudes. It provided a definition of attitudes and a discussion of its components. The role that attitudes have on successful inclusion of children with LNFS into schools was discussed. This was followed by a discussion of attitude studies on children with disabilities followed by studies that specifically focus on attitudes towards children who use AAC. The significance of technology was described along with its application to AAC. The rationale for investigating the attitudes of typically developing children towards children with LNFS who use high-technology non-dedicated communication devices, in particular the iPad™ with Proloquo2Go, was discussed.

Chapter 3: Methodology

3.1 Introduction

This chapter describes the research methodology of this study. The chapter outlines the main aim, sub-aims and the research design of the study. The pilot study, its objectives, procedures, results and recommendations are also discussed. The main study is discussed in terms of sampling, participant selection and description of participants. The general procedures and data collection procedures for the study are then described. This is followed by a description of the materials and equipment used in the study. The data capturing and analysis is presented. Finally, reliability and validity of the data are presented.

3.2 Aim

3.2.1 Main aim

The main aim of the study is to determine and compare the attitudes of typically developing children aged 9;00-12;11 (years;months) towards an unfamiliar peer with LNFS who uses a high-technology device (iPad™ with Proloquo2Go) and a low-technology device (a communication board).

3.2.2 Sub-aims

The sub-aims of the study were delineated as follows:

- To determine the equivalence of the two groups of participants in this study in terms of their age, gender and home language

- To determine the internal consistency and reliability of the Communication Aid/Device Attitudinal Questionnaire (CADAQ), which was the attitudinal measuring instrument used in this study
- To determine whether there was a carry-over effect present due to the sequence in which the videos were watched
- To determine the attitudes of typically developing children and aged 9;00-12;11, toward an unfamiliar peer with LNFS using the iPad™ with Proloquo2Go and a communication board
- To compare the attitudes of typically developing children and aged 9;00-12;11, toward an unfamiliar peer with LNFS using the iPad™ with Proloquo2Go and a communication board
- To determine if the gender of the typically developing children and aged 9; 00-12;11 influenced their attitudes towards an unfamiliar peer with LNFS using an iPad™ with Proloquo2Go and a communication board

3.3 Research design

A 2 x 2 crossover design was utilised to determine and compare the attitudes of typically developing children children with LNFS using a high-technology non-dedicated device and low-technology communication device. The design allows the use of a small sample size; it has lower variability, is more robust and reduces carry-over effects (Wang & Bakhai, 2006). In addition, the design enabled between-group and within-group comparisons (Jones & Kenward, 1989; Kuehl, 2000).

In this study, two videos were developed for the purpose of this study. Video 1 depicted an unfamiliar peer with LNFS using a high-technology non-dedicated device, namely the iPad™ with Proloquo2Go, while Video 2 depicted the same unfamiliar peer

with LNFS using a communication board. The measuring instrument used in the study was the CADAQ (Lillienfeld, 1999; Lillienfeld & Alant 2002) which was completed by the participants after viewing each video. The participants were divided into two groups. Group 1 viewed Video 1 followed by Video 2. Group 2 viewed the videos in an alternating sequence. Video 2 was viewed first, followed by Video 1; this was done to counterbalance the effects of order. This design enabled the determining of carry-over effects (the first viewing influenced the second viewing) and the treatment effect (which video was perceived more positively).

Table 3.1 provides a summary of the sequence that was followed for each video and group.

Table 3.1

Alternating Sequence of 2 x 2 Crossover Design

Group	Group 1	Group 2
Video	1	2
	(iPad™ with Proloquo2Go)	(Communication board)
Measure	CADAQ	CADAQ
Video	2	1
	(Communication board)	(iPad™ with Proloquo2Go)
Measure	CADAQ	CADAQ

3.4 Pilot Study

A pilot study was conducted to identify whether the participant selection, the data collection procedure and the material and equipment utilized were feasible for the study (McMillan & Schumacher, 2001). The pilot study is described in Table 3.2 according to participants, objectives, methods, results and recommendations for the main study

3.4.1 Participants

Twenty-two (22) children (9 boys and 13 girls) between the ages of 09; 00 and 12; 11 participated in the pilot study. The participants were selected from an English co-educational school (boys and girls) primary school. The participants met the selection criteria used in this main study (Table 3.3). The procedure outlined in the pilot study was similarly used for the main study.

3.4.2 Objectives, procedures, results and recommendations

Table 3.2 provides an outline of the objectives, procedures, results and recommendations for the pilot study.

Table 3.2

Pilot study: Objectives, Procedures, Results and Recommendations

No	Objectives	Method	Results	Recommendations for main study
1	To determine whether the class list would be appropriate to establish: a) Chronological age b) The number of years the participants are at this particular school	a) The potential participants' dates of birth were manually coded with paper and pencil to determine their chronological age in years and months. b) The year the potential participant registered at school was indicated on the class list and was manually coded with paper and pencil.	a) A miscalculation was made with one potential participant's age. b) Ten (10) potential participants' did not meet the selection criteria for participants.	a) Potential participants' ages should be calculated with a Microsoft Excel spread sheet as this is more efficient and accurate than manual calculations. b) Procedure to remain the same.
2	To determine whether the distribution of the letters requesting informed consent from parents and biographical information sheets to the parents was effective	Teachers distributed and collected letters that requested informed parental consent from potential participants' parents.	The number of one letter requesting informed parental consent was changed and given to a child who did not meet the selection criteria.	The principal letter should be amended to specify that the numbers allocated on the forms in ' <i>For Official Use</i> ' column should not be tampered with.
3	To determine the appropriateness of the letter requesting informed parental consent and the biographical information sheet	Once collected, all letters were screened and checked to determine if they were adequately completed.	Two potential participants' parents did not sufficiently complete the biographical information sheet and letter requesting informed parental consent.	The letter requesting informed parental consent should be amended for easier completion. The choice to participate or not participate in the study should be simplified by only two choices.
4	To determine whether the division of participants into groups through the means of paired randomization was effective	The participants whose parents gave consent were divided into a boys' and girls' group and rearranged from the oldest to the youngest boy and girl. The oldest boy was selected for Group 1 and the oldest girl was selected for Group 2. The second oldest boy on the list was allocated to Group 2 and the second oldest girl was allocated to Group 1. This procedure was followed throughout, until all the participants were equally divided into two groups.	Groups were found to be statistically equivalent according to their age and gender.	Procedure to remain the same.

5	To determine the time needed to set up the classroom, to collect the groups and to conduct the data collection session	A stopwatch was utilised to record the time taken to complete each of these tasks.	It took approximately 30 minutes for setup prior to the collection of participant groups. The time it took to collect groups and conduct data collection was approximately 45 minutes per group.	It was found that more time will be needed for the main study. Sixty (60) minutes is recommended for each task to allow time for delays that may occur.
6	To determine whether the procedures of allocating the letters of assent and measuring instrument to participants were effective	A nametag with the participant's name, group number and participant number, which corresponded with a letter of assent and the CADAQ, was provided to each participant by the researcher. Once each participant received their name tags, the number allocated on the letter of assent was called. Participants could then see on their nametags which number they were and then collected their letter of assent and CADAQ as their number was called.	Each potential participant received their letters of assent and CADAQ that was allocated to them effectively.	Procedure to remain the same.
7	To determine whether the participants were able to understand the assent procedure and letter of assent and whether it was adequately completed	The letter of assent was read to the potential participants prior to data collection and time was given for them to complete the assent letter.	Reading the letter of assent and only later completing the reply slip seemed to confuse the participants.	The assent procedure and assent reply slip should be combined into one letter.
8	To determine if there were any difficulties experienced by the participants in understanding the instructional script	An instructional script was followed throughout the data collection session.	The researcher noted that the participants followed the given instructions. It was, however, difficult for the researcher to follow both the instructional script and the CADAQ simultaneously from two documents.	The CADAQ and the instructional script should be combined into one document.
9	To determine whether the CADAQ scale was easily understood by the participants	The CADAQ was read aloud to the participants, question by question, in order to ensure that each participant understood the questions posed.	The participants followed the CADAQ questions since it was read to them, no difficulties in answering the questions were observed during each data collection session.	CADAQ scale to remain the same.
10	To determine whether the number of assistants used during the study was adequate for efficient data collection	Two assistants checked the participants' assent letters, including each page that was answered on the CADAQs.	One CADAQ was overlooked as a participant chose two answers for one question.	It is recommended that 3 - 4 assistants should be used on the day of data collection for the main study as there would be more participants

11	To determine the reliability of the procedures that were followed during data collection	Audio recordings were made of both groups' data collection sessions. A checklist was used to check if the script for the data collection procedures were followed adequately.	Minor differences where noted, due to the difficulty in following the instructional script and CADAQ simultaneously.	Combine the instructional script and the CADAQ.
12	To determine if the process of manually coding the participants' answers in the CADAQ was effective	A transparency was made with the scores of the CADAQ according to the Likert scale. The transparency was placed on each page of the CADAQ and the score was manually transferred with paper and pencil into the column <i>For Official Use</i> . An independent rater was screened the data for correctness.	No errors were noted during this process.	Procedure to remain the same.
12	To determine the reliability of the collected data	An independent rater screened 40% of the CADAQs.	No errors were found.	Procedure to remain the same.
13	To determine the appropriateness of data analysis for: a) descriptive statistics b) inferential statistics	Data was captured and transferred onto an Microsoft Excel spread sheet for: a) descriptive statistics b) inferential statistics	a) Frequencies, means and modes could be calculated. b) Inferential statistics could be used for group analysis. Further analysis could not be done due to the small sample size.	a) Procedure to remain the same. b) Ensure a larger sample size for main study.

3.4.3 Summary

The pilot study highlighted some of the areas that required modifications in the procedures for data collection in the main study. It was established that clear instructions were needed for the school principal and teachers on the distribution of the letter requesting informed parental consent. Furthermore, the assent procedure and reply slip should be amalgamated into one document for easier completion. The instructional script needed to be amended in order to avoid repetitiveness and lengthy instructions. A larger sample size was required to enable better statistical analysis. These recommendations were incorporated into the main study.

3.5 Main study

3.5.1 Selection of school

The school from which the main participants were selected, was registered at the Department of Education within the Tshwane South District in the Gauteng province of South Africa. Non-probability purposive sampling was utilized (McMillan & Schumacher, 2001), whereby a co-educational (boys and girls) primary school based on the eastern side of Centurion, Gauteng, was selected for data collection. The school is within the middle market segment within the socio-economic class. Parents are able to pay school fees in order for their children to attend this particular school, thus they are more likely to have been exposed to technological devices such as the iPad™.

The school accommodated approximately 1020 learners ranging from Grade R to Grade seven. The school's language of learning and teaching was English. The participants required for the study were selected from the intermediate phase (from Grade four to Grade six), consisting of learners between the ages of 9; 00 and 12; 11.

3.5.2 Participant sampling and selection criteria

Non-probability purposive sampling was utilized for the selection of the 160 participants (McMillan & Schumacher, 2001) required for the study. All learners who met the selection criteria were included from the selected school in which the main study was conducted. The participant selection criteria that were set for the selection of the participants in this study are outlined in Table 3.3

Table 3.3

Criteria for Selection of Participants

No	Criteria	Justification	Measure
1	Children aged 9;00-12;11 (years; months)	This age group was selected because participants were able to complete the CADAQ independently (Lillienfeld & Alant, 2002).	Biographical information sheet and school class list
2	Children attending a mainstream school where the language of learning and teaching is English for a minimum of 1 year	Data collection was conducted in English and required participants to be literate in order to understand the statements posed in the CADAQ as well as the conversation within the two videos.	The class list and biographical information sheet.
3	No previous experience with a person using a communication device	Previous experience with children with disabilities influences attitudes (Beck & Dennis, 1996).	Biographical information
4.	Parental consent	Informed consent is an ethical consideration (McMillan & Schumacher, 2001).	Reply slip from letter requesting informed parental consent
5.	Children's assent	Children's assent is an ethical consideration (McMillan & Schumacher, 2001).	Reply slip from letter of assent

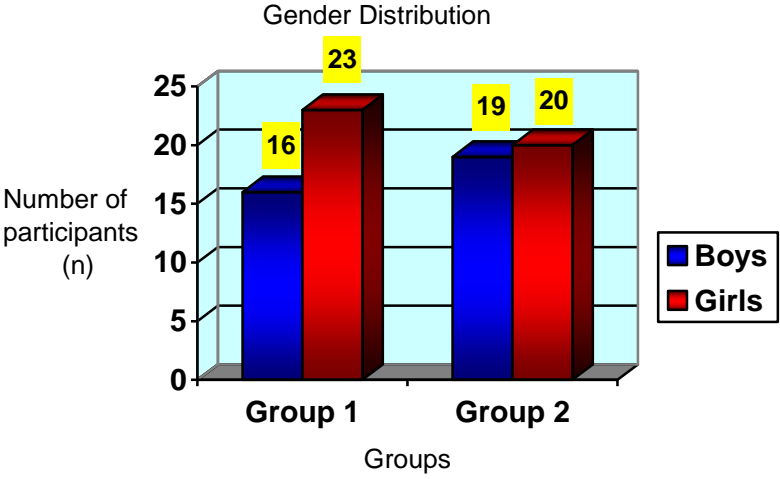
3.5.3 Participant Description

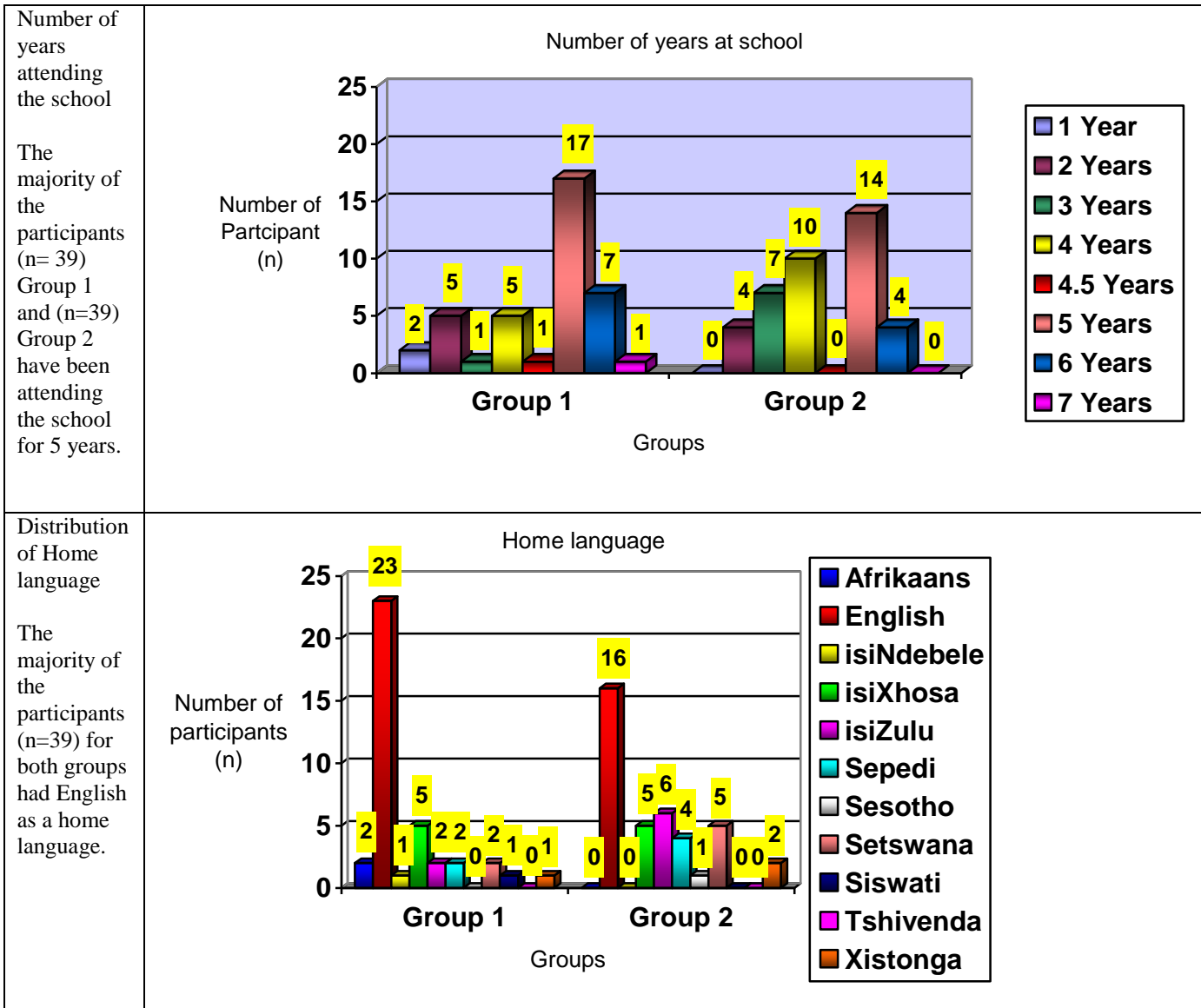
One-hundred-and-sixty (160) letters requesting informed parental consent were sent to parents or caregivers of the potential participants. Six (6) parents did not consent and 71 did not return the consent reply forms. Eighty-three (83) parents gave consent for their child to participate in the study. Three participants did not meet the set selection criteria outlined because they had previous experience with a person with disabilities. Two were excluded because the CADAQ was completed inadequately. Hence, 78 participants participated in the study.

Paired randomization was conducted whereby the participants were divided into groups according to their gender (boys and girls) and then rearranged from oldest to youngest participant in each gender group. The oldest boy was placed in Group 1 and then the oldest girl was placed in Group 2. The second oldest boy was placed in Group 2 and the second oldest girl was placed in Group 1. This process was repeated until all the boys and girls were allocated to a group. The participants are described in their groups according to their age, gender, home language and number of years of attendance at the school. Table 3.4 provides the biographical information of participants.

Table 3.4

Participants' Biographical Data

Description	Results									
<p>Gender distribution among the two groups (n=78)</p> <p>In Group 1 there were 16 boys and 23 girls and in Group 2 there were 19 boys and 20 girls.</p>	 <p>The bar chart displays the gender distribution of participants across two groups. The vertical axis represents the number of participants (n), ranging from 0 to 25 in increments of 5. The horizontal axis lists Group 1 and Group 2. For each group, there are two bars: a blue bar for Boys and a red bar for Girls. The exact number of participants for each category is labeled above the bars: Group 1 (Boys: 16, Girls: 23) and Group 2 (Boys: 19, Girls: 20).</p> <table border="1"> <thead> <tr> <th>Group</th> <th>Boys (n)</th> <th>Girls (n)</th> </tr> </thead> <tbody> <tr> <td>Group 1</td> <td>16</td> <td>23</td> </tr> <tr> <td>Group 2</td> <td>19</td> <td>20</td> </tr> </tbody> </table>	Group	Boys (n)	Girls (n)	Group 1	16	23	Group 2	19	20
Group	Boys (n)	Girls (n)								
Group 1	16	23								
Group 2	19	20								



3.5.4 Procedures

Ethical approval for the study was obtained from the Ethics Committee of the University of Pretoria (Appendix A). A letter requesting permission from the Gauteng Department of Basic Education was sent to the department outlining the objectives, aims and procedures of the study. After receiving permission from the Gauteng Department of Education (Appendix B), the school principal was contacted and a meeting was arranged with him. The aim, rationale and procedures of the research were discussed during this meeting and consent was requested. A letter requesting permission from the school

principal (Appendix C) to i) conduct the study at the selected school; ii) to use the school premises for the study; and iii) request teachers' assistance in distribution and collection of letters of informed parental consent (Appendix D) was provided. A reply slip was attached on which the principal could indicate if he granted or did not grant permission for the study to be conducted at the school.

In order to develop the video material required for the study, informed consent was requested from parents/caregivers of an unfamiliar peer with LNFS (Appendix G), prior to making the videos. The process of making the video and showing it to the potential participants were discussed in the letter. A reply slip was attached whereby the parents/caregivers could indicate whether they give or do not give consent for their child to participate in the making of the videos.

A letter requesting assent (Appendix H) was similarly handed to the unfamiliar peer with LNFS, which explained the objectives, purpose and procedures that were to be followed in the research study, including the making of the videos. An attached reply slip was provided in order for the unfamiliar peer with LNFS to give his/her assent to take part and appear in the videos. Both the parents/caregivers and the unfamiliar peer with LNFS completed the reply slips giving the researcher their consent and assent respectively.

3.5.4.1 General procedures for data collection

Once informed consent (Appendix C) was obtained from the principal, the researcher collected the class lists whereby the potential participants' chronological ages were determined through Microsoft Excel. After the identification of the potential participants according to their ages in years and months and the number of years that they have been attending that school, they were each assigned a participant number that was written on the class list. The potential participant numbers were copied onto the letters requesting parental informed consent (Appendix D) and the biographical information sheet (Appendix E) in the '*For Official Use*' column. The letter requesting informed

consent from the parents outlined the purpose of the study, its objectives, the procedures and what their child would be required to do. A reply slip was attached for the parents to complete, on which they could indicate if they gave or did not give consent for their child to participate in the study. The biographical information sheet requested information from the parents regarding their child's date of birth, gender, home language, number of years at school and previous experience with a person using a communication device. The biographical information sheet, along with the letter requesting informed parental consent and were sent home for completion.

A copy of each class list along with the letters (informed parental consent and biographical information sheet) for each class of potential participants were prepared for easier distribution and delivered to the school. The principal gave each teacher his/her packet of letters and requested them to distribute the letters among the potential participants according to the number allocated to each. The potential participants took the letters home and gave them to their parents for completion; the letters were returned to the teachers at school one week later. The teachers collected the letters and gave them to the principal who contacted the researcher for collection. The researchers collected all the letters and arranged a date and time for data collection. All the letters were screened and marked off on the class list; indicating all the potential participants whose parents did and did not give consent for their children to take part in the study.

The potential participants whose parents gave their consent for their child to take part in the study were divided into a boys and girls group. The potential participants were then re-arranged from the oldest to youngest in each gender group. After these two groups were formed, the researcher divided the potential participants into two further groups (Group 1 and Group 2), who were to become the two research groups. Firstly, the oldest boy from the boys' group was placed in Group 1 and the oldest girl from the girls' group was placed in Group 2. Subsequently, the second oldest boy was taken and placed in Group 2 and the second oldest girl was placed in Group 1. This sequence was continued until all the boys and girls were divided equally into two groups.

After all the participants were divided into two equal groups, the researcher wrote each participant's nametag. On the nametag, the participant's name, group number (either 1 or 2) and their participant number (retrieved from the letter requesting informed parental consent and biographical information sheet) were written. The participant number was similarly recorded in the '*For Official Use*' column onto the potential participants assent letter (Appendix F) and CADAQs (Appendix I). A booklet was made for each potential participant that consisted of an assent letter and two CADAQs (yellow paper CADAQ for the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go video and green paper CADAQ for the video of the unfamiliar peer with LNFS using the communication board video). The researcher then packed the booklets according to the participants in Group 1 and Group 2.

3.5.4.2 Data collection procedure

The study was conducted in a classroom at the school. The classroom was large enough to accommodate each group of participants. Each participant was familiar with the classroom and comfortably seated at a desk. The classroom was well ventilated with minimal audible and visual distractions. The TV and DVD player was in the front of the class, enabling each participant to view the videos without any glare on the screen or with any other difficulty. The TV's built in speakers allowed the participant to clearly hear the audio recording on the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go and the video of the unfamiliar peer with LNFS using the communication board. The lighting in the classroom was adequate for viewing the two videos and for completing the CADAQs.

On the day of data collection, the researcher set up the TV and DVD player in the room allocated for the data collection session. The researcher packed all the booklets and pencils out on the table and placed the stopwatch and audio recorders on the counter. The participants were called over the intercom and asked to assemble at the video room. Once all the potential participants were at the video room, the researcher and principal took the nametags and called all the names of the participants. The participants came

forward to collect their nametags. Group 1 stayed behind in their line and Group 2 formed a new line. Once all nametags were distributed, Group 2 was notified that they will be called a bit later over the intercom and were then dismissed back to their classes.

After Group 2 was dismissed, the researcher took the booklets which were allocated to Group 1 and read the participant number allocated on it. The participants could now look at their name tags to see what number was allocated to them and once their number was read, they could come forward and collect his/her booklet. The participant then proceeded to the video room and was handed a pencil by the assistant before entering the video room. Once all the booklets and pencils were distributed to the participant, the researcher entered the video room and started the stopwatch and audio recorder. The researcher made use of an instructional script (Appendix J) which was read throughout the data collection session. The researcher explained to the participants that it was necessary to get their permission for them to take part in the study. The researcher, while following the instructional script, commenced with the letter requesting assent (Appendix F). The assent letter explained the aim and procedures to be followed with the data collection process. As soon as the researcher finished explaining a section of the letter, the participants were given time to complete the assent question. This was done until the whole assent letter was completed. After the assent letter was completed, the assistants and researcher checked to see if all the participants adequately completed the letters. The participants' participation in the research was voluntary and the participants who chose not to take part in the study were allowed to leave and return to class without any consequences; however there were no participants who did not assent to participate in the study.

The researcher proceeded with the instructional script (Appendix J) which requested the participants to page over to the next page which was yellow and therefore the first CADAQ. The instructional script was read to the participants in Group 1, informing them that they will now view the video while giving some background information on the video that they are about to see. The researcher started Video 1 (video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go) and Group 1

watched it. Once the video was finished, the researcher continued with the instructional script for the completion of the CADAQ which pertained to the video that the participants had just viewed. The researcher read out the trial items, one example at a time, on the yellow paper CADAQ and allowed the participants 10 seconds each to answer the statement, which enabled the participants to become familiar with the structure of the Likert scale. After the trial items were completed, the researcher commenced with the first statement of the CADAQ.

Each statement on the CADAQ was then read out aloud to the participants one by one; when the participants reached the end of a page the assistants and researcher screened the page to ensure that each participant selected only one answer per statement. Participants were then asked to turn to the next page and the researcher again read the statements aloud; this process was followed until all the questions of the first CADAQ were completed.

After the first CADAQ was completed, the researcher requested the participants to stand. A game comprising a few physical exercises was done in order to give the participants a break, without the participants talking to each other. When the game was finished, the participants were seated and the researcher requested the participants to turn to the green paper, which was the second CADAQ. The instructional script was read to the participants in Group 1, informing them of the procedure which would be followed prior to the video. The researcher started Video 2 (the video of the unfamiliar peer with LNFS using the communication board) and Group 1 watched it. Once the video was finished, the researcher continued with the instructional script for the completion of the second CADAQ that pertained to the video that the participants have just viewed. The procedures that were followed for Video 2 were similar to those outlined for Video 1. After the second CADAQ was completed by Group 1, the researcher asked the participants whether they had any questions; the researcher answered some of the questions that were asked. The assistants and the researcher then collected the booklets from the participants and the audio recorder and stopwatch were stopped. The participants were each given a pencil as a token of appreciation and were thanked for

their time. Once all the participants received their pencils, they were dismissed back to their classes. Subsequently, Group 2 was called over the intercom. The same procedure was followed for the participants in Group 2, except that alternating sequences was utilised when viewing the two videos. Participants watched Video 2 (the video of the unfamiliar peer with LNFS using the communication board) first and completed the green paper CADAQ and then watched Video 1 (video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go) and then completed the yellow paper CADAQ.

3.5.5 Materials and Equipment

3.5.5.1 Communication Aid/Device Attitudinal Questionnaire (CADAQ)

The CADAQ (Appendix I) was developed by Lilienfeld (1999) and published in Lilienfeld and Alant (2002). It was based on the Chedoke-McMaster Attitudes toward Children with Handicaps (CATCH), which was a scale developed to measure the attitudes of typically developing children towards children who use AAC (Rosenbaum et al., 1988). The CATCH was used as the baseline for the development of the Communication Aid/Device Attitudinal Questionnaire (CADAQ) (Lilienfeld & Alant, 2002).

The CADAQ comprises 37 statements that cover three dimensions of attitudes namely the i) Affective/Behavioural (the feelings and intent to take action on these feelings by typically developing peers towards a child with LNFS (Lilienfeld & Alant, 2002)), ii) Cognitive/Belief (the beliefs of typically developing peers about a child with LNFS (Lilienfeld & Alant, 2002)); and the iii) Communicative Competence (the operational, strategic, linguistic and social competencies of the child with LNFS (Light, 1989; Light & McNaughton, 2014)) Dimension. The affective/behavioural dimension comprises 13 statements, including 6, 9, 10, 12, 13, 15, 16, 18, 21, 26, 28, 31 and 37; the cognitive/belief dimension comprises of 11 statements, including 2, 4, 8, 17, 20, 25, 29, 32, 33, 34 and 36; and the communication dimension comprise 13 statements, including 1, 3, 5, 7, 11, 14, 19, 22, 23, 24, 27, 30 and 35.

The CADAQ uses a five-point Likert scale. The five points on the scale were: *I strongly agree*, *I agree*, *I cannot decide*, *I disagree* and *I strongly disagree*. A minor modification was made to the CADAQ that replaced the name Allan with Grace to accurately portray the gender of the person with LNFS on the iPad™ with Proloquo2Go and the video of the unfamiliar peer with LNFS using the communication board.

Measuring attitudes is a complex process and many researchers have developed various measuring instruments in an attempt to determine attitudes accurately. Various researches have implemented the use of a rating scale when determining the attitudes of typically developing children towards children with disabilities and those with LNFS (Bedrosian et al., 2004; Beck & Dennis, 1996; Gorenflo & Gorenflo, 1997; Lilienfeld & Alant, 2002). Most of these attitudinal scales used a Likert type scale (Avramidis, Bayliss, & Burden, 2000; De Boer et al., 2012; Lilienfeld & Alant, 2002; Maras & Brown, 2000), as it was—and still is—one of the most popular rating scales.

3.5.5.2 Videos

Two videos were made depicting an unfamiliar peer with LNFS who was communicatively competent in using both high-technology non-dedicated communication devices and low-technology communication devices. Communication competence was essential, since it influences attitudes (McCarthy & Light, 2005). The video recordings were made with a Nikon 5D camera. A script (Appendix K) was used for the communication interaction between an unfamiliar peer with LNFS and the communication partner in order to ensure consistency between the videos. Video 1 was 3:23 minutes in duration and depicted a scripted communication interaction between the person with LNFS and a communication partner, using a high-technology non-dedicated device, namely an iPad™ with Proloquo2Go. The unfamiliar peer with LNFS was required to communicate by touching the letters on the display in order to spell the words. Video 2 was 3:32 minutes in duration and displayed the same scripted communication interaction between the communication partner and the unfamiliar peer with LNFS, using

a low-technology communication board. The unfamiliar peer with LNFS was required to communicate by touching the display in order to spell the words. The overlays seen during the communication interaction for both videos were the same.

The setting for the video was a consultation room. The person with LNFS and the communication partner were seated at a table. The video started with a view of the person with LNFS and the communication partner sitting at the table. The video then focussed on the display and only the back of the person with LNFS was now visible. The communication partner who was visible at the beginning of the video was no longer visible. With Video 1, the unfamiliar peer with LNFS typed each word letter for letter, the iPad™ would then ‘say’ the word when the space bar was pressed. As soon as the unfamiliar peer with LNFS completed the whole sentence, the iPad™ would repeat the sentence and the communication partner would respond to the question asked by the unfamiliar peer with LNFS. With Video 2, the communication partner would say each word after the unfamiliar peer with LNFS has typed it letter for letter on the communication board. The communication partner would repeat the sentence once it is completed and then respond accordingly. The only visible difference in the two videos was that the first video displayed the iPad™ with Proloquo2Go, with a synthesised voice output, while the second video portrayed the unfamiliar peer with LNFS using the communication board; here the communication partner’s voice was audible.

3.5.5.3 Instructional script

An instructional script (Appendix J) was followed throughout the data collection process. It was a step-by-step guide that enabled the researcher to keep the two data collection sessions the same.

3.5.5.4 iPad™ with Proloquo2Go

The iPad™ 2 with Proloquo2Go v.3.0, was the high-technology non-dedicated communication device implemented for the study. The voice output selected was Olivia,

which is a downloadable British accent voice (currently there are no South African voices available within the App store, hence a voice was selected which would be easily understood by the English speaking participants) available as part of the Proloquo2Go software package.

The settings used on the Proloquo2Go v. 3.0 software for the iPad™ (Appendix L), were i) appearance; the display style is grid, the number of columns were 7 and the display were on the image and label option; ii) the background colour was white, the label position was below the image and the multi-line table was on; iii) the text option used was ArialMT, 25pt.; iv) speech setting ‘speak as you type’ settings were all off; v) interaction settings; auto-clear message was on, repeated tap was on stop speech, and there was no repeated delay selected; vi) the keyboard button, grid keyboard and all view buttons were off; vii) volume was set to high, viii) speech rate was slow; and ix) voice personalisation; normal; x) grammar setting; grammar support on, the trigger use was on hold, the hold duration was on 0.5 seconds, the use of double tap was switched off and the advanced grammar was on; xi) access method setting; no selections were made.

3.5.5.5 Communication board

A low-technology communication board (Appendix M) was utilised in this study. A QWERTY keyboard, with black letters (font and size) on a white background was printed. This was pasted onto a black cardboard and matt laminated. The size of the communication board was 19 8cm x 14 9 cm. The communication partner repeated the words and then the entire sentence as a whole. The layout of the display (Proloquo2Go v3.0) used on the video of the unfamiliar peer with LNFS using the communication board was similar to the display on the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go in content and size.

Equipment

3.5.5.6 Video and audio recording camera

A Canon 5d Mark III digital camera and a tripod was used for the recording of the videos.

3.5.5.7 Television

A Sony Bravia Flat Screen 42 inch CT-21Q20E television monitor was used to display the videos to the participants.

3.5.5.8 DVD Player

A Sansui DVD Player BD-E5300 was utilised to play the videos to the TV.

3.5.5.9 Audio recorder

An Olympus Digital Voice Recorder DM-650, was used to audio tape each session.

3.5.5.10 Pencils

A HB pencil with an attached eraser was handed to each participant to use for completing the CADAQ.

3.5.5.11 Tokens of appreciation

Each participant was given a colourful printed pencil by the researcher after the session, as a token of appreciation.

3.6 Analysis of data

McMillan and Schumacher (2001) indicated that data analysis is a visual

summary of the data in the form of statistical tables and diagrams. The five-point Likert scale used on the CADAQ was graded from ‘*I strongly agree, I agree, I cannot decide, I disagree, and I strongly disagree*’. Depending on the nature of the question asked in the CADAQ, the answers indicated by the participants were scored from 1 to 5 points. Half of the questions in the attitudinal scale were worded in a positive form and the other half were worded in a negative form. Questions in the positive form were scored as follows: *I strongly agree* (5 points), *I agree* (4 points), *I cannot decide* (3 points), *I disagree* (2 points) and *I strongly disagree* (1 point). Questions in the negative form were reverse-scored (Appendix O).

All data was first entered manually into the CADAQ column marked ‘*For official use*’ using a transparency with the scores. The researcher then transferred all the raw data onto a Microsoft Excel sheet, which was then statistically analysed. The choice of statistical procedures was based on their appropriateness. The results are presented in tables in Chapter 4.

Table 3.5 presents the statistical procedures implemented on the data collected during the data collection sessions.

Table 3.5
Procedures for analysis of data

Description of Data	Statistical procedures used
Reliability:	
Response reliability	Response Rate Calculator
CADAQ reliability	The Coefficient Alpha / CORR (correlation) procedure
Comparisons of responses:	
<i>Between Groups:</i>	
Equivalence of groups	The Fisher’s Exact Test / t-test
Carry-over effect	ANOVA
<i>Within Groups:</i>	
Treatment effect	The t-test procedure
Gender effect	ANOVA

3.6.4 Reliability

3.6.4.1 Procedural reliability

Procedural reliability was determined using a checklist (Appendix N) to ensure that the procedures followed for both groups were consistent. An independent rater listened to 50% of the audio recordings and completed the checklist to ensure that all the various steps were followed during the data collection session. The procedural reliability was calculated using formulae and basic mathematical calculations. Procedural reliability is expressed as a percentage (McMillan & Schumacher, 2001).

$$\frac{\text{Total number of procedural steps} - \text{Number of incorrect procedural steps}}{\text{Total number of procedural steps}} \times 100$$

= Procedural Reliability

$$\frac{340 - 5}{340} \times 100 = 98.5\%$$

Procedural reliability was high, at 98.5% indicating good consistencies within the data collection sessions (McMillan & Schumacher, 2001).

3.6.4.2 Reliability of data collection

Reliability of data was determined on 40% of the CADAQs. An independent rater checked the CADAQs to ensure that the researcher correctly coded and scored each statement. The reliability of the data was calculated using formulae and basic

mathematical calculations. The reliability of coding the data is expressed as a percentage (McMillan & Schumacher, 2001).

$$\frac{\text{Total number of coded data} - \text{Number of incorrectly coded data}}{\text{Total number of coded data}} \times 100$$

= data collection reliability

$$\frac{2886 - 3}{2886} \times 100 = 99.8\%$$

The data collection reliability was high, at 99.8%, indicating reliable scoring of the data (McMillan & Schumacher, 2001).

3.7 Validity

The validity of this research study was strengthened through the use of a published scale, namely the CADAQ (Lilienfeld & Alant, 2002). The CADAQ was age-appropriate and sensitive towards the measuring of attitudes towards children with LNFS who uses AAC devices in the South African context. Face validity of the CADAQ was established when the teachers of the students confirmed that the vocabulary and grammar used within the questionnaire was age appropriate for the participants. Threats to internal validity (for example, the use of participants who were familiar with or had previous experience with children with LNFS) were eliminated through the criteria for participant selection. Extraneous variables within the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go and video of the unfamiliar peer with LNFS using the

communication board were controlled by ensuring that the two conversations on the videos were scripted and therefore sufficiently similar. The experimenter effects on the internal validity were reduced by the implementation of an instructional script during the data collection process. External validity may however be influenced by the fact that generalisation to larger populations might not be possible, due to the small number of participants used in the study (McMillan & Schumacher, 2001).

3.8 Summary

This chapter described the research methodology of this study. The chapter outlined the main aim, sub-aims and the research design of the study. The pilot study, its objectives, procedures, results and recommendations were discussed. The main study was discussed in terms of sampling, participant selection and description. The general procedures and data collection procedures for the study were described. This was followed by a description of the materials and equipment used within the study. The data analysis and capturing was presented. Finally, reliability and validity of the data was presented.

Chapter 4

Results and discussion

4.1 Introduction

This chapter presents and discusses the results according to the sub-aims as outlined in Chapter 3 (Section 3.2.2). Firstly, the reliability is discussed in terms of the of the participants’ responses, followed by the internal consistency of the CADAQs. Comparisons of responses are discussed in terms of between group (Group 1 Group 2) and within group comparisons. Between groups comparisons discusses the equivalence of Group 1 and Group 2. The carry-over effect is presented. Within group comparisons illustrates and discusses the results according to the effect of treatment, indicating which video was preferred. Finally, the effect of gender on attitudes is described and discussed. Figure 4.1 is a schematic representation of the chapter outline.

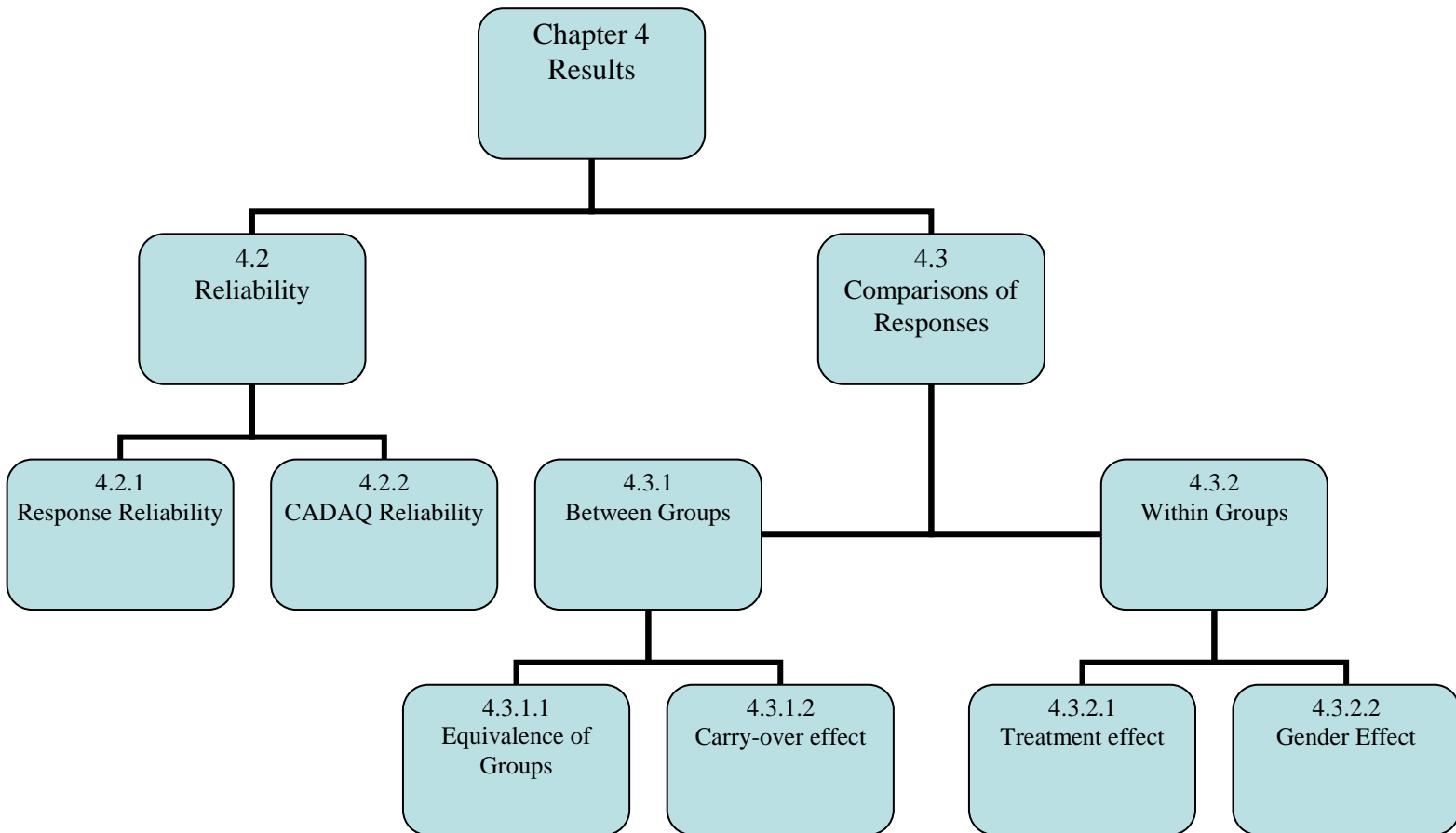


Figure 4.1 Schematic representation of this chapter (Chapter 4)

4.2 Reliability

4.2.1 Response Reliability

The completion of the measuring instrument, namely the CADAQ, required that the participants select an answer for each statement within the CADAQ by making a tick (✓) in a block of their choice. The participants were provided with two trial items, located at the beginning of the CADAQ, before the commencement of the data collection, for demonstration purposes. The trial items allowed the participants to become familiar with CADAQ before commencing with data collection. The participants achieved 100% for the completion of the trial items presented.

It was established that the participants had the ability to carry out the procedures correctly and had sufficient comprehension of the instructions given and the statements made within the CADAQ. With the completion of the CADAQ, it was found that two participants (2.5% of total participants) selected two scale options (2 ticks) on one statement line, resulting in the elimination of their CADAQs from the study. The groups were still equally divided, and the overall response reliability was determined with the assistance of a response rate calculator (AAPOR, 2010), at 97.5%.

4.2.2 CADAQ reliability

Cronbach's Alpha is a measurement of a scale's internal consistency and reliability (Cronbach's, 1951). Using Cronbach's Alpha to determine the internal consistency of a measuring instrument is the most appropriate manner of determining reliability tests for questionnaires in which there is a range of possible answers for each item (McMillan & Schumacher, 2001).

Cronbach's Alphas were used to determine the internal consistency and reliability of the CADAQ according to its dimensions. The dimensions within the CADAQ is as follows; the first dimension, namely the Affective/Behavioural dimension; which included statements 6, 9, 10, 12, 13, 15, 16, 18, 21, 26, 28, 31 and 37; the second

dimension; namely the Cognitive/Belief dimension, included statement numbers 2, 4, 8, 17, 20, 25, 29, 32, 33, 34 and 36; the third dimension, namely the Communicative Competence Dimension; included statements 1, 3, 5, 7, 11, 14, 19, 22, 23, 24, 27, 30 and 35.

Table 4.1 illustrates the Cronbach's Alpha values found within the Affective/Behavioural, Cognitive/Belief and the Communicative Competence dimensions for the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go and for the video of the unfamiliar peer with LNFS using the communication board.

Table 4.1

Cronbach's Coefficient Alpha per Dimension of the CADAQ for the Video of the Unfamiliar Peer with LNFS Using the iPad™ with Proloquo2Go and the Video of the Unfamiliar Peer with LNFS Using the Communication Board

Video	Cronbach's Alpha Affective/ Behavioural Dimension α	Cronbach's Alpha Cognitive/ Belief Dimension α	Cronbach's Alpha Communicative Competence Dimension α
iPad™ with Proloquo2Go	0.866691	0.721557	0.818403
Communication board	0.873616	0.751891	0.771941

Table 4.1 illustrates the Cronbach's Alpha for each dimension of the CADAQ for the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go: a Cronbach's Alpha for the Affective/Behavioural Dimension was $\alpha = 0.866691$, the Cognitive/Belief Dimension Alpha was $\alpha = 0.721557$, and the Communication Competence Dimension Alpha was $\alpha = 0.818403$. The Cronbach's Coefficient Alphas for the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go video on all three dimensions were above 0.7. The internal consistency and reliability of the CADAQ was therefore regarded as satisfactory for the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go video. Cronbach's Alpha of ≥ 0.70 is regarded as satisfactory for research purposes (Nunally, 1978).

For the video of the unfamiliar peer with LNFS using the communication board video, the Cronbach's Alpha for the Affective/Behavioural Dimension was $\alpha = 0.873616$, the Cognitive/Belief Dimension Alpha was $\alpha = 0.751891$, and the Communication Competence Dimension was $\alpha = 0.771941$. The Cronbach's Coefficient Alpha for all three dimensions were above 0.7 for the video of the unfamiliar peer with LNFS using the communication board video, which indicated that the reliability of the CADAQ was satisfactory (Nunally, 1978).

4.3 Comparisons and description of responses between and within groups

A crossover design was used in this study with Group 1 viewing an unfamiliar peer with LNFS using the iPad™ with Proloquo2Go (Video1), followed by the unfamiliar peer with LNFS using the communication board (Video 2) and Group 2 viewing the unfamiliar peer with LNFS using the communication board (Video 2) first, followed by the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go (Video 1). In this crossover design it is imperative to determine a) equivalence between Group 1 and Group 2; b) the presence/absence of the carry-over effect (sequence in which the videos were viewed influenced the responses); and c) the treatment effect (which video was preferred by the participants).

4.3.1 Comparisons of responses between Group 1 and Group 2

4.3.1.1 Equivalence of groups

The t-test was used to test for statistically significant differences in the age distribution of Group 1 and Group 2. The t-test is used to determine the level of significance when two means are compared (p-value) (McMillan & Schumacher, 2001).

Table 4.2 illustrates the age distribution of Group 1 and Group 2.

Table 4.2

Mean Age Distribution of Group 1 and Group 2

Group	Mean (months)	Standard Deviation	p-value*
G 1	131.3589744	9.62859955	0.6570
G 2	130.3589744	10.1734618	

Note: * if $p \leq 0.05$ then significant at a 5% level

Table 4.2 illustrates the absence of a statistically significant difference between the age distributions of Group 1 and Group 2 (p-value 0.6570).

Equivalence between Group 1 and Group 2 in terms of their gender, number of years at school and their home language was also tested using the Fisher Exact test. The results are illustrated in Table 4.3.

Table 4.3

Equivalence of Groups, in Terms of Gender, Number of Years' Attending the School and the Home Language

	Category	Group 1	Group 2	p-value*
Gender	Boys	41.03%	48.72%	0.6492
	Girls	58.97%	51.28%	
Number of years attending School	1 year	5.13%	0.00%	0.0933
	2 years	12.82%	10.26%	
	3 years	2.56%	17.95%	
	4 years	12.82%	25.64%	
	4.5 years	2.56%	0.00%	
	5 years	43.59%	35.90%	
	6 years	17.95%	10.26%	
Home language	7 years	2.56%	0.00%	0.2940
	Afrikaans	5.13%	0.00%	
	English	58.97%	41.03%	
	isiNdebele	2.56%	0.00%	
	isiXhosa	12.82%	12.82%	
	isiZulu	5.13%	15.38%	
	Sepedi	5.13%	10.26%	
	Sesotho	0.00%	2.56%	
	Setswana	5.13%	12.82%	
	Siswati	2.56%	0.00%	
Tshivenda	0.00%	0.00%		
Xitsonga	2.56%	5.13%		

Note: * if $p \leq 0.05$, then significant at a 5% level

According to Table 4.3, there were no statistically significant differences between Group 1 and Group 2 on a 5% level in terms of their age (p-value 0.6570), gender (p-value 0.6492), number of years at school (p-value 0.0933) or their home language (p-value 0.2940) distribution. This indicates equivalence between Group 1 and Group 2.

4.3.1.2 The carry-over effect

The crossover design enables the researcher to determine whether a carry-over effect exists. The carry-over effect refers to whether the sequence in which the videos were viewed influenced the responses.

The carry-over effect was calculated using one-way analysis of variance, otherwise known as ANOVA (McMillan & Schumacher, 2001). ANOVA is an extension of the t-test and is implemented to test the differences between the groups in order to make an accurate probability statement; it uses the variances within the groups to calculate the degree of differences within the means (McMillan & Schumacher, 2001). The variances used were group, gender and group*gender interactions. Results are illustrated through partial eta-square, which shows the calculation of the effect size found within the data. Cohen's effect size is used to determine whether the significant differences found by the ANOVA is a practical significance and not simply caused by large same sizes. If the partial eta-square is calculated between 0.01 and 0.05 a small effect size is present; when the partial eta-square is between 0.06 and 0.14 a medium effect size is present and when a partial eta-square of < 0.15 is calculated, a large effect is present within the data (Nandy, 2012).

4.3.1.2.1 The iPad™ with Proloquo2Go

Table 4.4 illustrates the results of the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go per Affective/Behavioural, Cognitive/Belief and

Communicative Competence dimension.

Table 4.4

Carry-over Effects for the Video of the Unfamiliar Peer with LNFS Using the iPad™ with Proloquo2Go

Dependent variable	Source	DF	F	P-value*	Partial Eta-square**	Effect size
Affective/ Behavioural Dimension	Group	1	3.02	0.0865	0.0392	Medium
	Gender	1	4.76	0.0323*	0.0604**	
	Group*Gender	1	0.00	0.9697	<0.0001	
Cognitive/Belief Dimension	Group	1	4.87	0.0304*	0.0617**	Medium
	Gender	1	0.42	0.5202	0.0056	
	Group*Gender	1	0.01	0.9100	0.0002	
Communication Competence Dimension	Group	1	1.91	0.1711	0.0252	None
	Gender	1	0.52	0.4751	0.0069	
	Group*Gender	1	0.01	0.9301	0.0001	

Note: * if $p \leq 0.05$, then significant at a 5% level

****if partial Eta-Square:**

0.01 – 0.05 small effect

0.06 – 0.14 medium effect

> 0.15 large effect

The results in Table 4.4 illustrate that, for the Affective/Behavioural Dimension for the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go video, there was a statistically significant difference between genders (p-value 0.0323), indicating a medium effect size (Nandy, 2012). However, there were no statistically significant differences found for group (p-value 0.0865) and group*gender interaction (p-value 0.9697). The Cognitive/Belief Dimension for the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go video, showed a statistically significant difference for the group (p-value 0.0304), indicating a medium effect size (Nandy, 2012). However, there were no statistically significant differences found for gender (p-value

0.5202) and group*gender interaction (p-value 0.9100). Regarding the Communication Competence Dimension there were no statistically significant differences found within the group (p-value 0.1711), gender (p-value 0.4751) or group*gender interaction (p-value 0.9301). Hence, a carry-over effect for gender on the Affective/Behavioural and for group on the Cognitive/Belief Dimension is evident for the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go.

Table 4.5 illustrates the means and standard deviations for the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go. The girls scored higher means than the boys did for the Affective/Behavioural Dimension. Table 4.5 also illustrates that Group 2 (viewed the video of the unfamiliar peer with LNFS using the communication board, followed by the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go) scored higher means than Group 1 (viewed video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go, followed by the video of the unfamiliar peer with LNFS using the communication board) for the Cognitive/Belief dimension of the CADAQ.

Table 4.5

Means and Standard Deviations of Dimensions for the Video of the Unfamiliar Peer with LNFS Using the iPad™ with Proloquo2Go

Level	N	Affective/ Behavioural Dimension		Cognitive/ Belief Dimension		Communicative Competence Dimension			
		Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation		
Group	Group 1	39	3.9723	0.6725	3.0652*	0.5738*	3.6114	0.6178	
	Group 2	39	4.1893	0.5509	3.3589*	0.5997*	3.8047	0.6367	
Gender	Boys	35	3.9252*	0.6374*	3.1766	0.5454	3.6593	0.6210	
	Girls	43	4.2075*	0.5833*	3.2410	0.6485	3.7477	0.6432	
Group*Gender	Group 1	Boys	16	3.7980	0.6622	3.0227	0.4861	3.5576	0.6854
		Girls	23	4.0936	0.6669	3.0948	0.6366	3.6488	0.5792
	Group 2	Boys	19	4.0323	0.6128	3.3062	0.5711	3.7449	0.5658
		Girls	20	4.3384	0.4508	3.4090	0.6363	3.8615	0.7074

4.3.1.2.2 The communication board

Table 4.6 illustrates the carry-over effect for the video of the unfamiliar peer with

LNFS using the communication board for the three dimensions of the CADAQ.

Table 4.6

Carry-over Effects for the Video of the Unfamiliar Peer with LNFS Using the Communication Board

Dependent variable	Source	DF	F	p-value*	Partial Eta-Square**	Effect size
Affective/Behavioral Dimension	Group	1	4.77	0.0321*	0.0606**	Medium
	Gender	1	2.28	0.1357	0.0298	
	Group*Gender	1	0.04	0.8363	0.0006	
Cognitive/Belief Dimension	Group	1	1.02	0.3156	0.0136	None
	Gender	1	0.18	0.6707	0.0025	
	Group*Gender	1	0.14	0.7142	0.0018	
Communication Competence Dimension	Group	1	4.26	0.0425*	0.0545**	Small
	Gender	1	0.57	0.4533	0.0076	
	Group*Gender	1	1.06	0.3064	0.0141	

Note: * if $p \leq 0.05$, then significant at a 5% level

**if partial Eta-Square:

0.01 – 0.05 small effect

0.06 – 0.14 medium effect

> 0.15 large effect

The results in Table 4.6 illustrate that the Affective/Behavioural Dimension for the video of the unfamiliar peer with LNFS using the communication board, gender (p-value 0.1357) and the group*gender interaction (p-value 0.8363), shows no statistically significant differences respectively. However, for the Affective/Behavioural Dimension, a statistically significant difference for group (p-value 0.0321) was found; a medium effect size was indicated (Nandy, 2012). For the Cognitive/Belief Dimension, there was no statistical significant differences found within the group (p-value 0.3156), gender (p-value 0.6707) and group*gender interaction (p-value 0.7142). Within the Communication Competence Dimension the group (p-value 0.0425) indicated a small effect size (Nandy, 2012), while the gender (p-value 0.4533) and group*gender (p-value 0.3064), indicated no statistical significance differences. Hence, there was a statistically significant carry-over effect on the video of the unfamiliar peer with LNFS using the communication board for group in the affective/behavioural and communicative competence dimension.

Table 4.7 illustrates the means and standard deviations for the video of the unfamiliar peer with LNFS using the communication board.

Table 4.7
Means and Standard Deviations of the Video of the Unfamiliar Peer with LNFS Using the Communication Board

Level	N	Affective/ Behavioural Dimension		Cognitive/ Belief Dimension		Communicative Competence Dimension			
		Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation		
Group	Group 1	39	3.8264*	0.7651*	3.0233	0.7530	3.2642*	0.6761*	
	Group 2	39	4.1262*	0.4552*	3.1701	0.4824	3.5700*	0.5110*	
Gender	Boys	35	3.8703	0.6295	3.1376	0.5687	3.4857	0.6475	
	Girls	43	4.0626	0.6488	3.0634	0.6850	3.3613	0.5888	
Group*Gender	Group 1	Boys	16	3.7163	0.7721	3.0284	0.6937	3.4086	0.7928
		Girls	23	3.9030	0.7679	3.0197	0.6937	3.1638	0.5790
	Group 2	Boys	19	4.0000	0.4615	3.2296	0.8070	3.5506	0.5084
		Girls	20	4.2461	0.4261	3.1136	0.4363	3.5884	0.5260

Table 4.7 revealed that, with the means and standard deviations for the video of the unfamiliar peer with LNFS using the communication board video, Group 2 (viewed the video of the unfamiliar peer with LNFS using the communication board, followed by the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go) scored significantly higher than Group 1 (viewed the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go, followed by the video of the unfamiliar peer with LNFS using the communication board) within the Affective/Behavioural and Communicative Competence Dimensions.

Due to the statistically significant differences on certain dimensions of the CADAQ for both the video of the unfamiliar peer with LNFS using an iPad™ with Proloquo2Go and the video of the unfamiliar peer with LNFS using the communication board, a carry-over effect was present. Hence, limited between group comparisons could be made on some of the dimensions of the CADAQ.

4.3.2 Within group comparisons

4.3.2.1 The treatment effect

The treatment effect refers to which video (the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go or the unfamiliar peer with LNFS using a communication board) created more positive attitudes in each group. The paired t-test was implemented to calculate the treatment effect for each group across each video on each dimension of the CADAQ.

Table 4.8 illustrates Group 1's means, standard deviation and paired t-tests for the Affective/Behavioural, Cognitive/Belief and Communicative Competence dimensions of the CADAQ for both the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go and the video of the unfamiliar peer with LNFS using the communication board.

Table 4.8

Group 1's Mean, Standard Deviations and Paired t-test for the Video of the Unfamiliar Peer with LNFS Using the iPad™ with Proloquo2Go and the Video of the Unfamiliar Peer with LNFS Using the Communication Board

Dimension	iPad™ with Proloquo2Go		Communication board		Differences		Paired t-test
	Mean	Std Dev	Mean	Std Dev	Diff. Mean	Diff. Std Dev	p-value*
Affective/ Behavioural Dimension	3.9723	0.6725	3.8264	0.7651	0.1460	0.3747	0.0198*
Cognitive/Belief Dimension	3.0652	0.5738	3.0233	0.7530	0.0420	0.3647	0.4769
Communicative Competence Dimension	3.6114	0.6178	3.2642	0.6761	0.3471	0.4004	<0.0001*

Note: * if $p \leq 0.05$, then significant at a 5% level

Table 4.8 further illustrates that, for Group 1, there was a statistically significant

difference within the Affective/Behavioural (p-value 0.0198) and the Communicative Competence Dimensions (p-value <0.0001) when comparing the attitudes towards the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go and the video of the unfamiliar peer with LNFS using the communication board. The Cognitive/Belief Dimension (p-value 0.4769) revealed no statistically significant difference in attitudes towards the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go when compared to the video of the unfamiliar peer with LNFS using a communication board.

Table 4.9 illustrates Group 2's means, standard deviations and paired t-test for the Affective/Behavioural, Cognitive/Belief and Communicative Competence dimensions of the CADAQ for the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go and the video of the unfamiliar peer with LNFS using the communication board.

Table 4.9

Group 2s Mean, Standard Deviations and T-test Between the Video of the Unfamiliar Peer with LNFS Using the iPad™ with Proloquo2Go and the Video of the Unfamiliar Peer with LNFS Using the Communication Board

Dimension	Communication board		iPad™ with Proloquo2Go		Differences		Paired t-test
	Mean	Std Dev	Mean	Std Dev	Diff. Mean	Diff. Std Dev	p-value*
Affective/ Behavioural Dimension	4.1262	0.552	4.1893	0.5509	0.0631	0.3910	0.3198
Cognitive/Belief Dimension	3.1701	0.4824	3.3589	0.5997	0.1888	0.5617	0.0425*
Communicative Competence Dimension	3.5700	0.5110	3.8047	0.6367	0.2347	0.4761	0.0039*

Note: * if $p \leq 0.05$, then significant at a 5% level

Table 4.9 further illustrates that, within Group 2, there was a statistically significant difference within the Cognitive/Belief (p-value 0.0425) and the

Communicative Competence Dimension (p-value 0.0039) when comparing the attitudes towards the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go and the video of the unfamiliar peer with LNFS using the communication board. The Affective/Behavioural Dimension (p-value 0.3198) revealed no statistically significant difference when comparing the attitudes towards video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go when compare to the video of the unfamiliar peer with LNFS using the communication board.

The current study demonstrates that the video of the unfamiliar peer using the iPad™ with Proloquo2Go was perceived more positively for both Group 1 and Group 2 within certain dimensions of the CADAQ. Group 1 was more positive within the Affective/Behavioural and Communicative Competence dimension, whereas Group 2 was more positive within the Cognitive/Belief and Communicative Competence Dimension. This statistically significant difference is particularly relevant.

Numerous studies conducted on the attitudes of typically developing children towards a child with LNFS who used a high-technology dedicated AAC device and a low-technology communication device did not find a statistically significant difference in attitudes towards the AAC devices implemented (Blockberger et al., 1993; Beck & Dennis, 1996; Gorenflo & Gorenflo, 1997; Beck et al., 2000a; Beck et al., 2000b & Beck et al., 2002). The exception was, however, the Lilienfeld and Alant (2002) study, that found that typically developing children displayed a more positive attitude towards a high-technology dedicated SGD when compared to a low-technology communication board across all three dimensions of the CADAQ. However, Lilienfeld and Alant (2002), found the greatest variances within the Communicative Competence Dimension.

A positive attitude displayed towards high-technology is supported by Bedrosian et al. (2004) who found that technology has the ability to shape perceptions of communication competence. In previous research, it was found that typically developing children display a more positive attitude towards children with disabilities if they are perceived to be more communicatively competent (Beck & Dennis, 1996; Beck et al.,

2002; Blockberger et al., 1993; King et al., 1989; Schlosser, 2003). Therefore, an underlying principle of intervention is that greater individual competence in the use of communication aids is likely to contribute to more frequent and diverse opportunities for participation in everyday life (Clarke et al., 2011). The results from this study are congruent with these findings since more positive attitudes were found on the communicative competence dimension with the unfamiliar peer with LNFS when using the iPad™ with Proloquo2Go for both groups of participants. This could indicate that, with the use of the iPad™ with Proloquo2Go, the typically developing children already perceive the unfamiliar peer with LNFS as being communicatively competent. Communicative competence according to Light (1989) and Light and McNaughton (2014) is reflected when a person with disabilities is viewed as being competent or functional in daily communication.

Discovering that the attitudes of typically developing children tend to be more positive towards the video of the unfamiliar peer with LNFS who used the iPad™ with Proloquo2Go, could have positive implications for children who use AAC. In addition, it is particularly relevant, since both groups perceived the video of the unfamiliar peer with LNFS more positively on the communicative competence dimension of the CADAQ. The potential of the iPad™ with Proloquo2Go to motivate and enhance social interactions with peers (McNaughton & Light, 2013) could be positively harnessed.

4.3.2.2 Gender effects

Table 4.10 illustrates the boys' results for the dimensions of the CADAQ for both the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go and the video of the unfamiliar peer with LNFS using the communication board.

Table 4.10

Boys' Means, Standard Deviations and Paired T-test for the Video of the Unfamiliar Peer with LNFS Using the iPad™ with Proloquo2Go and the Video of the Unfamiliar Peer with LNFS Using the Communication Board

Dimension	iPad™ with Proloquo2Go		Communication Board		Differences		p-value*
	Mean	Std Dev	Mean	Std Dev	Diff. Mean	Diff. Std Dev	
Affective/ Behavioural Dimension	3.9252	0.6374	3.8703	0.6295	0.0549	0.4034	0.4260
Cognitive/Belief Dimension	3.1766	0.5454	3.1376	0.5687	0.0390	0.4144	0.5817
Communicative Competence Dimension	3.6593	0.6210	3.4857	0.6475	0.1736	0.4012	0.0151*

Note: * if $p \leq 0.05$, then significant at a 5% level

Results shown Table 4.10 illustrate that the means of the boys in the study were higher for the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go when compared to the video of the unfamiliar peer with LNFS using the communication board. The Communicative Competence Dimension (p-value 0.0151) indicated a statistically significant difference while the Affective/Behavioural (p-value 0.4260) and the Cognitive/Belief (p-value 0.5817) illustrated no statistically significant difference between the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go and the video of the unfamiliar peer with LNFS using the communication board.

Table 4.11 illustrates the girls' results for the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go and the video of the unfamiliar peer with LNFS using the communication board.

The results from Table 4.11 illustrate that the means scores for the girls in the

study were found to be higher for the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go than for the video of the unfamiliar peer with LNFS using the communication board. The Affective/Behavioural (p-value 0.0127), the Cognitive/Belief (p-value 0.0298) and the Communicative Competence Dimension (p-value <0.0001), showed a statistically significant difference between the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go and the unfamiliar peer with LNFS using the communication board for all three dimensions.

Table 4.11

Girls' Means, Standard Deviations and Paired Test for the Video of the Unfamiliar Peer with LNFS Using the iPad™ with Proloquo2Go and the Video of the Unfamiliar Peer with LNFS Using the Communication Board.

Dimension	iPad™ with Proloquo2Go		Communication Board		Differences		p-value*
	Mean	Std Dev	Mean	Std Dev	Diff. Mean	Diff. Std Dev	
Affective/ Behavioural Dimension	4.2075	0.5833	4.0626	0.6488	0.1449	0.3648	0.0127*
Cognitive/Belief Dimension	3.2410	0.6485	3.0634	0.6850	0.1776	0.5177	0.0298*
Communicative Competence Dimension	3.7477	0.6432	3.3613	0.5888	0.3864	0.4528	<0.0001*

Note: * if $p \leq 0.05$, then significant at a 5% level

The role gender plays on children's attitudes have been well documented over the past few years (Blockberger et al., 1993; Beck & Dennis 1996; Beck et al., 2000a; Beck et al., 2000b; Beck et al., 2002 & Lilienfeld & Alant 2002). Similarly, the results of this research study found that girls tended to be more positive towards an unfamiliar peer with disabilities who uses AAC communication devices than boys did.

The male participants in this study were found to be more positive towards the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go on the communicative competence dimension when compared to the video of the unfamiliar

peer with LNFS using the communication board. The importance of communicative competence and its influence on attitudes have been documented (Light, 1989; Light & McNaughton, 2014).

Previous researchers have established that intervention and awareness programmes had a positive impact on the attitudes of typically developing boys towards children with LNFS (Rillotta & Nettelbeck, 2007; Ison, McIntyre, Rothery, Smithers-Sheedy, Goldsmith, Parsonage, & Foy, 2010; Schwartz, Blue, McDonald, Giuliani, Weber, Seirup, Rose, Elkis-Albuhoff, Rosenfeld, & Perkins, 2010; Moore & Nettelbeck, 2013). Moore and Nettelbeck (2013) found that short-term disability awareness training on attitudes of adolescent boys in school towards persons with a disability, improved the boys' attitude scores towards children with LNFS.

A more positive impact could be made on the boys' attitudes if the devices implemented were viewed more positively. With the use of the high-technology non-dedicated device, typically developing boys might accept the use of iPad™ with Proloquo2Go more readily, which could assist with the inclusion of these children with LNFS.

4.4 Summary

This chapter presented and discussed the results according to the sub-aims as outlined in Chapter 3 (Section 3.2.2). Firstly, reliability was discussed in terms of the responses of participants and the CADAQ's internal consistency. Following this, the comparisons of responses between groups and within groups were discussed. Results of between group comparisons were discussed including the equivalence of the groups and the carry-over effect. The within group comparisons were presented according to the treatment and gender effect. These findings were discussed.

Chapter 5

Summary and recommendations

5.1 Introduction

This chapter provides a summary of and a critical evaluation of this research study. The clinical implications and limitations of the study are discussed and, finally, recommendations for future research are made.

5.2 Summary

The importance of knowing the attitudes of that typically developing children hold towards children with LNFS that use AAC devices has been highlighted in the literature. In South Africa, there is a dire need for AAC devices that affordable, acceptable, appealing and easy to use (Alant, 2007) The technology explosion has resulted in the high-technology non-dedicated AAC device, namely the iPad™ with Proloquo2Go, being more widely used by children with LNFS. Whilst the iPad™ with Proloquo2Go offers a child with LNFS many positive attributes, technology alone does not facilitate communication. Knowing peers' attitudes towards these technologies is important, since it could be argued that attitudes that were more positive would result in more interaction between the typically developing peer and the child with LNFS who use AAC.

The purpose of this study was to determine and compare the attitudes of typically developing children towards and unfamiliar peer with LNFS using a high-technology non-dedicated device (iPad™ with Proloquo2Go) and a low-technology (communication board) device. The 2 x 2 crossover design was utilized whereby the attitudes of typically developing children (aged 09;00-12;11) towards an unfamiliar peer with LNFS who used a high-technology non dedicated AAC device and low-technology device was determined. Group 1 viewed the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go video, followed by a video of the unfamiliar peer with LNFS

using the communication board. Group 2 viewed the video of the unfamiliar peer with LNFS using the communication board, followed by the video of the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go.

The results of this research study found that there were no statistically significant differences between these two groups regarding, gender and home language. The Cronbach's Alpha on the CADAQs revealed satisfactory internal consistency. In addition, the results of the study revealed that the video with the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go was perceived more positively when compared to the video of the unfamiliar peer with LNFS using a low-technology communication board. A statistically significant difference was found for the Affective/Behavioural and Communicative Competence dimensions on the CADAQ for Group 1 and a statistically significant difference was found on the Cognitive/Belief and Communicative Competence dimensions of the CADAQ for Group 2. A statistically significant difference was found within the communicative competence dimension for both groups. This finding is supported by previous research studies, where typically developing children displayed a more positive attitude towards an unfamiliar peer with a disability who was seen as being communicatively more competent (Beck et al., 2002). It may be argued that children who use the iPad™ with Proloquo2Go as a communication device will be perceived, by typically developing children, to be more communicatively competent and therefore they would be more positive toward a child with LNFS who uses this high-technology non-dedicated device.

The results also revealed a statistically significant difference between the girls' attitudes towards the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go video compared to the unfamiliar peer with LNFS using the communication board video, thereby indicating that girls had a more positive attitude towards the unfamiliar peer with LNFS using the iPad™ when compared to the unfamiliar peer with LNFS using the communication board.

5.3 Clinical Implications

The most important finding of this study was that the typically developing children displayed a more positive attitude towards the unfamiliar peer with LNFS using the iPad™ with Proloquo2Go within various dimensions of the CADAQ when compared to attitude toward the low-technology communication board. The use of the iPad™ with Proloquo2Go to assist with the process of inclusion for children with LNFS into mainstream schools could therefore be considered. As Liliensfeld and Alant (2002) noted, an AAC communication device plays only a small part in promoting the inclusion of children with LNFS into a mainstream school; however, a more positive attitude displayed by typically developing peers towards AAC devices can hold numerous advantages for social interaction and inclusion. The gender differences found in this study need to be considered in developing awareness programmes to facilitate inclusion of children with LNFS. Greater considerations, empathy and a more positive attitude within boys' perceptions of children with LNFS need to be developed.

5.4 Critical Evaluations

The study was evaluated in terms of its strengths and limitations.

5.4.1 Strengths of the study

The strengths of the study were:

- The 2 x 2 crossover design enabled both between and within group comparisons.
- The order effect could be controlled for in this study, with Group 1 and Group 2 viewing the same videos in a way that was counter balanced.
- The CADAQ is a previously published measure that has satisfactory internal consistency. In addition, it was used in the South African context.

- The paired randomization was a further strength of the study, since it enabled equivalence of groups in terms of age and gender.
- The two videos were scripted with similar displays that allowed the type of technology (high-technology non-dedicated AAC device and low-technology communication board) to be isolated.
- This study is the first of its kind to explore attitudes towards an unfamiliar peer with LNFS using a high-technology non-dedicated device, namely the iPad™ with Proloquo2Go as compared to a low-technology communication board.

5.4.2 Limitations of the study

Several limitations of the study were apparent:

- The small sample size limited generalization.
- Due to the crossover effect between groups a longer washout period may have been required.
- Generalization of the results is limited to English speaking participants from a specific geographical area.

5.5 Recommendations for future research

Recommendations for future research include:

- Replication of the study, but with a longer washout period between the viewing of the videos.

- Replication of the study, but with a descriptive survey design that will allow the comparisons of two equivalent groups of participants, where each group only watched one of the two videos respectively and then completed the CADAQ.
- This research study could be replicated on participants who have limited exposure and access to technology.
- Replications of the study where a high-technology dedicated AAC device is compared to a high-technology non-dedicated AAC device.
- Replication of this study, with a focus on varying levels of communication competence.

5.6 Summary

This chapter provided a summary of the study; the clinical implications of the study were also discussed. The critical evaluations and recommendations for future research were also presented.

References

- AAC RERC (2011). White paper on mobile devices and communication apps: An AAC RERC White Paper. *The Rehabilitation Engineering Research Center on Communication Enhancement (AAC-RERC)*
<http://aac-rerc.psu.edu/index.php/publications/list/type/3>
- AAPOR (2010). AAPOR outcome rate calculator: Standard definitions and Eligibility Calculator.
<http://www.aapor.org/resonse/ratesanoverview/3720.htm#UyQULT-Sz8Q>
- Abbot, C, Brown, D., Evett, L., Standen, P., & Wright, J. (2011). Learning differences and digital technologies: A literature review of research involving children and young people using assistive technologies 2007-2010. *King's College. London*, pp. 1-17.
- Aiken, L. R. (1996). *Rating scales and checklists. Evaluating Behaviour, Personality and Attitudes*. New York: John Wiley & Sons Inc.
- Alant, E. (2007, August 14). Covering the world of communication sciences and disorders: Training and intervention in South Africa. *The ASHA Leader*.
<http://www.asha.org/Publications/leader/2007/070814/f070814a1.htm>
- Anthonak, R.F., & Livneth, H. (1988). *The measurement of attitudes toward people with disabilities*. Springfield, IL: Charles C. Thomas.
- Anthanat, S., Curtin, C., & Knotak, D. (2013). Comparative observations of learning engagement by students with developmental disabilities using the iPad and computer: A pilot study. *Assistive Technology: The official journal of RESNA*, 24(4), 204-213. doi:10.1080/10400435.2012.761293

- Avramidis, E., Bayliss, P., Burden, R. (2000). A survey into mainstream teachers' attitudes toward intervention of children with special education needs in the ordinary school in one local education authority. *International Journal of Experimental Education Psychology*, 20(2), pp. 191-211. doi: 10.1080/713663717
- Baxter, S., Enderby, P., Evans, P., & Judge, S. (2012). Intervention using high-technology communication devices: A state of the art review. *School of Health and Related Research*. Sheffield, UK. *Folia Phoniatri*, 64, pp. 137-144. doi: 10.1159/000338250
- Beck, A. R., Bock, S., Thompson, J. R., & Kosuwan, K. (2002). Influence of communicative competence and augmentative and alternative communication technique on children's attitudes toward a peer who uses AAC. *Augmentative and Alternative Communication*, 18, pp. 217-227. doi: 10.1080/07434610212331281301
- Beck, A. R., & Dennis, M. (1996). Attitudes of children toward a similar-aged child who uses augmentative communication. *Augmentative and Alternative Communication*, 12(6), pp 78-87. doi: 10.1080/07434619612331277528
- Beck, A. R., Fritz, H., Keller, A., & Dennis, M. (2000 a). Attitudes of school-aged children toward their peers who use augmentative and alternative communication. *Augmentative and Alternative Communication*, 16, pp. 13-26. doi: 10.1080/07434610012331278874
- Beck, A. R., Kingsbury, K., Neff, A., & Dennis, M. (2000b). Influence of length of augmented messages on children's attitudes toward peers who use augmentative and alternative communication. *Augmentative and Alternative Communication*, 16, pp. 239-249. doi: 10.1080/07434610012331279094

- Beck, A.R., Thompson, J.R., Kosuwan, K., & Prochnow, J. M. (2010). The development and utilization of a scale to measure adolescents' attitudes toward peers who use Augmentative and Alternative Communication (AAC) devices. *Journal of Speech, Language, and Hearing Research* 53, pp. 572-587.
doi: 10.1044/1092-4388(2009/07-0140)
- Bender, L. F. (1980). Attitudes toward disabled people. *Developmental Medicine and Child Neurology*, 22, pp. 427-428.
- Bedrosian, J. L., Haog, L. A., & McCoy, K. F. (2004) Relevance and speed of messages delivery trade-offs in augmentative and alternative communication. *Journal of Speech, Language, and Hearing Research*, 46, pp. 800-817.
- Beukelman, D. R., & Mirenda, P. (2013). *Augmentative and alternative communication: supporting children and adults with complex communication needs*. (4th ed.). Baltimore, Maryland: Paul H. Brooks Publishing Co.
- Blischak, D. M., Lombardino, L. L., & Dyson, A. T. (2003). Use of speech-generating devices: In support of natural speech. *Augmentative and Alternative Communication*, 19(1), pp. 29-35. doi: 10.1080/0743461032000056478
- Blockberger, S., Armstrong, R. W., O'Connor, A., & Freeman, R. (1993). Children's attitudes towards a nonspeaking child using various augmentative and alternative communication techniques. *Augmentative and Alternative Communication*, 9(4), pp. 243-250. doi: 10.1080/07434619312331276661
- Bornman, J., Alant, E., & Meiring, E. (2001). The use of a digital voice output device to facilitate language development in a child with developmental apraxia of speech: A case study. *Disability and Rehabilitation*, 23(14), pp. 623-634.
doi: 10.1080/0963828011003651 7

- Bornman, J., & Donohue, D.K. (2013). South African teacher's attitudes toward learners with barriers to learning: Attention-deficit and hyperactivity disorders and little or no functional speech. *International Journal of Disability, Development and Education*, 60(2), pp. 85-104..doi: 10.1080/1034912X.2013.786554
- Bunning, K., Heath, B., & Minnion, A. (2009). Communication and empowerment: A place for rich and multiple media? *Journal of Applied Research in Intellectual Disabilities*, 22(4), pp. 370-379. doi: 10.1111/j.1468-3148.2008.00472.x
- Calculator, S. N. (1999). AAC outcomes for children and youth with severe disabilities: When seeing is believing. *Augmentative and Alternative Communication*, 15(1), pp. 4-12. doi: 10.1080/07434619912331278525
- Cantwell, D. P., & Baker, L. (1985). Speech and language: Development and Disorders. In M. Rutter & L. Hersov (Eds.), *Child and adolescent psychiatry: Modern approaches (2nd ed.)* pp. 526-544. Boston: Blackwell Scientific Publications.
- Cronbach, L. J. (1970). Other characteristics desired in tests. In: *Essentials of Psychological Testing*, 2nd ed. L. J. Cronbach (Ed.). pp. 160–161. Harper and Row, New York, NY, USA.
- Chappel, D. (2011). The evolution of augmentative communication and the importance of alternate access. *Perspectives on Augmentative and Alternative communication*, 20(4), pp. 34-37. doi:10.1044/aac20.1.34
- Clarke, M. T., Newton, C., Griffiths, T. Price, K., Lysley, A., & Petrides, K. V. (2011). Factors associated with the participation of children with complex communication needs. *Research in Developmental Disabilities*, 32(2), pp. 774-780. doi: 10.1016/j.ridd.2010.11.002

- Dada, S., & Alant, E. (2001). Teachers' attitudes towards learners with little or no functional speech using alternative/augmentative communication devices, *South African Journal of Education*, 21(2), pp. 99-103.
- Dada, S., & Alant, E. (2002). A comparative study of the attitudes of teachers at special and educationally inclusive schools towards learners with little of no functional speech using communication devices. *South African Journal of Education*, 22(3), pp. 213-218.
- De Boer, A., Phijl, S.J., & Minnaert, A. (2012). Students' attitudes towards peers with disabilities: A review of literature. *International Journal of Disability, Development and Education* 59(4), pp. 379-392.
doi: 10.1080/1034912X.2012.723944
- Drager, K., Light, J., & McNaughton, D. (2010). Effects of AAC intervention on communication and language for young children with complex communication needs. *Journal of Pediatric Rehabilitation Medicine*, 3(4), pp. 303-310.
doi: 10.3233/PRM-2010-0141
- Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes*. Fort Worth, TX: Harcourt Brace Javanovich.
- Education White Paper 6 (2001). *Special needs education: Building an Inclusive education and system*. Pretoria, Department of Education.
- Farrell, P. (2004). School psychologists: Making inclusion a reality for all. *School Psychology International*. 25(1), pp. 5-19. doi: 10.1177/0143034304041500

Flores, M., Musgrove, K., Renner, S., Hinton, V., Strozier, S., Franklin, S., & Hil, D. (2012). A comparison of communication using the Apple iPad and a picture-based system. *Augmentative and Alternative Communication*, 28(2), pp. 74-84.
doi: 10.3109/07434618.2011.644579

Gavrilis, G. (2014). *Evaluating iPad technologies as an augmentative and alternative communication device and its effects on vocal communication skills*. Unpublished Masters thesis, California State University, Fresno.

Gilmore, L., Campbell, J., & Cuskelly, M. (2003). Developmental expectations, personality stereotypes, and attitudes towards inclusive education: Community and teacher views of Down syndrome. *International Journal of Disability, Development and Education*, 50(1), pp. 65-76.
doi: 10.1080/1034912032000053340

Glennen, S. L., & DeCoste, D. C. (1997). *Handbook of Augmentative and Alternative Communication*. p.62. USA, Delmar: Singular Publishing Group.

Gonzales, C., Leroy, G., & De Leo, G. (2009). Augmentative and alternative communication technologies. *Handbook of research on developments in e-health and telemedicine: technologies and social perspective. Medical Information Sciences*, pp. 1-16.

Gorenflo, D. W., & Gorenflo, C. W. (1997). Effects of synthetic speech, gender, and perceived similarity on attitudes towards the augmented communicator. *AAC Augmentative an Alternative Communication*, 13, pp. 87-91.
doi: 10.1080/07434629712331277878

- Granlund, M., Björk-Åkesson, E., Wilder, J., & Ylvén, R. (2008). Intervention for children in a family environment: Implementing evidence in practice. *Augmentative and Alternative Communication*, 24(3), pp. 207-219. doi: 10.1080/08990220802387935
- Hager, E.B. (2010, October 29). iPad opens world to a disabled boy. *The New York Times Reprint*.
http://www.calgarycp.org/data/24/rec_docs/2715_IPad%20Opens%20World%20to%20a%20Disabled%20Boy.pdf
- Hayhoe, S. (2012). Using an iPad as an assistive device to improve technical literacy: Trial usage with an Emirati student. In: S. Dowling,(Ed.) *eLearning in action: Opening up learning*. Abu-Dhabi, UAE: Educational Technology Series .HCT Press.
- Higginbotham, D. J., & Jacobs, S. (2011). The future of the android operating system for augmentative and alternative communication. *Perspectives on Augmentative and Alternative Communication*, 20, pp. 52-56. doi:10.1044/aac20.2.52
- Higginbotham, D. J., Shane, H., Russel, S., & Caves, K. (2007). Access to AAC: present, past, and future. *Augmentative and Alternative Communication*, 23(3), pp. 243-257. doi: 10.1080/07434610701571058
- Hu, W. (2011). Math that moves: school embraces the iPad. *The New York Times*, 4.
- Ison, N., McIntyre, S., Rothery, S., Smithers-Sheedy, H., Goldsmith, S., Parsonage, S., & Foy, L. (2010). ‘Just like you’: A disability awareness program for children that enhance knowledge, attitudes and acceptance: Pilot study findings. *Development Neurorehabilitation*, 13, pp. 360-368. doi:10.3109/17518423.2010.496764

- Jones, B., & Kenward, M.G. (1989). *Design and Analysis of Cross-Over Trials: Monographs on Statistics and Applied Probability*. New Delhi, London: Thomson Press (India) Ltd.
- Johnson, G. M. (2013). Tactile input features of hardware: Cognitive processing in relation to digital device. *International Journal of Research and Reviews in Applied Sciences*, 41(2), pp. 464-469.
- Johnston, S.S, Reichle, J., & Evans, J. (2004). Supporting augmentative and alternative communication use by beginning communicators with severe disabilities. *American Journal of Speech-Language Pathology*, 13(1), pp. 20-30.
- King, S. M., Rosenbaum, P., Armstrong, R. W., & Milner, R. (1989). An epidemiological study of children's attitudes toward disability. *Developmental Medicine and Child Neurology*, 31(2), pp. 237-245.
doi: 10.1111/j.1469-8749.1989.tb03984.x
- Koul, R. (2003). Synthetic speech perception in individuals with and without disabilities. *Augmentative and Alternative Communication*, 19(1), pp. 49-58.
doi: 10.1080/0743461031000073092
- Kuehl, R. O. (2000). *Design of experiments: Statistical principles of research design and Analysis*. (2nd ed.). Pacific Grove, California: Duxbury Press, Brooks/Cole Publishing Co.
- Kuiper, N. A., & MacDonald, M. R. (1983). Reason, emotion, and cognitive therapy. *Clinical Psychology Review*, 3(3), pp. 297-316. doi: 10.1002/casp.849
- Law, J., Plunkett, C. C., & Stringer, H. (2012). Communication interventions and their impact on behaviour in the young child: A systematic review. *Child Language Teaching and Therapy*, 28, 7. doi:10.1177/0265659011414214

Light, J. (1988). Interaction involving individuals using augmentative and alternative communication systems: state of the art and future directions. *AAC Augmentative and Alternative Communication*, pp. 66-74.

doi: 10.1080/07434618812331274657

Light, J. (1989). Toward a definition of communicative competence for individuals using augmentative and alternative communication systems. *Augmentative and Alternative Communication*, 5(2), pp 137-144.

doi: 10.1080/07434618912331275126

Light, J., & Drager, K. (2007). AAC technologies for young children with complex communication needs: State of the science and future research directions. *Augmentative and Alternative Communication*, 23(3), pp. 204-216.

doi:10.1080/07434610701553635

Light, J., & McNaughton, D. (2012). Supporting the communication, language and literacy development of children with complex communication needs: State of the science and future research priorities. *Assistive Technology*, 24(1), pp. 34-44.

doi: 10.1080/10400435.2011.648717

Light, J., & McNaughton, D. (2014). Communication competence for individuals who require augmentative and alternative communication. *Augmentative and Alternative Communication*, 30 (1), pp. 1-18.

doi: 10.3109/07434618.2014.885080

Lilienfeld, M. (1999). The attitudes of children toward unfamiliar peers who use augmentative and alternative communication devices. *Centre for Augmentative and Alternative Communication*, pp. 1-87. University of Pretoria. Pretoria.

- Lilienfeld, M & Alant, E. (2002). Attitudes of children toward an unfamiliar peer using an AAC device with and without voice output. *Augmentative and Alternative Communication, 18*, pp. 91-101. doi: 10.1080/07434610212331281191
- Lloyd, L.L., Fuller, D. R., & Arvidson, H.H. (1997). *Augmentative and Alternative Communication: A handbook of principles and practice*. (1st ed), Pearson.
- Lomofsky, L. & Lazarus, S. (2001). South Africa: First steps in the development of an inclusive education system. *Cambridge Journal of Education, 31*(3), pp.303-317. doi: 10.1080/03057640120086585
- Maras, P., & Brown, R. (2000). Effects of different forms of school contact on children's attitudes towards disabled and non-disabled peers. *British Journal of Education Psychology, 70*, pp. 337-351. doi: 10.1348/000709900158164
- McCarthy, J. & Light, J. (2005). Attitudes toward individuals who use augmentative and alternative communication: Research review. *Augmentative and Alternative Communication, 21*(1), pp. 41-55. doi: 10.1080/07434610410001699753
- McGregor, G., Young, J. Gerak, J. Thomas, B., & Vogelsberg, R.T. (1992). Increasing functional use of an assistive communication device by a student with severe disabilities. *Augmentative and Alternative Communication, 8*(3), pp.243-250. doi: 10.1080/07434619212331276233
- McNaughton, D., & Light, J. (2013). The iPad and mobile technology revolution: Benefits and challenges for individuals who require augmentative and alternative communication. *Augmentative and Alternative Communication, 29*(2), pp. 107-116. doi: 10.3109/07434618.2013.784930
- McMillan, J. H., & Schumacher, S. (2001). *Research in Education: A conceptual introduction*. (5th ed.). US, Wisely Longman, pp. 358-390.

- Moore, D. & Nettelbeck, T. (2013). Effect of short-term disability awareness training on attitudes of adolescent schoolboys toward persons with a disability. *Journal of Intellectual and Developmental Disability*, 38(3), pp. 223-231.
doi: 10.3109/13668250.2013.790532
- Muran, J. C. (1991). A reformation of the ABC Model in cognitive psychotherapies: Implication for assessment and treatment. *Clinical psychology review*, 11, pp. 399 - 418.
- Nandy, K. (2012). Understanding and Quantifying Effect Size. [PowerPoint Slides]. Department of Biostatistics, School of Public Health, University of California, LA Retrieved from: <http://nursing.ucla.edu/workfile/research/Effect%20Size%.204-9-2012.pdf>
- Niemeijer, D., Leopold, M., Marden, J., de Wit, H., Barnick, J. & Harris, P. (2008-2013). Proloquo2Go; Communication on the Go for iPhone, iPod, and iPad. Manual version 3.0. *Assistive Hardware*. The Netherlands: Europe. Apple™, p. 7.
- Nowicki, E.A. (2006). A cross-sectional multivariate analysis of children's attitudes towards disabilities. *Journal of Intellectual Disability Research*, 50(5), pp. 335-348. doi: 10.1111/j.1365-2788.2005.00781.x
- Nowicki, E. A., & Sandieson, R. (2002). A meta-analysis of school-aged children's attitudes towards a person with physical and intellectual disabilities. *International Journal of Disability, Development and Education*, 51, pp. 287-313.
doi:10.1080/1034912022000007270
- Nunally, J. C. (1978). *Psychometric theory*. (2nd Ed.). New York: McGraw – Hill.

- Patel, R., & Roden, A. (2008). Intelligibility and attitudes toward a speech synthesizer vocoded using dysarthric vocalizations. *Journal of Medical Speech-Language Pathology, 16*(4), pp. 243-249.
- Raghavendra, P., & Allen, G. D. (1993). Comprehension of synthetic speech with three text-to-speech systems using a sentence verification paradigm. *Augmentative and Alternative Communication, 9*, pp. 126-133.
doi: 10.1080/07434619312331276511
- Raghavendra, P., Olsson, C., Sampson, J., McInerney, R., & Connell, T. (2012). School participation and social networks of children with complex communication needs, physical disabilities, and typically developing peers. *Augmentative and Alternative Communication, 28* (1), pp. 33-43.
doi: 10.3109/07434618.2011.653604
- Rillotta, F., & Nettelbeck, T. (2007). Effect of an awareness program on attitudes of students without an intellectual disability towards persons with an intellectual disability. *Journal of Intellectual and Developmental Disability, 32*(1), pp. 19-27.
doi: 10.1080/13668250701194042
- Roberts, C. M., & Lindsell, J. S. (1997). Children's attitudes and behavioural intentions towards peers with disabilities. *International Journal of Disability, Development and Education, 44*(2), pp. 133-145.
doi: 10.1080/0156655970440205
- Roberts, C. M., & Smith, P. R. (1999). Attitudes and behaviour of children toward peers with disabilities. *International Journal of Disability, Development and Education, 46*(1), pp. 35-50. doi: 10.1080/103491299100713

- Rodriquez-Fortis, M. J., Fernandes-Lopez, A., & Rodriquez, M. L. (2011). Mobile communication and learning applications for autistic people. *Autism spectrum disorders – From genes to environments*. Granada: ETSIIT. CITIC-UGR. University of Granada. Spain.
- Romski, M. (2005). Augmentative communication and early intervention: Myths and realities. *Infants and Young Children, 18*(3), pp. 174–185.
- Rosenbaum, P. L., Armstrong, R. W., & King, S. M. (1988). Determinants of children's attitudes towards disability: A review of evidence. *Children's Health Care, 17*(1), pp. 32-39.
- Saxe, R., Carey, S., & Kanwisher, N. (2004). Understanding other minds: Linking developmental psychology and functional neuroimaging. *Annual Review Psychology, 55*, pp. 87-124. doi: 10.1146/annurev.psych.55.090902.142044
- Schepis, M. M., & Reid, D. H. (1995). Effects of a voice output communication aid on interaction between support personnel and an individual with multiple disabilities. *Journal of Applied Behavior Analysis, 28*(1), pp. 73-77.
- Schlosser, R. W. (2003). Roles of speech output in augmentative and alternative communication: Narrative Review. *Augmentative and Alternative Communication, 19*(1), pp. 5-27. doi: 10.1080/0743461032000056450
- Schwartz, D., Blue, E., McDonald, M., Giuliani, G., Weber, G., Seirup, H., Rose, S., Elkis-Albuhoff, D., Rosenfeld, J., & Perkins, A. (2010). Dispelling stereotypes: Promoting disability and equality through film. *Disabilities and Society, 25*, pp. 841-848. doi:10.1080/09687599.2010.520898

- Sellwood, D., Wood, D., & Raghavendra, P. (2012). Perspectives on the telecommunications access methods of people with complex communications needs. *Telecommunications Journal of Australia*, 62(2), pp. 1-11.
- Sigafoos, J. (2010). Introduction to the special issue on augmentative and alternative communication. *Journal of Physical Disability*, 22, pp. 101-104.
doi: 10:1007/s10882-10-9197
- Silinger, D., Sherrill, C., & Jankowski, C.M. (2000). Children's attitudes toward peers with severe disabilities: Revisiting contact theory. *Adapted physical activity quarterly*, 17, pp. 175-196.
- Solomon, G., & Almog, T. (1998). Educational psychology and technology: A matter of reciprocal relations. *Teachers College Record*, 100 (1), pp. 222-241.
- Soto, G., Müller, E., Hunt, P., & Goets, L. (2001). Critical issues in the inclusion of students who use augmentative and alternative communication: an educational team perspective. *AAC Augmentative and Alternative Communication*, 17, pp. 62-72. doi: 10.1080/aac.17.2.62.72
- South African Government (1996). South African School Act No. 84 of 1996. Presidents Office.
- South African Government (1996). The Constitution of the Republic of South Africa, *Chapter 2: Bill of Rights*. Parliament.
- Swaim, K.F., & Morgan, S.B. (2001). Children's attitudes and behavioural intentions toward a peer with autistic behaviours: Does a brief education intervention have an effect? *Journal of Autism and Developmental Disorders*, 31, pp. 195-205.

- Todman, J. (2000). Rate and quality of conversations using a text-storage AAC system: single case training study. *Augmentative and Alternative Communication*, 16, pp. 164-179. doi: 10.1080/07434610701287564
- Towfighty-Hooshyar, N., & Zingle, H. W. (1984). Regular-class students' attitudes toward integrated multiply handicapped peers. *American Journal of Mental Deficiency*, 88(6), pp. 630-637.
- Triandis, H.C. (1971). *Attitude and attitude change*. New York, NY: Wiley.
- Vass, A. (2010). Communication Apps – A Review. *TechnoTalk Newsletter*, 19(5), pp. 2-6.
- Voeltz, L. M. (1980). Children's attitudes toward handicapped peers. *American Journal of Mental Deficiency*, 84(5), pp. 455-464.
- Wang, D., & Bakhai, A. (2006). *Clinical Trials: A practical guide to design, analysis and reporting*. pp. 91-99. London: Andrew Ward, UK.
- Watson Hyatt (2011). The iPad: A cool communicator on the go. *Perspectives on Augmentative and Alternative Communication*, 20, pp. 24-27.
doi:10.1044/aac20.1.24
- Wendt, O., & Lloyd, L. L. (2011). Definitions, history, and legal aspects of assistive technology. In O.Wendt, R.W. Quist, & L. L. Lloyd (Eds.), *Assistive technology: Principles and applications for communication disorders and special education*. pp. 1–22. Howard House, Wagon Lane, Bingley: Emerald Group Publishing Limited.

- Wilkinson, K. M., & Hennig, S. (2007). The state of research and practice in augmentative and alternative communication for children with developmental/intellectual disabilities. *Mental retardation and developmental disabilities Research Review, 13*, pp. 58-69. doi: 10.1002/mrdd.20133
- Wood, L.A., Lasker, J., Siegel-Causey, E., Beukelman, D.R., & Vall, L. (1998). Input framework for Augmentative and Alternative Communication. *Augmentative and Alternative Communication, 14*, pp. 261-267.
doi: 10.1080/07434619812331278436
- Zang, H., & Betts, J. D. (2012). The analysis of the potential capability of iPad used in mobile-learning. *International Conference on Future Computers in Education, 24*, pp. 116-120.

Appendix A
Ethics Approval: University of
Pretoria



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Office of the Deputy Dean

22 May 2013

Dear Prof Bornman

Project: Children's attitudes towards interaction with an unfamiliar peer with little or no functional speech: comparing high and low technology devices
Researcher: T Horn
Supervisor: Dr S Dada
Department: Centre for Augmentative and Alternative Communication
Reference: 22013025

Thank you for your response to the Committee's letter of 29 April 2013.

I have pleasure in informing you that the Research Ethics Committee formally **approved** the above study at an *ad hoc* meeting held on 22 May 2013.

Please note that data collection may not commence prior to the schools giving written permission; proof of this approval is therefore required. To facilitate the administrative process, please respond to Ms Tracey Andrew, Room HB 7-27, at your earliest possible convenience.

We wish you success with the project.

Sincerely

Prof. Sakhela Buhlungu
Chair: Postgraduate Committee &
Research Ethics Committee
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail: Sakhela.buhlungu@up.ac.za

Appendix B

Ethical Clearance: Department of Education



GAUTENG PROVINCE

Department of Education
REPUBLIC OF SOUTH AFRICA

For administrative use:
Reference no. D2014/003

GDE RESEARCH APPROVAL LETTER

Date:	2 April 2013
Validity of Research Approval:	2 April 2013 to 20 September 2013
Name of Researcher:	Horn T.
Address of Researcher:	P.O. Box 13270
	Clubview
	0014
Telephone Number:	072 368 2628
Email address:	tenille.horn@gmail.com
Research Topic:	Children's attitudes toward interaction with an unfamiliar peer with little or no functional speech: Comparing high and low technology devices
Number and type of schools:	THREE Primary Schools
District/s/HO	Tshwane South

Re: Approval in Respect of Request to Conduct Research

This letter serves to indicate that approval is hereby granted to the above-mentioned researcher to proceed with research in respect of the study indicated above. The onus rests with the researcher to negotiate appropriate and relevant time schedules with the school/s and/or offices involved to conduct the research. A separate copy of this letter must be presented to both the School (both Principal and SGB) and the District/Head Office Senior Manager confirming that permission has been granted for the research to be conducted.

The following conditions apply to GDE research. The researcher may proceed with the above study subject to the conditions listed below being met. Approval may be withdrawn should any of the conditions listed below be flouted:

Making education a societal priority

Office of the Director: Knowledge Management and Research

9th Floor, 111 Commissioner Street, Johannesburg, 2001
P.O. Box 7710, Johannesburg, 2000 Tel: (011) 355 0506
Email: David.Makhado@gauteng.gov.za
Website: www.education.gpg.gov.za

Makhado 2013/04/03

Appendix C Principal Consent Letter

Date: 22 August 2013



Dear Mr. [REDACTED]

Request to take part in research project

I hereby request permission to conduct research at [REDACTED].

I am currently a Masters student in Augmentative and Alternative Communication (AAC) at the Centre for Augmentative and Alternative Communication (CAAC) at the University of Pretoria. In order for me to comply with the requirements set out for degree purposes, I have to do a full research study. The aim of the study is to determine and compare the attitudes of typically developing children towards an unfamiliar peer with little or no functional speech who uses a high-technology device (iPad with Proloquo2Go) and a low-technology device (a communication board).

Research Topic:

Children's attitudes toward interaction with an unfamiliar peer with little or no functional speech: Comparing high- and low-technology devices

Rationale of Study:

Children with disabilities, who have little or no functional speech (LNFS), make use of AAC as a means of communicating with others. Hence, AAC refers to other means of communicating, except through speech. With the use of various symbols and devices, depending on the child's needs, children with disabilities are able to express their thoughts, feelings, wants and ideas, hence allowing them to communicate effectively in everyday life. A positive attitude towards a specific device, which a child with LNFS uses to communicate with, may assist with the inclusion of these children into mainstream schools. This may lead to a better educational experience, the development of various education strategies and better implementation of legislation. Determining and comparing the attitudes of typically developing children towards child with LNFS, using a high-technology device and a low-technology device, could assist interventionist when deciding on an appropriate communication device for children with disabilities.

Objectives of the study:

The main objective of the study is to determine and compare the attitude of typically developing children aged 9; 00 - 12; 11 toward an unfamiliar peer with little or no

functional speech using high-technology AAC device namely an iPad™ with Proloquo2Go and a low-technology communication board.

The sub-aims formulated for this study is:

- To determine the attitudes of typically developing children aged 9; 00 - 12; 11 (years; months), towards an unfamiliar peer with little or no functional speech using an iPad™ with Proloquo2Go
- To determine the attitudes of typically developing children aged 9; 00 - 12; 11, towards an unfamiliar peer with little or no functional speech using a communication board
- To compare the attitudes of typically developing children aged 9; 00 - 12; 11, towards an unfamiliar peer with little or no functional speech using the iPad™ with Proloquo2Go and a communication board
- To determine if the gender of typically developing children aged 9; 00 - 12; 11, influences their attitudes towards an unfamiliar peer with little or no functional speech using an iPad™ with Proloquo2Go and a communication board.

What will be expected of us as a school?

Once approval has been granted for the researcher to conduct the proposed research study at your school, the researcher will commence with the selection of Grade 4, 5 and 6 learners, from the Intermediate Phase. This selection entails access to the Grade 4, 5 and 6 class lists and the assistance of their teachers/HOD to distribute and collect the Informed Parental Consent Letters. The researcher kindly requests a meeting with the teacher/HOD who will be the correspondent between the school and the researcher, in order to discuss the general and data collection procedures to be followed. Furthermore, you will also be granting the researcher permission to use your premises as the main site for conducting the research. A classroom/media centre/library/school hall with tables and chairs will be required where approximately 35 participants, this is one class at a time, can sit and watch two videos and answer questionnaires thereafter pertaining to the videos which they have seen. A TV and DVD player will be brought to school where the videos will be shown on. The viewing and completion of the questionnaires can be arranged at such a time when it is convenient for the school and will result in the least interruption of academic and various activities time.

Procedures:

All the participants', whose parents give their consent for their child to participate in the research, will receive an assent form on the day of the data collection (viewing of the video and completion of the questionnaires). The researcher will read the assent form with the children and if they decide that they would like to participate, they will be required to complete this assent form. The Grade 4, 5 and 6 learners, between the ages of 9; 00 - 12; 11, will be selected class by class, for the purpose of data collection. The first class will watch a video of a child with little or no functional speech communicating with an iPad™ with Proloquo2Go and then they will answer a questionnaire thereafter. They will then watch a second video of a child with little or no functional speech communicating with a communication board and then answer the same questionnaire

again. The first class of participants will then be dismissed back to their class. The second class will also watch these videos but in a different order. After the second class has watched the videos and completed the questionnaires, these participants will be dismissed back to their class. Each class will take approximately 60 minutes to watch the video and complete the questionnaires. An additionally 60 minutes will be required for the setup of the projector and screen and the collection of all the participants including the collection of these participants and distribution of their booklets.

Who can participate in this study?

There is a specific selection criteria set out for the children to be able to take part in this research study. The children must be between the age of 9; 00 - 12; 11 and be registered at your school for a period of two or more years. The children's parents should give their consent for their children's participation in the study and the children should also give their assent for the participation in the study. Furthermore, the children should be in a school where their language of teaching and learning is in English.

How do we handle the Parent Informed Consent Letters?

Each learner or potential participant in Grade 4, 5 and 6 will receive a participant number, which will be allocated on the class list. This number will be transferred onto to the potential participants Parents Informed Consent Letter and Biographical Information Sheet. These letters will then be brought to school along with a copy of the class lists. The teachers can then clearly see which participant gets which letter by referring to the number allocated next to their name on the class list. If it is found that a Informed Consent Letter or Biographical Information Sheet is missing from the packs or do not correspond to the class list, the researcher kindly requests the teacher/HOD to contact the researcher in this situation. Please do not change the numbers allocated to the participants or give these letters to participants who have not been selected, as this may entail potential participants being selected without having the necessary participation selection criteria requirements.

Risks and Benefits of Participation:

By participating in the research, the participants will enable the researcher to determine the attitudes that typically developing children hold towards an unfamiliar peer with little or no functional speech communicating using these devices. The participants will voluntarily participate in this project and will not receive any incentive to participate in this study. As a token of appreciation they will receive a pencil at the end of the session. Participants may withdraw at any time from the study without any negative consequences. Furthermore, the data from the questionnaires will be handled with confidentiality and will be used in this research study only. There will be no identifiable information of the school or participants in this study.

Approval already granted by:

Approval for the research project has already been granted by the University of Pretoria Ethics Board as well as the Government Department of Education.

Who will have access to the results of this study?

The research results will be made available upon request following the completion of the project. The research data will be stored both as a hard copy and in an electronic format at the University of Pretoria for 15 years as part of the ethical requirements of the University. Results may also be shared with other professionals in article format.

Who can be contacted about this study?

Please feel free to contact me on the contact details below, if you have any further queries:

Researcher: Tenille Horn (BEd: Senior Phase; BA (Hons) AAC)
072 368 2628
tenille.horn@gmail.com

I trust that this letter has provided you with sufficient information as to allow you to grant the researcher permission to conduct the proposed study at your school.

Thank you for time in this regard.
Kind Regards,



Me. Tenille Horn
Researcher

Dr. Shakila Dada
Supervisor
shakila.dada@gmail.com
012 420 2001

Date: 16 July 2013

Principal permission for school's participation in research: Consent Reply Slip

Please complete this form and return it, to the researcher

School name: _____

Research Topic:

Children's attitudes toward interaction with an unfamiliar peer with little or no functional speech: Comparing high- and low-technology devices

Researcher: Tenille Horn
Master's Student
University of Pretoria

Supervisor: Dr. Shakila Dada

I _____
Name and Surname

hereby:

- Give consent for the school to take part in this research
- Do not give consent for the school to take part in this research
- Understand all aspects related to the study
- I am aware that no harm will come to any participants participating in the study
- I have a classroom/media centre/library available for the viewing of the videos and completing of the questionnaires
- The teachers can assist with distributing and collecting the consent letters to/from the potential participants parents.

Principal Signature

Date

Tenille Horn
Researcher

Date

School Stamp

The school would like to get feedback about the results of this study.


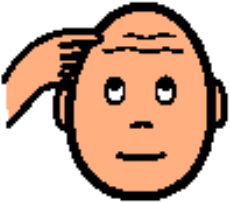

Appendix D




Informed Parent Consent Letter

Dear Parent

Date: 23 August 2013

I am currently a Masters student in Augmentative and Alternative Communication (AAC) at the Centre for Augmentative and Alternative Communication (CAAC) at the University of Pretoria. In order for me to comply with the requirements set out for degree purposes, I have to do a full research study. The aim of the study is to determine and compare the attitudes of typically developing children towards an unfamiliar peer with little or no functional speech (LNFS) who uses a high-technology device (iPad™ with Proloque2Go) and a low-technology device (a communication board).

	<p>Research topic: Children’s attitudes toward interaction with an unfamiliar peer with LNFS: comparing high- and low-technology devices</p>
	<p>Rationale for the study: Children with disabilities, who have LNFS, make use of AAC as a means of communicating with others. AAC refers to other means of communicating, except through speech. With the use of various symbols and devices, depending on the child’s needs, children with disabilities are able to express their thoughts, feelings, wants and ideas, hence allowing them to communicate effectively in everyday life. A positive attitude towards a specific device, which a child with LNFS uses to communicate with, may assist with the inclusion of these children into mainstream schools. This may lead to a better educational experience, the development of various education strategies and better implementation of legislation. Determining and comparing the attitudes of typically developing children towards children with LNFS, using a high-technology device and a low-technology device, could assist interventionist when deciding on an appropriate communication device for children with disabilities.</p>
	<p>What is expected of my child? Your child will be asked to watch two videos of a child with LNFS communicating with two devices and answer two questionnaires pertaining to the videos that they have seen. There is no right or wrong answers. The answers given by your child on the questionnaires will only be viewed by the researcher. The session will be conducted at school, will be no longer than 60 minutes and will take place in non academic times. In order to enable your child to take part in this study you are requested to complete the attached <i>Reply Slip</i> and the <i>Biographical Information sheet</i>, giving permission for your child to take part in the research. Please read the <i>Reply Slip</i> and <i>Biographical Information Sheet</i> carefully and ensure that you have selected and ticked (✓) all the appropriate blocks needed for your child to take part in this study. Please note that all forms will be treated as strictly</p>

	confidential.
	<p>Will my child experience any risk or discomfort?</p> <p>At no time during the research will your child be at risk or subjected to any harm whatsoever. They will be in their group and only watch two videos and answer some questions after each video that they have seen. After the session has taken place, the researcher will give your child a pencil as a token of appreciation.</p>
	<p>What are my child's rights as a participant in this study?</p> <p>Your child's participation in the research is voluntary and he/she will be allowed to withdraw at any time without any consequences. After you have given your permission for your child to take part in the study, your child's assent will also be requested, whereby your child will choose whether to take or not to take part in the research. This will be done on the day of data collection. The researcher will thoroughly explain the research study and the procedures that will be followed. The children will then be requested to complete the letter where they can indicate their willingness to or not to take part in the study. Should your child feel that he/she would like to stop at any time; your child can simply bring it to the researcher's attention by raising his/her hand and say that he/she would like to stop now. Your child will be allowed to leave without any consequences. Under no circumstances will your child be coerced into doing the study as his/her participation is strictly voluntary and of his/her free will.</p>
	<p>Will I have access to the research results?</p> <p>The answers of your child will be combined along with the other children's answers, there after it will be statistically analysed in order to answer the questions posed in the research study. The research study results will be made available upon request following the completion of the study. If you would like a copy of the research results you are requested to tick (✓) the appropriate block on the <i>Reply Slip</i>. For archival purposes the research study will also be stored at the University of Pretoria's at the CAAC for 15 years.</p>

If you require further information after reading this document, please feel free to contact the researcher on the details below:

Researcher: Tenille Horn (BEd: Senior Phase; BA (Hons) AAC)

072 368 2628
tenille.horn@gmail.com

Supervisor: Dr. Shakila Dada
shakila.dada@gmail.com
 012 420 2001

Co-Supervisor: Alecia Samuels

alecia.samuels@up.ac.za

Thank you for your time in this regards,
Kind regards



Ms. Tenille Horn
Researcher

Dr. Shakila Dada
Supervisor

Date: 23 August 2013

For Official Use

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Parent Informed Consent: Consent Reply Slip
(Please complete this form and return it to school)

Name and Surname of Child: _____

Research Topic: Children's attitudes toward interaction with an unfamiliar peer with little or no functional speech: comparing high- and low-technology devices

Researcher: Tenille Horn
Master's Student
University of Pretoria

Supervisor: Dr. Shakila Dada

I _____
(Parent name and surname)

Parent / Legal guardian / Caregiver of _____ in Grade _____
(Child name and surname)

hereby acknowledge that I have read this letter and:

Give consent for my child to participate in this study

Do not give consent for my child to participate in this study

Parent Signature

Date

Tenille Horn
Researcher

Date

I would like to get feedback on the results of this study

Appendix E

Biographical Information Sheet

Biographical Information Sheet

(Please complete this form and send it to school along with the reply slip)

		For Official Use				
Participant Number:		V1				
Child Name and Surname:						
Child Date of Birth:		V2				
	dd/mm/yyyy					
Gender of Child:	<table border="0" style="border-collapse: collapse;"> <tr> <td style="padding-right: 10px;">Boy</td> <td style="border: 1px solid black; width: 40px; height: 20px; text-align: center;">1</td> </tr> <tr> <td>Girl</td> <td style="border: 1px solid black; width: 40px; height: 20px; text-align: center;">2</td> </tr> </table>	Boy	1	Girl	2	V3
Boy	1					
Girl	2					
Number of years your child has been attending this school:		V4				
What is the Home Language of your child:						
	<i>(Please tick (✓) the appropriate block)</i>					
Afrikaans	1	V5				
English	2					
isiNdebele	3					
isiXhosa	4					
isiZulu	5					
Sepedi	6					
Sesotho	7					
Setswana	8					
Siswati	9					
Tshivenda	10					
Xitsonga	11					
Has your child had any previous experience with a person with disabilities using a device to communicate with?						
	<i>(Please tick (✓) the appropriate block)</i>					
Yes	1	V6				
No	2					

Appendix F

Participant Assent Letter

Date: 11 September 2013

For Official Use

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Participants Assent Procedure and Letter

Your name and surname: _____ **Age:** _____

After each section has been read, you have to circle the 'yes' or 'no' to show me that you understand what was read to you

I am a Masters student at the University of Pretoria and today I would like to collect some information in order for me to complete my studies.

What is the research topic?

This researcher topic is: Children's attitudes toward interaction with an unfamiliar peer with LNFS: comparing high- and low-technology devices

Why is it important for you to participate in this study?

You can help children who have disabilities and who are unable to speak to find a good way of talking to others in school.

What do you have to do when you participate in this study?

Today I will show you two short videos of a child who communicates in different ways and does not speak. After watching the first video, I will read out the questions and you will answer by ticking in a column in your booklet. After that, you will watch a second video of the same child using another way of communicating and again I will read the questions and you will answer in your booklet. That will be all you have to do. There is no right or wrong answers, so you can choose the answer that feels right for you.



Would you like to watch these videos today?

YES	NO
-----	----



Would you like to take part in this study today?

YES	NO
-----	----

For Official Use

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Can I stop if I don't want to do it anymore?

You can stop at any time; your participation in this study is voluntary and you can choose to take part in the study. You will not be in trouble if you decide that you do not want to take part anymore. If you would like to stop, you can put your hand up and just tell me that you want to stop. I will then allow you to go back to your class.



Do you understand that you may stop when you want to without any consequences?

YES	NO
-----	----



Do you understand that you CAN choose to take part in this study?

YES	NO
-----	----

What will happen with my answers?

I will not show your answers to anyone, the answers you choose in your booklet will only be seen by me. I will then combine everybody's answers in this group together and I will write a report on it to help other people understand which way of communicating is the best way for children who cannot speak. I will come back to the school and discuss the combined answers so that you can see as a group what answers were given and what the results of my study was.



Do you know that your answers will only be seen by me?

YES	NO
-----	----



Did somebody read the letter to you and explain to you what you will have to do today?

YES	NO
-----	----

Your Signature:

Date:

Teacher Tenille Horn
Researcher

Dr Shakila Dada
Supervisor

Appendix G

Informed Parental Consent Letter of Person with LNFS

Date: 10 June 2013

Dear Parent/Legal Guardian of [REDACTED]

Request for participation in research project

Currently I am Masters student in Augmentative and Alternative Communication (AAC) at the Centre for Augmentative and Alternative Communication (CAAC) at the University of Pretoria. In order for me to comply with the requirements set out for degree purposes, I have to do a full research study. The aim of the study is to determine and compare the attitudes of typically developing children towards an unfamiliar peer with little or no functional speech who uses a high-technology device (iPad™ with Proloquo2Go) and a low-technology device (a communication board).

I am cordially requesting you permission for your child to take part in this study. I am aware that she is a competent communicator regarding the use of an iPad™ with Proloquo2Go and a communication board.

What will be required of your child?

Two videos will be made of your child communicating with two different communication devices. In the first video, she will be using a high-technology device, namely the iPad™ with Proloquo2Go, to communicate with the communication partner and in the second video, she will be using a communication board to communicate with the communication partner. Both videos will have a script which your child and the communication partner will follow exactly, in order to ensure that the interaction process is the same in both videos. It will take about an hour to make both the videos which include the practicing of the script before the time. Due to the fact that the participants, who will be viewing the video is 9; 00 – 12; 11 years old, your child will have to wear school clothes, as the participants could then associate better with the person they are seeing in the video. These clothes will be provided by the researcher.

What will the researcher do with the videos?

The two videos made will be shown to the participants (typically developing children) divided into two groups. They will watch the videos in different sequences and then answer questions on the videos that they have seen, regarding the use of the high-technology and low-technology communication devices. Due to the fact that the participants will only see your child from the back and one alias name is utilized for her, for e.g. Grace, her anonymity will be ensured. The videos made will be used for conference presentations, research purposes, journal articles and to write a thesis. Your child's anonymity will be ensured throughout the use of the videos.

What will the research participants see?

The typically developing children aged 9;00 – 12;11 who will be the participants, will see both the videos. The two videos will start of with just a view of the communication devices (the iPad™ with Proloquo2Go in the first video and a communication board in the second video). The video camera will then zoom out in order for the participants to see the back of your child and the communication devices simultaneously. She will be communicating with the communication partner through the use of these devices and the participants will only be able to see her from the back

Should you agree that she is allowed to make the videos with the researcher, you are requested to please complete and sign the reply slip below. If you would like a copy of the final research report and the two videos, you are welcome to request it and I will send it through to you. The data collected and videos will be in safekeeping at the Centre for AAC, University of Pretoria for 15 years.

If you require further information after reading this document, please feel free to contact me on the details below:

Researcher: Tenille Horn (BEd: Senior Phase; BA (Hons) AAC)
072 368 2628
tenille.horn@gmail.com

Supervisor: Dr. Shakila Dada
shakila.dada@gmail.com

Co-Supervisor: Alecia Samuels
alecia.samuels@up.ac.za

Kind Regards,



Me. Tenille Horn

Researcher

Dr. Shakila Dada

Supervisor

Date: 10 June 2013

Caregiver permission for participation in video: Consent Reply Slip

Please complete this form and return it, to the researcher

Name of Caregiver: _____

Research Topic: Children's attitudes toward interaction with an unfamiliar peer with little or no functional speech: Comparing high- and low-technology devices

Researcher: Tenille Horn
Master's Student
University of Pretoria

Supervisor: Dr. Shakila Dada

I _____ (Name and Surname) hereby:

- Give consent for my child to be video taped for the research project
- Do not give consent for my child to be video taped for the research project
- I understand that 160 typically developing children aged 09;00- 12;11 will view the videos made and then answer questions pertaining to the videos that they have seen
- I understand that the information gathered from the questionnaires will be handled with confidentiality and used for research purposes, conference presentations, journal articles and to write a thesis
- I understand that the videos made will be handled with anonymity and used for research purposes, conference presentations, journal articles and to write a thesis
- I understand that no identifiable information will be given in the long term, and the research paper and the videos made will be stored for a period of 15 years in a safe place at the CAAC at the University of Pretoria, for archival purposes.

Signature

Date

Tenille Horn
Researcher

Date

- I would like to get feedback about the results of this study
- I would like a copy of both the videos made for the research project

Appendix H
Person with Little or No Functional Speech Assent Letter

Dear Miss. [REDACTED]

Date: 10 June 2013

Assent Form: Participation in Research Project

Research topic: Children's attitudes toward interaction with an unfamiliar peer with little or no functional speech: Comparing high- and low-technology devices

Why is it important for you to participate in this study? With your assistance two videos will be made of you communicating with a communication partner with an iPad™ with Proloquo2Go and a communication board. These videos made will allow the researcher to do a study on the attitudes of typically developing children towards an unfamiliar peer with little or no functional speech using these devices.

What do you have to do when you participate in this study? I am aware that you are a competent communicator with the use of an iPad™ with Proloquo2Go and a communication board. The communication processes in both videos will be done with a script, which will ensure that the same message is used in both the videos. These videos will start of with just a view of the communication devices (iPad™ with Proloquo2Go) in the first video and a communication board in the second video) that you will be using to communicate with. The video camera will then zoom out in order for the participants to see you from the back, while you are using the communication devices from a distance. An alias name, Grace, will be utilized for, your anonymity.

What will happen to the videos? The two videos made (will be shown to typically developing children aged 9 - 12 years. They will answer some questions on how you use the different devices to communicate with others. The videos made will be used for research purposes, conference presentations, journal articles and to write a thesis. The videos and the research study will be kept at the Centre for Augmentative and Alternative Communication at the University of Pretoria for 15 years.

What are your rights as a participant? I will show you both the videos made. If you do not want to participate in the study anymore you can choose not to and there will be no penalties because of this. Should you agree to the making of the videos for this research study, you are requested to please complete and sign the attached reply slip below. Thank you very much that you are willing to help me.



Teacher Tenille Horn
Researcher

Dr Shakila Dada
Supervisor









Assent Form

Date: 10 June 2013

Name: _____

Date: _____

Make a tick next to the one that you choose:

	Did somebody read the letter to you and explain to you what you will have to do today?		
	Yes		No
	Do you understand that you may choose to take part in the video?		
	Yes		No
	Do you understand that you may stop the video or choose not to let it be seen by anyone if you want to?		
	Yes		No
	Do you understand that other children and individuals will be seeing the videos?		
	Yes		No
	Do you have any questions to ask me?		
	Yes		No
	Would you like to make the video today?		
	Yes		No
	Would you like a copy of the videos and the research study?		
	Yes		No
	Do you understand that the videos and research study will be kept at the Centre or Augmentative and Alternative Communication at the University of Pretoria for 15 years?		
	Yes		No

 Signature

 Date

 Tenille Horn
 Researcher

Appendix I
 Communication Aid/Device Attitudinal Questionnaire (CADAQ)

Communication Aid/Device Attitudinal Questionnaire
(CADAQ)

Please use a tick (✓) to indicate your answer

For Official Use

Participant Number

V1

--	--	--

Group

V7

--

Video

V8

--

		I strongly agree	I agree	I can't decide	I disagree	I strongly disagree		
e.g	Bubblegum tastes great							
e.g	School pupils enjoy detention							
1	Grace took an active part in the conversation						A1	
2	Our class works too quickly for Grace						A2	
3	Kim understood everything Grace said						A3	
4	Grace would find it difficult to make friends at my school						A4	
5	If I couldn't speak I would like to communicate like this						A5	
6	I would worry if Grace sat next to me in class						A6	
7	I found it easy to understand what Grace meant						A7	

		I strongly agree	I agree	I can't decide	I disagree	I strongly disagree		
8	I think Grace has many friends						A8	
9	I would be scared to talk to Grace						A9	
10	I would like to talk to Grace						A10	
11	There must be better ways for Grace to communicate						A11	
12	I would tell my secrets to Grace						A12	
13	I would be embarrassed to communicate like Grace does						A13	
14	It was easy to understand what Grace was 'saying'						A14	
15	It would be fun to talk to Grace						A15	
16	Grace would be unwelcome at my birthday party						A16	
17	Grace would get teased in our class						A17	

		I strongly agree	I agree	I can't decide	I disagree	I strongly disagree		
18	If Grace was in my class I would like to do a project with her						A18	
19	Grace could not communicate quickly enough						A19	
20	Grace would be popular with the boys						A20	
21	I would try to stay away from Grace if she came to my school						A21	
22	Grace was frustrated communicating like that						A22	
23	Grace was unable to say what she really wanted to						A23	
24	Grace could answer Kim's questions quickly enough						A24	
25	Grace would need lots of help in the classroom						A25	
26	I feel upset when I see how Grace has to 'talk'						A26	
27	Kim did not always understand what Grace wanted to say						A27	

		I strongly agree	I agree	I can't decide	I disagree	I strongly disagree		
28	Grace would not be my best friend						A28	
29	Grace had interesting things to say						A29	
30	The way Grace communicated with Kim resulted in some misunderstanding						A30	
31	I would like to go to 'The Spur' with Grace						A31	
32	Grace most likely comes last in class						A32	
33	Grace should be good with computers						A33	
34	I do not think Grace has much fun						A34	
35	Grace could say exactly what she wanted to						A35	
36	Grace needs lots of help to tell a story						A36	
37	I would like Grace to sit next to me in class						A37	

Appendix J

Instructional script

Instructional script for participants

Instructions are the same for Group 1 and Group 2 with crossover, were Video 1 will be shown first to the participants in Group 1 and Group 2 will view Video 2 first.

GROUP 1:

When participants have settled down:

(Researcher starts Audio Recorder). Good afternoon and welcome to this research study. My name is Tenille and these are my assistants They will be helping me today. I have permission from your parents for you to take part in the research study and it is important that I get your permission as well. We are going to read and complete a letter which explains how today is going to work. Here you can show if you would like to help me today. We will be going through everything together now.

As you entered the class you all received a pencil with a booklet. Did everyone get a booklet and a pencil? Ok, I am now going to start reading with you on the first page of the white paper, which says assent procedure and letter on top (the researcher shows the assent procedure and letter page). Once we read a specific section there will be a picture with a question, here you can make a circle on the yes or no to show that you understand what I just read. Let's start, please write your name and age on the top of the letter. Ok, let's read the letter (the researcher reads the assent procedure and letter out loud and allows time for participants to circle the yes or no after each section). Ok, did everyone complete this letter now? The assistants and I will quickly go through this letter to see that you have completed each question. If you decided that you do not want to watch the videos and answer some questions today and you circled this choice on your letter you may go back to your class now (the researcher allows time for the participants who chose not to take part to leave).

Before the video is shown:

We are now ready to start. You are about to watch a 4 minute video of Grace, a person with a disability, who is unable to talk. Grace was born with this disability and she does not speak but uses other ways of communicating which you will see in the video. Please do not talk to each other while you are watching the video and remember to watch the video carefully as you are going to answer a few questions when you have finished watching it. (the researcher plays Video 1 (iPad™ with Proloquo2Go)

After the video is seen:

Ok, now we are going to answer the yellow paper questionnaire about the video that you have just seen. We are going to do two examples first so that you can see how you must

answer the questions. Remember that there is no right or wrong answers and that you will not be getting any marks from your teachers for your answer. I will read each question out loud and you must tick the answer that best shows how you feel. Please remember that you can only make one tick per questions and you must remember not to leave any questions out. Please page to the yellow page, page 1. Is everyone there? (the researcher shows the page) Let's start with the first example:

Bubblegum tastes great, now you tick the block you prefer which is either; I strongly agree, I agree, I can't decide, I disagree, I strongly disagree. Did everyone tick their answer in a block?

Ok, now let's do the second example,

School pupils enjoy detention, now you again tick the block you prefer which is either I strongly agree, I agree, I can't decide, I disagree, I strongly disagree. Does everyone see now how the questionnaire will be answered?

Ok, if everyone is ready we will now start with question 1 which is just below the examples we completed (the researcher reads question 1 to 7 and asks the participants to choose a block after each question, the researcher allows time for the participants to answer).

1	Grace took an active part in the conversation					
2	Our class works too quickly for Grace					
3	Kim understood everything Grace said					
4	Grace would find it difficult to make friends at my school					
5	If I couldn't speak I would like to communicate like this					
6	I would worry if Grace sat next to me in class					
7	I found it easy to understand what Grace meant					

The assistants and I will now check if you have answered all the questions on page 1. Ok, let's turn to page 2, we will continue now with question 8 (the researcher reads questions 8 to 17 and asks the participants to choose a block after each question, the researcher allows time for the participants to answer).

8	I think Grace has many friends					
9	I would be scared to talk to Grace					
10	I would like to talk to Grace					
11	There must be better ways for Grace to communicate					
12	I would tell my secrets to Grace					
13	I would be embarrassed to communicate like Grace does					
14	It was easy to understand what Grace was 'saying'					
15	It would be fun to talk to Grace					
16	Grace would be unwelcome at my birthday party					
17	Grace would get teased in our class					

We will now check if you have answered all the questions on page 2.

Ok, now let's page to page 3, we will now continue with question 18 (the researcher reads question 18 to 26 and asks the participants to choose a block after each question, the researcher allows time for the participants to answer).

We will again check page 3 to make sure that you have answered all the questions.

18	If Grace was in my class I would like to do a project with her					
19	Grace could not communicate quickly enough					
20	Grace would be popular with the boys					
21	I would try to stay away from Grace if she came to my school					
22	Grace was frustrated communicating like that					
23	Grace was unable to say what she really wanted to					
24	Grace could answer Kim's questions quickly enough					
25	Grace would need lots of help in the classroom					
26	I feel upset when I see how Grace has to 'talk'	116				

Please turn to the last page of the yellow questionnaire, this is page 4, we will now continue from question 27 (the researcher reads question 27 to 36 and asks the participants to choose a block after each question, the researcher allows time for the participants to answer).

27	Kim did not always understand what Grace wanted to say					
28	Grace would not be my best friend					
29	Grace had interesting things to say					
30	The way Grace communicated with Kim resulted in some misunderstanding					
31	I would like to go to 'The Spur' with Grace					
32	Grace most likely comes last in class					
33	Grace should be good with computers					
34	I do not think Grace has much fun					
35	Grace could say exactly what she wanted to					
36	Grace needs lots of help to tell a story					
37	I would like Grace to sit next to me in class					

We will now check if you have answered all the questions on the last page of the yellow pages. We are now finished with the first video's questionnaire. Please page to the next page, this is now page 1 of the green questionnaire. Ok, but before we continue, I would like you all to stand up quickly.

Exercise:

We are quickly going to play a little game; it is called the robot game. You have to listen to what I am saying, and not look at what I am doing. So, if I say Red is you must Stop, if I say yellow you must jump up and down and if I say green, you must jog on the spot. Are you ready? Let's start... (the researcher now starts with saying green and then red. The children will at first follow what the researcher does, but then the researcher will start mixing up the movements with the colours. The children will play this game for a few minutes). Thanks guys, you can now sit down again so that we can continue. Please settle down now and remember that you should not talk to each other.

Before the second video is shown:

We are now ready to start again, in front of you there should now be a green paper questionnaire. We will be answering this questionnaire once you have seen the second video. You are about to watch another 4 minute video of Grace, she will now be using a different way of communicating from what you have seen in the first video. Grace's friend is talking for her in this video. Remember to watch this video carefully as you are going to answer some more questions when you have finished watching it' (the researcher will now play video 2 (communication board))

After the second video is seen:

Ok, if everyone is ready we will now start with question 1 on the green paper (the researcher reads question 1 to 7 and asks the participants to choose a block after each question, the researcher allows time for the participants to answer).

1	Grace took an active part in the conversation					
2	Our class works too quickly for Grace					
3	Kim understood everything Grace said					
4	Grace would find it difficult to make friends at my school					
5	If I couldn't speak I would like to communicate like this					
6	I would worry if Grace sat next to me in class					
7	I found it easy to understand what Grace meant					

The assistants and I will now check if you have answered all the questions on page 1.

Ok, let's turn to page 2, we will continue now with question 8 (the researcher reads questions 8 to 17 and asks the participants to choose a block after each question, the

8	I think Grace has many friends					
9	I would be scared to talk to Grace					
10	I would like to talk to Grace					
11	There must be better ways for Grace to communicate					
12	I would tell my secrets to Grace					
13	I would be embarrassed to communicate like Grace does					
14	It was easy to understand what Grace was 'saying'					
15	It would be fun to talk to Grace					
16	Grace would be unwelcome at my birthday party					
17	Grace would get teased in our class					

researcher allows time for the participants to answer).

18	If Grace was in my class I would like to do a project with her					
----	--	--	--	--	--	--

19	Grace could not communicate quickly enough					
20	Grace would be popular with the boys					
21	I would try to stay away from Grace if she came to my school					
22	Grace was frustrated communicating like that					
23	Grace was unable to say what she really wanted to					
24	Grace could answer Kim's questions quickly enough					
25	Grace would need lots of help in the classroom					
26	I feel upset when I see how Grace has to 'talk'					

We will now check if you have answered all the questions on page 2.

Ok, now let's page to page 3, we will now continue with question 18 (the researcher reads question 18 to 26 and asks the participants to choose a block after each question, the researcher allows time for the participants to answer). We will again check page 3 to make sure that you have answered all the questions.

27	Kim did not always understand what Grace wanted to say					
----	--	--	--	--	--	--

28	Grace would not be my best friend					
29	Grace had interesting things to say					
30	The way Grace communicated with Kim resulted in some misunderstanding					
31	I would like to go to 'The Spur' with Grace					
32	Grace most likely comes last in class					
33	Grace should be good with computers					
34	I do not think Grace has much fun					
35	Grace could say exactly what she wanted to					
36	Grace needs lots of help to tell a story					
37	I would like Grace to sit next to me in class					

Please turn to the last page of the green questionnaire, this is page 4, we will now continue from question 27 (the researcher reads question 27 to 36 and asks the participants to choose a block after each question, the researcher allows time for the participants to answer).

We will now check if you have answered all the questions on the last page of the green pages. We are now finished with the second video's questionnaire the green one. Before you leave, I would just like to find out from you which video you preferred and why? (the researcher ask the children and listens to the responses, the assistant writes the childrens' thoughts down). Are there any other questions that you would like to ask me? (the researcher allows time for a few questions and to answer it). That's all the questions we have time for, thank you so much. We will now collect the booklets from you and give you a pencil to say thank you for your time (the researcher and assistants collect the questionnaires and hand out the pencils). Please would you push in your chairs and go back to your classes. Thank you. (The Researcher stops Audio Recorder)

Appendix K Conversational Script

Transcript for videotaped conversational extract

The following is the transcript of the conversation in the video:

Kim: Hi Grace.

Grace: Hi Kim.

Kim: Long time no see!

Grace: Yes.

Kim: How have you been?

Grace: Good thanks.

Kim: You look tired.

Grace: Yes, I am.

Kim: Why?

Grace: Was up late.

Kim: Watching TV?

Grace: Yip.

Kim: Lucky you, my mom wants me in bed by 8.

Grace: O, shame.

Kim: I know, but at least I get some sleep (Laughing)

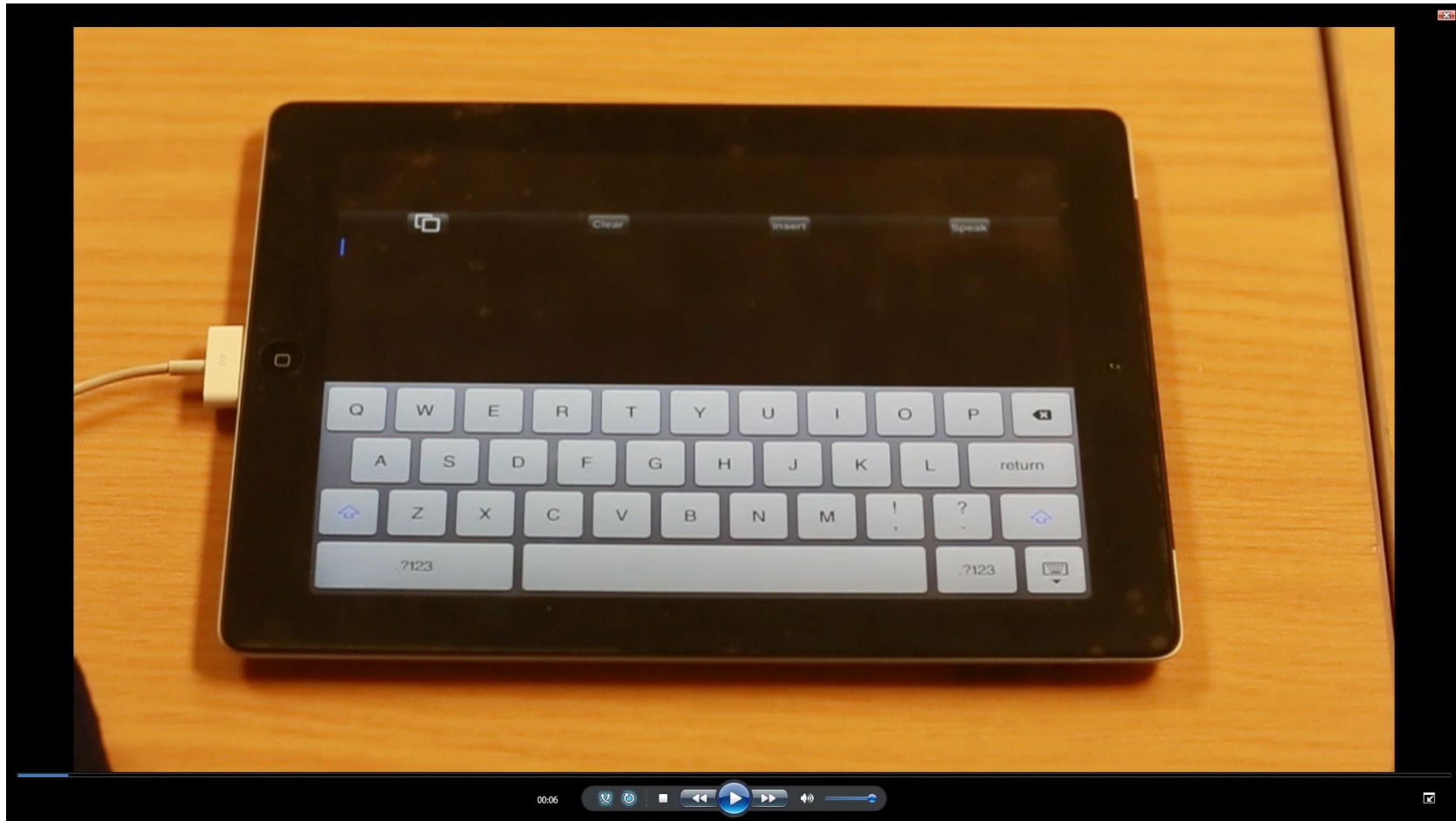
Grace: That's so true (Laugh). I have to go, nice chatting to you.

Kim: Ok, see you.

Grace: Bye.

Appendix L

iPad™ with Proloquo2Go Display



Appendix M

Communication Board Display



Appendix N

Procedural Checklist

No	Checklist	Group 1		Group 2	
		Agree	Disagree	Agree	Disagree
1	Good afternoon and welcome to this research study.				
2	My name is Tenille and these are my assistants				
3	They will be helping me today				
4	I have permission from your parents for you to take part in the research study and it is important that I get your permission as well.				
5	We are going to read and complete a letter which explains how today is going to work.				
6	Here you can show if you would like to help me today.				
7	We will be going through everything together now.				
8	As you entered the class you all received a pencil with a booklet.				
9	Did everyone get a booklet and a pencil?				
10	Ok, I am now going to start reading with you on the first page of the white paper, which says assent procedure and letter on top				
11	Once we read a specific section there will be a picture with a question, here you can make a circle on the yes or no to show that you understand what I just read.				
12	Let's start, please write your name and age on the top of the letter.				
13	Ok, let's read the letter				
14	After each section has been read, you have to circle the 'yes' or 'no' to show me that you understand what was read to you				
15	I am a Masters student at the University of Pretoria and today I would like to collect some information in order for me to complete my studies.				
16	What is the research topic?				

17	This researcher topic is: Children's attitudes toward interaction with an unfamiliar peer with LNFS: comparing high- and low-technology devices				
18	Why is it important for you to participate in this study?				
19	You can help children who have disabilities and who are unable to speak to find a good way of talking to others in school.				
20	What do you have to do when you participate in this study?				
21	Today I will show you two short videos of a child who communicates in different ways and does not speak.				
22	After watching the first video, I will read out the questions and you will answer by ticking in a column in your booklet.				
23	After that, you will watch a second video of the same child using another way of communicating and again I will read the questions and you will answer in your booklet.				
24	That will be all you have to do.				
25	There is no right or wrong answers, so you can choose the answer that feels right for you.				
26	Would you like to watch these videos today?				
27	Would you like to take part in this study today?				
28	Can I stop if I don't want to do it anymore?				
29	You can stop at any time; your participation in this study is voluntary and you can choose to take part in the study.				
30	You will not be in trouble if you decide that you do not want to take part anymore.				
31	If you would like to stop, you can put your hand up and just tell me that you want to stop.				
32	I will then allow you to go back to your class.				

33	Do you understand that you may stop when you want to without any consequences?				
34	Do you understand that you CAN choose to take part in this study?				
35	What will happen with my answers?				
36	I will not show your answers to anyone, the answers you choose in your booklet will only be seen by me				
37	I will then combine everybody's answers in this group together and I will write a report on it to help other people understand which way of communicating is the best way for children who cannot speak.				
38	I will come back to the school and discuss the combined answers so that you can see as a group what answers were given and what the results of my study was.				
39	Do you know that your answers will only be seen by me?				
40	Did somebody read the letter to you and explain to you what you will have to do today?				
41	Ok, did everyone complete this letter now?				
42	The assistants and I will quickly go through this letter to see that you have completed each question.				
43	If you decided that you do not want to watch the videos and answer some questions today and you circled this choice on your letter you may go back to your class now				
44	We are now ready to start.				
45	You are about to watch a 4 minute video of Grace, a person with a disability, who is unable to talk.				
46	Grace was born with this disability and she does not speak but uses other ways of communicating which you will see in the video.				
47	. Please do not talk to each other while you are watching the video and remember to watch the video carefully				

	as you are going to answer a few questions when you have finished watching it				
48	Ok, now we are going to answer the yellow paper questionnaire about the video that you have just seen.				
49	We are going to do two examples first so that you can see how you must answer the questions.				
50	Remember that there is no right or wrong answers and that you will not be getting any marks from your teachers for your answer.				
51	I will read each question out loud and you must tick the answer that best shows how you feel. Please remember that you can only make one tick per questions and you must remember not to leave any questions out.				
52	Please page to the yellow page, page 1. Is everyone there?				
53	Let's start with the first example:				
54	Bubblegum tastes great, now you tick the block you prefer which is either; I strongly agree, I agree, I can't decide, I disagree, I strongly disagree				
55	Did everyone tick their answer in a block?				
56	Ok, now let's do the second example,				
57	School pupils enjoy detention, now you again tick the block you prefer which is either I strongly agree, I agree, I can't decide, I disagree, I strongly disagree.				
58	Does everyone see now how the questionnaire will be answered?				
59	Ok, if everyone is ready we will now start with question 1 which is just below the examples we completed				
60	Grace took an active part in the conversation				
61	Our class works too quickly for Grace				
62	Kim understood everything Grace said				
63	Grace would find it difficult to make friends at my school				

64	If I couldn't speak I would like to communicate like this				
65	I would worry if Grace sat next to me in class				
66	I found it easy to understand what Grace meant				
67	The assistants and I will now check if you have answered all the questions on page 1.				
68	Ok, let's turn to page 2, we will continue now with question 8				
69	I think Grace has many friends				
70	I would be scared to talk to Grace				
71	I would like to talk to Grace				
72	There must be better ways for Grace to communicate				
73	I would tell my secrets to Grace				
74	I would be embarrassed to communicate like Grace does				
75	It was easy to understand what Grace was 'saying'				
76	It would be fun to talk to Grace				
77	Grace would be unwelcome at my birthday party				
78	Grace would get teased in our class				
79	We will now check if you have answered all the questions on page 2.				
80	Ok, now let's page to page 3, we will now continue with question 18				
81	If Grace was in my class I would like to do a project with her				
82	Grace could not communicate quickly enough				
83	Grace would be popular with the boys				
84	I would try to stay away from Grace if she came to my school				
85	Grace was frustrated communicating like that				
86	Grace was unable to say what she really wanted to				
87	Grace could answer Kim's questions quickly enough				
88	Grace would need lots of help in the classroom				
89	I feel upset when I see how Grace has				

	to 'talk'				
90	We will again check page 3 to make sure that you have answered all the questions.				
91	Please turn to the last page of the yellow questionnaire, this is page 4, we will now continue from question 27				
92	Kim did not always understand what Grace wanted to say				
93	Grace would not be my best friend				
94	Grace had interesting things to say				
95	The way Grace communicated with Kim resulted in some misunderstanding				
96	I would like to go to 'The Spur' with Grace				
97	Grace most likely comes last in class				
98	Grace should be good with computers				
99	I do not think Grace has much fun				
100	Grace could say exactly what she wanted to				
101	Grace needs lots of help to tell a story				
102	I would like Grace to sit next to me in class				
103	We will now check if you have answered all the questions on the last page of the yellow pages.				
104	We are now finished with the first video's questionnaire				
105	Please page to the next page, this is now page 1 of the green questionnaire.				
106	Ok, but before we continue, I would like you all to stand up quickly.				
107	We are quickly going to play a little game; it is called the robot game.				
108	You have to listen to what I am saying, and not look at what I am doing.				
109	So, if I say Red is you must Stop, if I say yellow you must jump up and down and if I say green, you must jog on the spot.				
110	Are you ready?				
111	Let's start...				
112	Thanks guys, you can now sit down again so that we can continue.				
113	Please settle down now and remember that you should not talk to each other.				

114	We are now ready to start again, in front of you there should now be a green paper questionnaire.				
115	We will be answering this questionnaire once you have seen the second video.				
116	You are about to watch another 4 minute video of Grace, she will now be using a different way of communicating from what you have seen in the first video.				
117	Grace's friend is talking for her in this video.				
118	Remember to watch this video carefully as you are going to answer some more questions when you have finished watching it'				
119	Ok, if everyone is ready we will now start with question 1 on the green paper				
120	Grace took an active part in the conversation				
121	Our class works too quickly for Grace				
122	Kim understood everything Grace said				
123	Grace would find it difficult to make friends at my school				
124	If I couldn't speak I would like to communicate like this				
125	I would worry if Grace sat next to me in class				
126	I found it easy to understand what Grace meant				
127	The assistants and I will now check if you have answered all the questions on page 1.				
128	Ok, let's turn to page 2, we will continue now with question 8				
129	I think Grace has many friends				
130	I would be scared to talk to Grace				
131	I would like to talk to Grace				
132	There must be better ways for Grace to communicate				
133	I would tell my secrets to Grace				
134	I would be embarrassed to				

	communicate like Grace does				
135	It was easy to understand what Grace was 'saying'				
136	It would be fun to talk to Grace				
137	Grace would be unwelcome at my birthday party				
138	Grace would get teased in our class				
139	We will now check if you have answered all the questions on page 2.				
140	Ok, now let's page to page 3, we will now continue with question 18				
141	If Grace was in my class I would like to do a project with her				
142	Grace could not communicate quickly enough				
143	Grace would be popular with the boys				
144	I would try to stay away from Grace if she came to my school				
145	Grace was frustrated communicating like that				
146	Grace was unable to say what she really wanted to				
147	Grace could answer Kim's questions quickly enough				
148	Grace would need lots of help in the classroom				
149	I feel upset when I see how Grace has to 'talk'				
150	We will again check page 3 to make sure that you have answered all the questions.				
151	Please turn to the last page of the green questionnaire, this is page 4, we will now continue from question 27				
152	Kim did not always understand what Grace wanted to say				
153	Grace would not be my best friend				
154	Grace had interesting things to say				
155	The way Grace communicated with Kim resulted in some misunderstanding				
156	I would like to go to 'The Spur' with Grace				
157	Grace most likely comes last in class				
158	Grace should be good with computers				
159	I do not think Grace has much fun				

160	Grace could say exactly what she wanted to				
161	Grace needs lots of help to tell a story				
162	I would like Grace to sit next to me in class				
163	We will now check if you have answered all the questions on the last page of the green pages.				
164	We are now finished with the second video's questionnaire the green one.				
165	Before you leave, I would just like to find out from you which video you preferred and why?				
166	Are there any other questions that you would like to ask me?				
167	That's all the questions we have time for, thank you so much.				
168	We will now collect the booklets from you and give you a pencil to say thank you for your time				
169	Please would you push in your chairs and go back to your classes.				
170	Thank you				

Appendix O
 Communication Aid/Device
 Attitudinal Questionnaire (CADAQ) scoring

Communication Aid/Device Attitudinal Questionnaire
(CADAQ)

Please use a tick (✓) to indicate your answer

For Official Use

Participant Number

V1

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**Group
Video**

V7

V8

1
1

		I strongly agree	I agree	I can't decide	I disagree	I strongly disagree		
e.g	Bubblegum tastes great							
e.g	School pupils enjoy detention							
1	Grace took an active part in the conversation	5	4	3	2	1	A1	
2	Our class works too quickly for Grace	1	2	3	4	5	A2	
3	Kim understood everything Grace said	5	4	3	2	1	A3	
4	Grace would find it difficult to make friends at my school	1	2	3	4	5	A4	
5	If I couldn't speak I would like to communicate like this	5	4	3	2	1	A5	
6	I would worry if Grace sat next to me in class	1	2	3	4	5	A6	
7	I found it easy to understand what Grace meant	5	4	3	2	1	A7	

		I strongly agree	I agree	I can't decide	I disagree	I strongly disagree		
8	I think Grace has many friends	5	4	3	2	1	A8	
9	I would be scared to talk to Grace	1	2	3	4	5	A9	
10	I would like to talk to Grace	5	4	3	2	1	A10	
11	There must be better ways for Grace to communicate	1	2	3	4	5	A11	
12	I would tell my secrets to Grace	5	4	3	2	1	A12	
13	I would be embarrassed to communicate like Grace does	1	2	3	4	5	A13	
14	It was easy to understand what Grace was 'saying'	5	4	3	2	1	A14	
15	It would be fun to talk to Grace	5	4	3	2	1	A15	
16	Grace would be unwelcome at my birthday party	1	2	3	4	5	A16	
17	Grace would get teased in our class	1	2	3	4	5	A17	

		I strongly agree	I agree	I can't decide	I disagree	I strongly disagree		
18	If Grace was in my class I would like to do a project with her	5	4	3	2	1	A18	
19	Grace could not communicate quickly enough	1	2	3	4	5	A19	
20	Grace would be popular with the boys	5	4	3	2	1	A20	
21	I would try to stay away from Grace if she came to my school	1	2	3	4	5	A21	
22	Grace was frustrated communicating like that	1	2	3	4	5	A22	
23	Grace was unable to say what she really wanted to	1	2	3	4	5	A23	
24	Grace could answer Kim's questions quickly enough	5	4	3	2	1	A24	
25	Grace would need lots of help in the classroom	1	2	3	4	5	A25	
26	I feel upset when I see how Grace has to 'talk'	1	2	3	4	5	A26	
27	Kim did not always understand what Grace wanted to say	1	2	3	4	5	A27	

		I strongly agree	I agree	I can't decide	I disagree	I strongly disagree		
28	Grace would not be my best friend	1	2	3	4	5	A28	
29	Grace had interesting things to say	5	4	3	2	1	A29	
30	The way Grace communicated with Kim resulted in some misunderstanding	1	2	3	4	5	A30	
31	I would like to go to 'The Spur' with Grace	5	4	3	2	1	A31	
32	Grace most likely comes last in class	1	2	3	4	5	A32	
33	Grace should be good with computers	5	4	3	2	1	A33	
34	I do not think Grace has much fun	1	2	3	4	5	A34	
35	Grace could say exactly what she wanted to	5	4	3	2	1	A35	
36	Grace needs lots of help to tell a story	1	2	3	4	5	A36	
37	I would like Grace to sit next to me in class	5	4	3	2	1	A37	